Academic Program Review University of New Mexico

Department of Mathematics and Statistics Self-Study

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Executive Summary

Department Overview: The Department of Mathematics and Statistics at the University of New Mexico fulfills the mission of teaching service courses in the two disciplines that go beyond the department's own programs in remarkable fashion despite the limited amount of human resources, financial resources and facilities. Currently we have 29.3 tenured or tenure track faculty: 22.5 in Pure and Applied Mathematics, 5.3 in Statistics, 1.5 in Mathematics Education. In addition, the Department has 7 Lecturers. Of these numbers, one faculty has been working for several years full time in the UNM Office of Research and 2 are on leave without pay (LWOP). These numbers reflect a net loss of total faculty and an even greater loss of tenured stream faculty compared to what we had in our last review (1995) when a growth in tenure stream faculty was recommended. As one of the largest departments in the College of Arts and Sciences, we currently generate over 45,000 student credit hours per year at the undergraduate and graduate level and rely heavily on a devoted and professional Part-time Instructor pool as well as highly trained graduate teaching assistants.

Despite challenges in funding, staffing, and faculty turnover, the department prides itself on maintaining its high integrity as one of the flagship departments at UNM. Long known for our service to students, the department continues to provide unstintingly to the University. Our faculty continues to receive grant funding, including; for example, active grants between 7/1/06 and 6/30/07 totaled $6.2. Beginning this summer, we will have a program funded by the NSF at 750K dollars entitled: "EMSW21-MCTP Attracting, Motivating and Preparing Mathematics students in the Southwest by building an energetic community" which amongst other things will help in attracting students to our graduate programs. We continue to thrive in interdisciplinary collaborations; examples include Statistics and Mathematics faculty collaborations with the federal Laboratories in the state, collaborations with the School of Engineering and the Health Sciences Center and no less important, collaborations (with funding) with scientists from other Institutions (UT Austin, Purdue, UC San Francisco). Faculty serve on critical committees representing the department with dedicated service; included committees are the provost search committee, Title V steering committee, the building committee, undergraduate curriculum committee, assessment and outreach committees, and many more. Our staff serve on several committees on a regular basis and are often the first sought to serve. Some of those committees include the Banner evaluations committees, faculty hiring committee, purchasing committee within the college, building committee, advisor training committee, advisement committees, represent the College of Arts and Sciences as IT agent, Arts and Sciences staff development committee, and much more.

The department is always responsive to calls for assistance from the University and the College of Arts and Sciences. There have been partnerships formed across the UNM community, the Albuquerque community, and Central New Mexico Community College to support students and programs at UNM. Recently, the department was called upon to develop a math course for the new BA/MD program and to provide faculty for that class. We now have a section of Calculus for the Life Sciences which could open the gates for an increase of Math majors with emphasis in the Life Sciences. To our benefit, the department shares a faculty member with Biology. Our graduation rates and retention at the graduate level are far above average. The number of majors in our department is astounding considering that this is after all, Mathematics and Statistics. Their graduation rates continue to rise under our excellent advisement program. Our reputation for collaboration is far above par and the department and its service to UNM is often pointed to as an excellent example of the collaborative spirit.

The programs in our department continue to depend on a hit and miss opportunity mode in terms of our Applicant pool. We try to "sell" our program as best as we can, including personal contacts. The challenges are, fro the Undergraduate program, to identify through our service courses students with talent and who have appreciation for our disciplines and who have not committed to another degree. This ideally should start with our Calculus courses; the fact that we do not have research faculty teaching such courses is a clear handicap. In terms of our Graduate programs, it all starts with the compensation packages (TAs) we offer, which are not competitive. This does not mean we can't provide success stories; the honors program grows steadily each year, helping undergraduate students learn the value of working on research with dedicated faculty. Two faculty members has a small (REU) grant added to a regular NSF grant to pay undergraduate students for their research.

Where does the department want to be in five years? Since the last Academic Program Review (APR), we experienced many changes in the upper Administration which hindered any possible long term plan. For the first time in many years it appears there will be some stability, in particular with a new (since 08/07) Dean and University President and next year a new Provost. This could make a big difference in addressing this question. If there is going to be serious commitment to our Programs and if there was a department wish list, it would include the ability to provide the number of faculty needed to support growing undergraduate and graduate programs. It would include the ability to hire additional staff to handle the ever growing list of administrative duties the department must do each year. This wish list would include the ability to attract and retain our best faculty and staff and provide competitive stipends to our top student applicants. The wish list would be for a university-wide system that works well and is beneficial for finance, student services, and human resources. With the upcoming new Sciences and Mathematics Learning Center; a building to be in place by 2011, we have a unique opportunity to strengthen our programs. As we embark into fundraising and creating endowments (and we are ahead of the curve as UNM has already raised 250K dollars in support of a visualization room) a parallel effort needs to be in place based on the APR recommendations so altogether we have programs in Pure and Applied Mathematics, Mathematics Education and Statistics we can all be proud of.

Concerns: To provide some perspective, we teach and administer about 15% of the total course load for a University of 28+ thousand students. To do so, we rely on a large number of Part time Instructors (PTI), Teaching Assistants (TAs) and a small core of Lecturers, and tenured stream Faculty. The demands and public pressure to demonstrate evidence of success in the classroom in the Algebra, pre-Calculus and Calculus courses taken by majors in Science, Business, pre-Med, Pharmacy, Health Sciences, and Engineering are all important and are taken seriously by our Department. In particular, the past few years we (UNM and the Department) have hosted annual summit meetings with High School Mathematics teachers to find ways to improve success in the classroom. An unintended consequence of the visibility of this issue is that historically there has been a lack of attention to our own degree programs. In recent years, the number of research faculty declined and we suffered a serious problem with retention of our outstanding faculty.

In the past 5 years, 8 faculty left and accepted offers from Institutions such as Georgia Tech, Minnesota State, Colorado State, Rice, UT Dallas, Southern Methodist University, and Ohio State. Two more have accepted outside offers and will leave in Fall 08. While we have been successful in hiring a few excellent faculty during the same period, we cannot stay even. Our new faculty view these losses with great concern in terms of the stability of the department and the overall morale among the faculty is quite low. The Statistics group has suffered the most

and they are at a point where their programs are in jeopardy since they cannot teach required courses or mentor the number of students currently enrolled in M.S. and Ph.D. programs.

Nationwide, many institutions are responding to the need to increase the number of scientists in STEM disciplines and to improve the quality and number of Mathematics teachers to supply the ever increasing demand for these professionals. Its importance is well stated in the "America Competes Act" (2007) signed by Congress and the President and this Act should be viewed as a mandate to boost Math and Science at all levels. Today, we see no evidence of UNM responding to this in a significant manner. This self-study will show efforts by our outstanding faculty; for the most part all coming from within the department, rather that from a consolidated effort lead by the administration to meet the needs of STEM professionals. Any successful initiative in our department, for the most part, has to be self-sustained. Just to give an example, our department was recently awarded a National Science Foundation Grant (3-years, $750,000) under the Enhancing the Mathematical Sciences Workforce in the 21st Century-Mentoring through Critical Transition Points (EMSW21-MCTP) program. The grant is for a proposal to transition from undergraduate to graduate education in mathematics. As those who apply for National Science Foundation (NSF) grants we know how competitive this program is and what it does to enhance visibility to our program. That we were awarded this grant validates the quality of our faculty. That we got it despite the fact that at the time we could not get institutional support (eg: a letter from the then Interim Dean or the Provost) is extraordinary. Those of us that participate in NSF panels know the positive (negative) impact institutional (lack thereof) support has in the decision making. The lack of institutional support is a great concern to our department.

On the research front, in the past two years we have generated the largest amount of research dollars ever seen in the department—this year alone the department received $6.2 million in grants. Given the obstacles presented by a dysfunctional Office of Research Administration, these successes produced a heavy burden in our outstanding staff. The department remains concerned that our staff will eventually burn out and leave us for other positions.

Our department has majors and minors in both Mathematics and Statistics, at the graduate and undergraduate level. At this point in time, there are 225 majors at the undergraduate level as identified in the majors lists supplied from the Registrar's Office (some of these students consider themselves majors, however until they become part of the College of Arts and Sciences we do not officially count them as our official majors). There are 122 graduate students in Pure Mathematics, Applied Mathematics, and in Statistics. As a major department at UNM, we are very concerned about our ability to fully meet the educational needs of our undergraduate and graduate majors with the 13 to 1 ratio of students to FTE. This is becoming particularly problematic as we lose senior faculty and continue to recruit and admit graduate students to the Ph.D. programs. Although we offer a master's examination for the M.S., we need more senior faculty to chair dissertation committees as our Ph.D. enrollment continues to remain steady. The only alternative the department has as a response to these low faculty positions, is to limit the number of Ph.D. students we admit each year. This move will not benefit our department nor will it benefit UNM as a whole.

Mathematics concentrations and Statistics offers a large (N=122) competitive graduate program with three distinct tracts. We offer funding for 43 .50 FTE graduate students in the form of Teaching Assistantships and through creative use of funding we are able to offer 13 .25 FTE Graduate Assistantships. In this manner we are able to offer funding to more students; however it is difficult for students to subsist on the .25 FTE alone. This lack of funding even with our

creative answers for the shortfalls causes concern regarding our ability to recruit top minority students for graduate study and to move students through our program quickly.

Rather than closing this section on a pessimistic tone, there are two things that give reason for hope the review team recommendations may be implemented: (1)The emergence of a stable Administration. We have a College Dean and a President who came on board in Fall of 2007. A permanent Provost should be in place by Fall 2008. (2) The eventual construction of the Science and Mathematics Learning Center. This building will house Mathematics and if completed according to the current program, will improve facilities and add technology in classrooms that altogether could attract faculty to our department.

In conducting this self-study, the department recognizes that this is a unique time in our history to either take the first steps in the right direction, or run the risk that a highly productive university department reaches a point of endangered programs. This is an overarching concern of the Department of Mathematics and Statistics as we enter into the final years of this decade.

Questions for the Review Team

1. How do we enhance our undergraduate and graduate programs?

The many tasks of delivering and overseeing service classes, while important to the institution, come at the expense of activities that could enhance our programs. This is especially true of diminishing faculty and resources. Neglected program activities include lack of delivery of courses by research faculty, lack of a sustained effort to recruit talented students that the department knows are here at UNM and are thinking of other degrees since as a department we cannot reach out and provide meaningful scholarships or fellowships. We know what would enrich our programs; we want recommendations on where to center our efforts and what resources need to be in place. Perhaps additional resources can be put immediately in place if the department gains sole ownership of all mentoring and student support programs on campus that in general deal in a major way with mathematics courses. Are existing resources well spent?

The small number of research faculty puts a limit on the number of students we can mentor at a satisfactory level. Should we make our programs smaller and be more selective with the admission of our students? What issues such as increased support for TA's would we need to pay attention to? Another point is that we would like to see recommendations come forward addressing whether we should tailor our Ph.D. degree programs, in particular the Pure Mathematics track toward excellence in teaching. This would be in response to where most if not all of our recent Ph.D.s look for jobs after completing the degree. How do we evaluate tailoring our Ph.D. programs?

2. How can we grow in Mathematics Education without doing it at the expense of the other sub-disciplines?

Today, we have 1.5 faculty in Math. Ed. and a few other faculty who are becoming more involved. To reach a level of excellence, there is a need for even modest growth from where we are now. What would be reasonable numbers of undergraduate and graduate majors we can and should aim at and how can efforts be sustained?

3. Should we consider splitting into two departments one of Mathematics and one of Statistics?

A former Dean and Provost put this suggestion in the table, in line with a new building that will house the Mathematics component of the department. This recommendation came without any reference to resources and budgets. If this is going to take place, what would be reasonable sizes for each department and reasonable budgets?

4. What should we do to increase our research productivity, in a way that benefits students, the University, and the academic community?

Securing federal funding is getting harder, and there is not much institutional support to do pre- and post- award processing. Faculty and staff at times see that extra hurdles are in place in an already competitive environment. Should we stay on the traditional single PI proposal format? Does the Review Team see strengths and opportunities we should pay attention to? Is the review team aware of models we could adopt from other outside receivers?

5. How should we develop a long-term hiring plan aligned with a strategy for faculty retention?

The department have had high turnover of faculty in recent years. In reality we do not have a hiring plan. Instead we seek opportunities to do additional hires from a particular pool. Losing junior faculty prevents the department from expanding into new exciting directions. Losing mid-senior and senior faculty limits the ability to effectively run our graduate programs. So both hiring and retention go hand in hand. We want recommendations on putting these two factors into a coherent long term plan with clear indications of what resources are needed. Is there any way to create such a plan?

Department of Mathematics and Statistics Self-study
This report reviews and analyzes the history and current status of both graduate and undergraduate programs in Mathematics and Statistics at the University of New Mexico. Based on these analyses we discuss current issues and future directions. The report follows the Self-study Guidelines for Academic Program Reviews distributed in November 2007 by the Office of the Provost and Office of Graduate Studies. This is a fairly lengthy history of our department, but we are pleased with the opportunity to have this in an historical document.

1. General Program Characteristics

History.
Mathematics offerings in the early years of the University of New Mexico (circa 1893) began with a "thorough drill in Arithmetic the first year . . . followed by two years in Algebra and one in Geometry. . . Our motto will not be 'Quantity', but 'Quality'. Not 'How Much', but 'How Well' and we will give much more than a mechanical drill" (Griegos, 1989). Over the past 114 years, the Department of Mathematics and Statistics has held firm to the intent of "how well" we can teach math to UNM students.

Only one UNM president was a professor of higher mathematics, and that was Clarence L. Herrick, M.S. in 1897-98. A significant event occurred in 1898 when the Department of Mathematics became a separate department with Edwin P. Childs, B.S. and Josephine S. Parsons as the only faculty of the department. That same year the department offered the first courses beyond algebra and geometry—calculus and the theory of equations.

By 1915, the department was offering substantial courses in a number of areas in mathematics. The first two students graduated with BA degrees in Mathematics that same year. Struggling to re-establish itself after the end of World War I, Charles Anthony Barnhart became the chair of the Department of Mathematics. Barnhart hired Carroll V. Newsom in 1928 as an assistant professor. Newsom served as a major figure in introducing UNM's mathematics department to the national mathematics community and eventually became the chair of the Department of Mathematics in the 1930's. When Newsom left UNM in 1944, the Department became the Department of Mathematics and Astronomy under Lincoln LaPaz.

Following World War II, the pace and level of activity of the university accelerated. In 1952, the Department of Mathematics instituted a program of credit courses at graduate levels to serve the needs of employees of the Los Alamos Scientific Laboratory. Although UNM had intended to offer advanced degrees in chemistry, engineering and physics, there were four applicants seeking master's degrees in mathematics. During this period of time 20% of students taking mathematics courses were taking those courses in the evening and 50% of the upper division and graduate classes were taken in the evening.

The total number of student credit hours taught in 1951-52 was 5062 with a jump of 57.3% the following year to 7964 student credit hours. Even in 1953-54, the department annual report stated, "As a result of these disproportionate changes, the department is greatly overloaded" (Griegos, 1989). By 1956-57 the credit hour production was up to 14,056. The department continuously struggles with a low faculty to student ratio even today.

The doctoral program in mathematics began in the 1956-57 academic year. The demand for doctoral mathematicians was based on the "voracious appetite" that large-scale computers have for such people and the growing number of computers was growing rapidly. Researchers made

the estimation that "only one Ph.D. per computer (and most of them now occupy several) there is a new demand for 10,000 Ph.D.s in the next ten years'" (Griegos, 1989). The graduate program at UNM continued steady growth from 67 in 1958-59 to 76 in 1959-60.

The statistics program began its development in 1959-60 when two statistician/probabilists were added to the faculty of the department. The Department of Mathematics and Astronomy was renamed in 1963-64 becoming the Department of Mathematics and Statistics.

The 1964-65 academic year saw the UNM Administration formally recognize that research must be supported by the university and therefore, teaching loads for faculty engaged in research was reduced to the standard two courses per semester. This led to the addition of NSF grants to the department which supported faculty members and graduate students with outside funding for a number of years. The NSF awarded a Departmental Development Grant (a Center of Excellence Grant) to the department in 1967. This $560,000 three-year grant was the first grant made to a mathematics department nationally. An additional $50,000 grant from the NSF provided funds for a mathematics computation lab which connected students to the university's IBM 360 computer to perform numerical methods related to topics covered in their classes.

Over the next two decades the department saw growth and decline as new faculty were hired and faculty left. One trend that had an adverse affect on the department during these years was the revision in how remedial mathematics was to be handled at the university level. Up until the point that this decision became practice at UNM, students who were unprepared take Math 121 had to take a remedial course through Continuing Education that did not count for credit at their own expense. In 1970, the department instituted Math 120 for students at the behest of the university. UNM shortly thereafter turned to a policy of open admissions and the number of Math students increased from an initial 200 in 1970 to 1200 in 1977 (that number is approximately 2600 per year as of spring 2008).

Student credit hours in 1976-77 were 34,174 with the majority of those hours being at the lower levels. At this time the department began to employ part-time instructors in ever increasing numbers to handle the number of students. At the same time, graduate applications were dwindling. In 1977-78, the department established three degrees at the graduate level—applied mathematics, pure mathematics, and statistics. By 1980-81, the student credit hours had increased to 47,557 and the graduate program began a steady growth.

In his centennial history of the Department of Mathematics and Statistics, former chair and professor, Richard Griegos mentioned that faculty salaries became a real problem in 1985, with the losses of a number of faulty from the department. During this time, the department had only 25 Teaching Assistants. He considered this, "much too low for a department this size for the teaching loads assigned to the department" (Griegos, 1989).

During the 1990s and into the 21st Century the department experienced ups and downs in growth, both in student enrollment in majors and graduate programs and with faculty hires and departures. One thing that remains steady is the amount of outside research funding the department continues to generate. The first outside funding for the department began in 1941 when Newsom received a grant of $10 for "Research in the Calculus Variations" and again in 1943 when he was awarded $30 to research the behavior of certain functions when a variable becomes large. In the last two fiscal years 2005-2007, the department received funding resources of $4.2 and $6.2 million, quite a dramatic increase from Newsom's earlier outside funding for research.

The department opened the Statistics Clinic during the 1997-98 academic year. The Statistics Clinic has a mission to improve the quality of research at UNM, as well as to enrich the education and training of statisticians through their involvement in statistical consulting. In the first semester of operation, there were 172 appointments with clients, there were several collaborations on grant proposals, and $1,700 was billed for contract services. Today the Statistics Clinic still serves research at UNM.

During the academic year 1999-2000, the department worked with the Registrar's Office to implement prerequisites (including ACT/SAT threshold scores) for all lower level mathematics and statistics courses. This move was done in an effort to increase retention and in 2006-2007 passing rates for our classes and was extremely successful. This also made the department's transition to the Banner system of prerequisite checking easier since we had been checking prerequisites for six years prior to Banner implementation.

2002-03 saw the implementation of the Algebra study tables in Dane Smith Hall, which allowed students access to faculty throughout the day for tutoring assistance. Two years later, the success of the Algebra Table inspired the addition of a Calculus Table on the third floor of Dane Smith Hall. These faculty members offer themselves as study resources for students and both tutoring tables remain well attended and appear to be helpful in student success. The department has made several attempts to find a way to record the number of students who visit the tables on a daily basis, but so far there is no consistent way to track these students. The department's information in this area is purely anecdotal. There has recently been a recommendation to request funding for portable scanners that can scan student ID cards, this will only work incidentally as many students do not always have their ID cards with them. The tutors would not refuse service simply because a student did not have an ID with them.

The department has consistently had strong chairs over the past 109 years. The problems appear to remain consistent over all these years: providing enough faculty for the demands on the department. Each year we lose outstanding faculty to other universities, and in turn must hire junior faculty so in essence our department is always rebuilding itself. Funding for faculty to compete with other universities, additional faculty to decrease our student to faculty ratio, and incentives for faculty would be meaningful in maintaining our department and building a strong and vital program that is stable and dedicated to student service and research.

Early Mission

In 1986, the department defined its mission statement as: "The department has the historical responsibility of providing the mathematical tools needed by students of the sciences, engineering, and the social sciences in order that they can practice and further develop their craft. In addition, for its own majors and graduate students the department must ensure that its course of studies is current, reflecting the continual growth of the subject sometimes called the "Queen and Servant of Science."

As specified in the Self-study Guidelines, our goals are related to the broad strategic directions identified in the Strategic Plan developed under President Bill Gordon and Provost Brian Foster and adopted by the Regents in December, 2001 (the brief label of the relevant strategic direction is indicated after each goal an explanation of the labels follows).

The four strategic directions in the university's Strategic Plan are:

- *Vital Academic Climate:* Foster a vital climate of academic excellence that actively engages all elements of our community in an exciting intellectual, social, and cultural life.

- *Public Responsibility:* Apply the University's education, research, and service capabilities to advancing the interests and aspirations of New Mexico and its people.
- *Diversity:* Value and benefit from the creativity, innovation, insight, and excitement generated by the many dimensions of diversity that are the essence of the University and the State.
- *Areas of Marked Distinction*: Provide an environment that cultivates and supports activities of national and global distinction and impact.

Substantial progress was made university wide on specific tactics targeting objectives relevant to these broad strategic directions under Provost Foster up through Spring 2005 (see The University of New Mexico Interim Report on the Strategic Plan, 2005). Since there is no formal adoption of this newer Strategic Plan, UNM still operates under the 2001 plan. The Department of Mathematics and Statistics continues to make strides in living up to the goals set in the 2001 plan.

Department of Mathematics and Statistics Statement of Mission 1989

The Department of Mathematics and Statistics shares with other academic departments at the university its *raison d'être*: the discovery and dissemination of knowledge. It shares with other science departments a commitment to empirical research.

The UNM Department of Mathematics and Statistics embraces a number of goals which serve to give the program a distinctive flavor. These are reflected in the mission of the department, reevaluated in 1989, and in compliance with the goals of the UNM Strategic Plan, which is to:

Conduct research and train graduate students to carry out research. This goal generates a steady stream of new knowledge that becomes the foundation of future progress. *(Vital Academic Climate)*

Promote a scientific approach to mathematics and statistics, emphasizing both experimental and theoretical methodologies as historic traditions for all undergraduate mathematics and statistics majors. *(Vital Academic Climate)*

Encourage respect for and openness to a variety of theoretical, philosophical, and empirical approaches, with the view that the study of mathematics and statistics is enriched by the interaction of multiple perspectives. *(Diversity)*

Value active research programs within the Department and in collaboration with colleagues outside the Department celebrating the considerable cross-disciplinary activity in our research programs. Continue to work closely with researchers from other UNM departments as well as outside institutions and labs. *(Vital Academic Climate)*

Maintain excellence in mathematical and statistical research and foster the growth of research and development of ideas in the areas of mathematics and statistics. *(Areas of Marked Distinction)*

Encourage and support effective teaching both in communicating mathematics and statistics to undergraduates as an area of major study and a critical part of a liberal arts education, and in training graduate students at a professional level. *(Vital Academic Climate)*

Train graduate and undergraduate students in the application of general mathematics and statistics in academic and other professional settings to create a technical work force of the future and particularly in New Mexico. *(Public Responsibility)*

Emphasize the critical role of mathematics teachers in public schools of New Mexico and the role we play in training those students. *(Public Responsibility)*

Ensure that graduate students in all areas are well trained in methodology and ethics appropriate for their effective functioning as researchers and professionals. *(Vital Academic Climate)*

Enable students to understand the development and operation of mathematics and statistics in the context of diversity within the larger scientific community and culture, and its application in the research culture of the Southwest in particular. *(Diversity)*

Make Mathematics and Statistics a gateway to a student's future and not a barrier to success. *(Public Responsibility)*

Maintain a statewide mathematics contest sponsored by PNM for high school students and cooperative programs in the public school system to nurture school mathematics education. *(Public Responsibility)*

It is essential that we evaluate, in an ongoing fashion, our performance as a department with respect to our mission. We should revise this Statement of Mission to accommodate to changing situations in the future.

Overview of Faculty, Staff, and Students

Faculty

Tenure Track—Currently the Department of Mathematics and Statistics has 29.3 tenure track faculty with two faculty members on leave without pay. Each year we have an average of two faculty members on sabbatical. (See Appendix A for a list of faculty and their brief CV's). Table 1 on the following page offers demographics regarding faculty, including books and articles, research funds brought in to UNM, and our staff and department budget from 1995-96 to 2005-2006.

Over the last four years, there was more turnover in faculty than at any time in the department's history. Of the 35 voting faculty present for our last program review in 1995, only 14 remain as active faculty. Eighteen faculty retired, one faculty died during active tenure, and two left for senior faculty positions at prestigious universities. Turnover has been even greater than these numbers indicate as another 6 junior faculty members were hired and left the university during this interval. Thus, more than half of the faculty present for this review was not part of the last program review. As the department mentioned earlier, we are currently not even able to keep up with the loss of faculty as we only hire one for every two we lose.

Of the 26.3 tenure track faculty currently occupied with departmental activities, 14.3 are professors, 6.5 are associate professors, and 5.5 are assistant professors. Although it is increasingly difficult to categorize the faculty along conventional lines, there are approximately 10 faculty in Applied Mathematics, 10 in Pure Mathematics, and 5.3 in Statistics, one sharing a dual appointment with Biology (.50), and one shared with the College of Education (.50) to assist with our Education program.

Non-tenure track faculty—In addition to the tenure track faculty, the department now includes 7 full-time lecturer positions. Their CV's are available in Appendix A (See Appendix A). This faculty is responsible for the entire non-majors curriculum, part of our undergraduate major's core and occasional upper division courses. These faculty members are responsible for curriculum planning at this level as well as assessment, etc. Most of these lecturers also have significant participation in the service missions of the department. This represents a substantial change since our last review when we had only three lecturers in the department. It also creates an obligation for the department to provide better long-term career tracks for Lecturers. Toward this end, our department is hoping that the College of Arts and Sciences will implement new promotion and hiring policies for all Lecturers.

Postdoctoral Associates—Each year the department strives to bring in postdoctoral associates for research and to teach. This year the department is hosting three postdoctoral students who are conducting research and teaching for the department. Depending on the funding resources the department generally host from two to three postdoctoral students each year.

Staff

The core office staff consists of the following: Linda Livingston, Department Administrator, who supervises and oversees the operation and maintenance of the department Gail Mercer, Administrative Assistant III, who directs the financial management of the department Claudia Gans, Administrative Assistant III who assists in purchasing, book orders, conference coordination, assistant to the chair, and assists the Coordinator of Program Advisement with student holds and prerequisites; Dr. Donna George, Coordinator, Program Advisement, who advises at all levels for both graduate and undergraduate students, supervises catalog revisions, and assists in program reporting Sterling Coke, Unit IT Support Manager; Dann Brewer, Systems Analyst III; and Seth Pershan, Systems Analyst II.

Students

Graduate students—Currently the department has 122 graduate students, 65 of whom are Ph.D. students and 57 are Master's students. The graduate students can be roughly divided into three concentrations, 46 in Applied Mathematics, 30 in Pure Mathematics, and 46 in Statistics.

Undergraduate students—The department has a large number of undergraduate majors, currently 225 with that number fluctuating between 170 and 225 at various times throughout the academic year. We have numerous minors, and we have a large non-majors program that supports University of New Mexico core requirements in mathematics serving thousands of non-majors each semester.

Leadership, governance, and organizational structure

The department uses a "shared governance" model of organization. It is our intent to involve all faculty from the most junior to the most senior, in discussing, formulating, and implementing departmental policies. Perhaps the most direct manifestations of this philosophy are our procedures for faculty hiring and for determining salary raises. In making decisions about hiring, the entire faculty votes, regardless of the area in which an applicant is to be hired.

Table 1. Department of Mathematics and Statistics* summary statistics from 1995 to 2006.

	AY 1995-96	AY 1996-97	AY 1997-98	AY 1998-99	AY 1999-00	AY 2000-01	AY 2001-02	AY 2002-03	AY 2003-04	AY 2004-05	AY 2005-06	AY 2006-07
Faculty Stats												
Professors	20	20	18	18	20	20	20	20	20	19	18	16
Assoc. Professors	12	12	11	11	6	4	6	6	4	6.5	8.5	7.5
Asst. Professors	3	3	4	4	7	8	6	6	6	6	3	3
Total of Tenure Track Faculty	**35**	**35**	**30**	**32**	**33**	**32**	**32**	**32**	**30**	**31.5**	**29.5**	**26.5**
Budgeted FTE Faculty (Lecturers)	3	3	3	3	3	8	6	6	8	8	8	8
Visiting Faculty	N/A	N/A	1	1	N/A	1	N/A	N/A	2	2	3	4
Books and Articles	N/A	N/A	68	65	N/A	76	78	85	53	62	66	68
Grants	N/A	N/A	$1.7M	$1.8M	$608,461	$2.55M	$2.6M	$2.53M	$4.37M	$3.97M	$4.2M	$6.2M
General Stats												
FTE Staff	4	4	4	4	7	7	7	7	7	7	7	7
Dept Budget	$2.76M	$2.54M	$2.66	$2.68M	$2.82M	$3.26M	$3.16M	$3.38M	$3.49M	$3.49M	3.58M	3.78M

*The numbers for academic year 2007-2008 are 15 Professors, 6.5 Associate Professors, and 5.5 Assistant Professors, total 27. Professor Bedrick is counted as one faculty member; however he is .33 in the department and has been for several years.

Previous program review

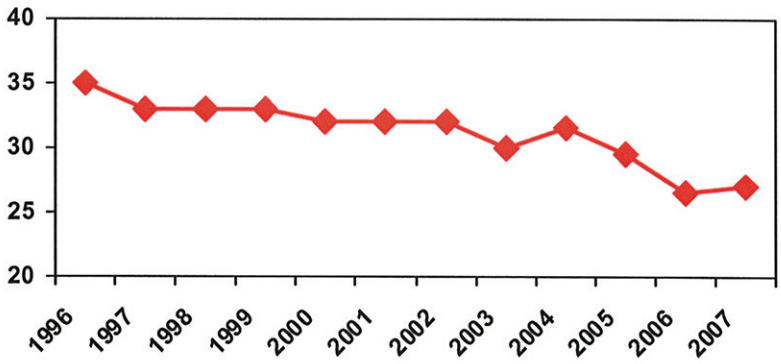
The purpose of this process of self-study is to examine and strategize ways to meet the requests the department makes at each review. In reading back through our departmental reports over the years from 1980 to present, we find the same requests: (1) more staff and money for existing staff, (2) more faculty and money for existing faculty, and (3) more space for the department. The changes that have occurred are accomplished internally by the department and changes that required resources from the university did not transpire. The department understands that there is no "magic" solution; however we do hope that recommendations that arise from this self-study will increase the opportunities for the department to meet its goals.

Our most recent external graduate review from November 1995, found major problems that 13 years later remain much the same. The report recommended that tenure track faculty numbers in this department reach 40 by the end of the century; that goal was not achieved. We continue

to suffer from "severe" staffing problems as our faculty leaves more quickly than we can rehire. Although our faculty remains collegial, they are stretched as far as they can. Our new hires remain excellent, although we are limited in the number of senior faculty available for hire. At the time of the report in 1995 there was an enormous pool of high-level applicants. As the report predicted that phenomenon did not persist into the future.

To emphasize the recommendations of the 1995 review and the reality of what happened with faculty in the department, the following chart reflects the tenured or tenure-track faculty numbers over the past 13 years. It is clear to see that the recommendations have yet to be met, in fact we now fall far below those recommendations.

Math Tenure Track Faculty 1996-2006



An area where the department has success, aside from tenure faculty staffing issues, the report recommended turning part-time teaching positions into instructorship positions. The department accomplished this goal in 2000 adding an additional 5 lectureship positions to the 3 on staff in 1995. Our current total of lecturers remains at 8 with one vacancy to be hired this year.

In their list of "Other Important Recommendations" several issues were addressed, including the Mathematics Education group. At that time there was concern about the inadequacy of classroom space for the faculty teaching the courses in mathematics teacher training. There was also concern about the understaffing of the Mathematics Education program. The recommendation was to appoint a tenure track faculty member in the mathematics education area. Dr. Kristen Umland now serves in that role and in 2006 the department added Dr. Richard Kitchen from the College of Education, to our faculty in mathematics education as a .50 faculty. This still leaves our program short staffed in this critical area. Dr. Umland was successful in receiving an extensive grant to assist in teaching teachers how to teach math in the public school classrooms—the La Meta Grant. Although this program is prestigious and brings a great deal of funding to the university, including two .25 FTE staff and a full-time Research Assistant, it is extremely time consuming. Dr. Umland is being stretched as far as she can at this point without another full-time faculty person in Mathematics Education. It should be noted that she is currently chairing one dissertation, and has students writing theses under her direction. The department feels that this is somewhat successful.

The report recommended two classrooms devoted to 200-500 level course teaching to incorporate computing and graphics in a natural fashion, including computers for the simultaneous use of the instructor and students. At the current time, we still do not have the

computing resources recommended in the study. There is a current building project for the Department of Mathematics and Statistics to move into a new building constructed as a Science and Mathematics learning center. At this time, the construction of this building is delayed and constantly being revised—there seems to be concern that the computing classroom areas are on the chopping block as funds are trimmed to fit the dwindling building budget. Therefore, we are unconvinced that this recommendation from 13 years ago will be met. Considering the giant strides in computer usage, this seems to the department to be a backward step.

In addressing the TA stipends in the department, the recommendation was for stipend support to be increased to compete effectively with comparable institutions in recruiting students. The recommendation included the suggestion that students know that TA positions are typically multi-year, subject to continued satisfactory progress in academic efforts. This recommendation has been implemented and that information is communicated in the very first letter they receive from the department. In 1995, the beginning stipend for an incoming TA was $9,200 for a ten month contract or $920 per month. At that time students did not receive health insurance. Today an incoming TA will receive a stipend of $15,720 or $1,572 per month for ten months and the contract now includes student health insurance. We have always offered 12 hours of tuition per semester for fall and spring. Although we are still not competitive with many peer institutions, we do offer one of the highest TA salaries on the main campus. This is fairly successful.

In 2003, Dr. Todd Kapitula, then Graduate Committee Chair, instituted a policy of awarding Teaching Assistantships for a set number of semesters to encourage our students to make satisfactory progress toward their degrees. This process resulted in a higher number of graduations at both the M.S. and the Ph.D. levels over the past few years. The largest effect of this move will be reflected spring and summer 2008. It should be noted, that Dr. Kapitula—exceptional senior faculty member—accepted a position at another university and is no longer a part of the faculty here at UNM.

Addressing the low salaries of the faculty and the noncompetitive salaries was another recommendation of the report. They strongly encouraged the elimination of salary inequities, which the department has made strides in so doing. We are now able to offer new hires the level and pay they merit and we are fairly competitive in the hiring of new faculty process. Unfortunately, this means often that many new faculty come in earning what took some of our current faculty years to earn. The alternative for these faculty members is to seek employment elsewhere to increase their salaries; we need to make our faculty salaries more competitive with our peer institutions. This has only been partly successful.

As mentioned earlier, the demand for mathematicians and statisticians has risen exponentially. However the number of experienced mathematicians and statisticians has decreased dramatically over the last decade. Senior faculty in the fields of mathematics and statistics all over the U.S. are retiring and universities are scouting senior mathematics and statistics faculty from other universities to fill these positions. Many of our recently departed faculty were recruited from other universities and enticed by high salaries and the opportunity to work at prestigious universities such as Rice, Georgia Tech, The University of Texas, Southern Methodist University, Ohio State University, and others. In an extremely competitive market, the University of New Mexico is not much of a competitor. Many of our own senior faculty members are retiring and we will be unable to replace them with senior faculty if we cannot compete with other universities.

The quality of the facilities and space for graduate students remained a problem in the eyes of the reviewers. They felt that the location of most of the natural departments for interdisciplinary research was relatively far away from the department. This situation should be resolved with the building of the new Mathematics and Sciences Building, tentatively scheduled for ground-breaking in late 2009. This building will be centrally located near Chemistry, Earth and Planetary Sciences, Biology, and the Engineering complexes. At this time, there is much concern about funding shortfalls for this building and the continued "shrinking" of the physical facilities with the reduced budget for the building. There is the possibility, that we will still have a space problem once the building is finally completed.

Our computing resources are greatly improved over the 1995 report, although we do not have funding for each TA to have an individual computer at their desk. We have 130 active computers. Of these computers, 25 are performing some system service or are in test mode, 5 are commonly accessible and used as computer servers, and the remaining 100 are desktop computers. The department considers this to be fairly successful.

We support offices in two locations, the Humanities Building and Hokona Hall. Each of these offices has at least one computer in them. We maintain a computing lab in which there are 11 of the 100 desktop computers. These 11 have specialized statistics and mathematics software packages installed on them. We provide wireless networking for individuals who prefer to bring in and work on their own laptops, and we support a growing number of laptops owned by the department, which are not included in the 100 count.

Since the report in 1995, nearly all of the computers we had at that time have been replaced with faster and more reliable machines. Wireless networking has been introduced since then. We have upgraded all our compute servers since that time as well. We have replaced all of our service machines and then either replaced them or have immediate plans to replace them a second time as we phase out Solaris in favor of Linux.

The final additional recommendation from that report concerned itself with academic advising at the university level. The report remarked on the burden that screening for course prerequisites created for already "stressed faculty". Shortly after this report, the University of New Mexico implemented a prerequisite system for both English and Mathematics and Statistics. The professional advisors in those departments took over the lifting of prerequisite holds for many of the lower level courses. With the implementation of the Banner system, lower level prerequisites are currently being checked and the department is preparing the catalog scrubs for prerequisite checking at the 300-400 level to begin in Fall 2009. There will still be some instructors who will be required to give permission for upper level courses, but this system should work fairly well in lessening the burden on faculty in teaching upper division courses at the appropriate level. However, this new system has added additional burdens to the already heavy workload of the professional advisor in the department. Aside from the issues that arise from any new system, the department considers this to be pretty successful.

The department offers advising in two steps, first with the professional Coordinator of Program Advisement, and then with the faculty advisor assigned to the student. All administrative duties for advisement are handled through the Coordinator, however most academic advisement is handled through the faculty. The department has established a culture of mentorship through faculty advisement; we feel that students benefit tremendously from regular contact with faculty. The students learn that there are many benefits to having faculty advisors, from correct placement in major courses to a faculty that can mentor research opportunities, host honors coursework, and write letters of recommendation for these students for graduate schools,

scholarships, and employment. The department strives to encourage students to find a faculty person whose interests they follow to select for advisement. Once that is done, we encourage a long-lasting mentor relationship with that faculty person. This culture has undergone severe changes over the last few years as faculty leave and students are placed in the position of finding new advisors whose interests they share from our limited current faculty or from our new faculty. Years ago new faculty were given time to settle in before being assigned students to advise, those days are gone and new faculty receive student assignments as soon as they get here. This is problematic in many ways, the most important being that new faculty are just getting acquainted with the university and the in's and out's of the system. These new faculty are not always the most knowledgeable on courses, faculty interests, or UNM rules and regulations.

There was one question the faculty senate addressed to the review team that was "How well is the department doing in recruiting women and minorities as undergraduate majors, as graduate students, and for tenure track positions?" In 1995, 40% of the total enrollment of graduate students was women. That number dropped slightly this year to 36% as the competition to recruit available suitable women candidates is extremely rigorous. Since we do not compete as well nationally with our Teaching Assistant stipends, we feel that we often lose the brightest women students to universities with higher salaries and additional incentives for Teaching Assistants.

We continue to recruit and graduate minority students in our graduate programs. We currently have four self-described American Indian students in our graduate programs, which is a dramatic increase over the past five years when we have struggled to have one American Indian graduate student. We currently have 17 Hispanic United States citizens or permanent residents in our graduate program. There are 10 Asian or Pacific Islanders in our program who are US citizens or permanent residents. We have one African American student in our graduate program. At the undergraduate level, 39% of our students are women. The minority student population is 57 Hispanic students, 4 American Indian, and 14 Asian or Pacific Islanders. We currently have 2 African American majors, and have graduated 4 African American students over the past three years with BS degrees. Our minority population is 34% of our undergraduate enrollment. As for the graduate students, U. S. minority students are 24%, but if you include all minority students in our graduate program the number is 49% of our graduate program.

The entire upper administration at the University of New Mexico changed since we began this self-study. We were told when we began the process that there would be no input of resources based on this review. With a new administration there are some assurances that there will be more use made of the review process. It is our sincere hope that this is the case.

2. Degree Programs and Curricula

Undergraduate majors

The Department of Mathematics and Statistics experienced steady growth over the past thirteen years. Currently there are 170 confirmed undergraduate majors with another 55 students who are self-declared and have not confirmed the major with Arts and Sciences. The department offers four Bachelor of Science (B.S.) concentrations in Math and a B.S. in Statistics. The math concentrations are Applied, Pure, Computation, and Education. Each major entering the department is assigned a faculty advisor with whom they are required to meet every semester. The ratio of undergraduate students to faculty advisors is 8.6 to 1, bearing in mind that the same faculty carries a graduate advisement load as well. It can also be noted that not all faculty

advise the same number of students, some faculty advise as many as 15 students, while others advise only three or four. We allow students to choose their own advisors after their initial assignment to the Chair of the Undergraduate Committee. This chair is responsible for assigning students to their faculty advisors.

Once a semester, the Coordinator of Program Advisement enters the student Banner system and assigns holds to all the majors and graduates in the department. This ensures that they may not register for the next semester until they are advised by their faculty advisor. These holds are lifted by the Coordinator after students are advised. It should be noted here that the majority of the faculty really enjoy this chance to interact with the majors, and often ask for lists of their advisees so that they can contact them personally via email before they see them in their offices.

The primary mission of the undergraduate curriculum in Mathematics and Statistics is to provide an education that teaches the fundamental information of either mathematics or statistics while providing students with the skills needed to appreciate the complexity and beauty of mathematics or statistics, as well as to understand the methods and evidence upon which mathematical science is based. It is recognized that many students enter this curriculum with specific career goals and therefore special missions of the department include: (1) Preparation of mathematics or statistics majors for successful entry into graduate programs in mathematics or statistics and related disciplines, with the goal of doctoral education for the majority of those planning to continue in academia. (2) Preparation of students for employment in positions in industry, governmental agencies, or as teachers in secondary schools. The department feels it has been quite successful in this area.

Faculty continually reviews and refines the different concentrations offered by the department. Recently, we discontinued a Distributed Mathematics concentration when faculty decided that there would be more merit in constructing a distributed major within one of the other concentrations, this would allow a stronger degree while letting students choose supplemental mathematics courses in areas they were interested in. In spring 2008, those concentrations should begin to appear on the diplomas of graduating Mathematics majors.

In the past few years, undergraduate enrollments have increased, especially in the entry level mathematics courses as the freshmen enrollment increases steadily each year. As a provider of one of the UNM core requirements and the Arts and Sciences group requirement, we offer lower level mathematics and statistics classes for an astounding number of students each semester. In spring 2008 by the 21st day of enrollment, the Math 120 course on the UNM main campus had more than 850 students registered, 17 sections of Math 120 were offered. A similar number of students registered for the Math 121 class with 17 sections, and almost 900 students were registered for the 17 sections of Stat 145. In Math 129, almost 300 students were still enrolled at the 21 day mark. There were 500 students registered for Math 123 and 150. There were 655 registered for 162 and 163—required courses for many science and engineering majors at UNM. Math 180 had 648 students registered at the 21st day and this course is required for Business majors as well as Pharmacy majors. Biology majors may choose this sequence for their degree as well, therefore there were also an additional 136 students registered for Math 181. There were also 177 Education students enrolled in the Math 111 and 12 classes. The department also offers supplemental one hour tutorial courses for students: Math 106, 107, and 110 with a total of 112 students taking advantage of these courses. The total number of students registered in spring 2008 for courses under the 200 level exceeds 4,800. This averages 42 students per section offered by the Department of Mathematics and Statistics and a minimum of 108 sections offered in the spring 2008 semester.

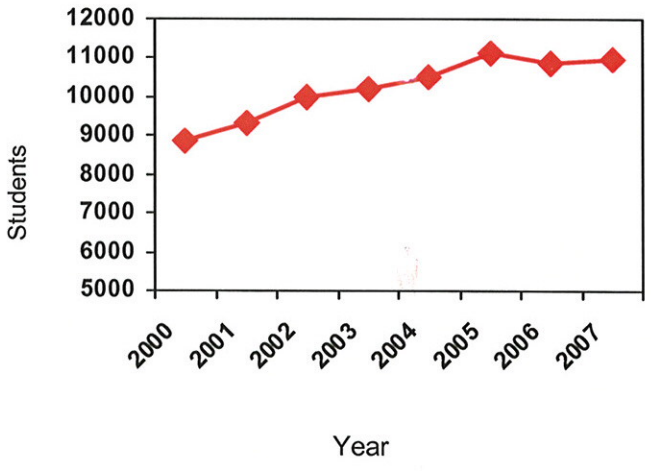
It is necessary to point out that the spring semester is generally much lighter in enrollment than the fall. In fall 2007, we offered 24 sections of Math 120, 23 sections of Math 121, and 16 sections of Stat 145. There were additional sections of Math 123, 129, 150, 162, 163, and 181. The total number of students enrolled in lower level math courses in fall 2007 exceeded 10,200 students. Totaled the number of student hours for 2007 academic year surpassed 45,000.

From the number of 45,000 student hours a logistical problem clearly arises. The only way the department can offer this many courses to this many students is through an extensive Teaching Assistant program and a dedicated cadre of Part Time Instructors. Because of the disparity in enrollment from fall to spring, our PTI's are usually extended to the limit for the fall semester, yet often we can only offer a fraction of the courses from fall to spring. Without our PTI's and their willingness to ride the ups and down of semester enrollments, we would be in a very difficult position. Although some of our tenured faculty teach the calculus sequences, all of the Math 120 courses are taught by PTI's who teach some of the Math 123 and 150 courses as well as 180 and 181, Math 129, and Stat 145. TA's teach Math 121, Stat 145, Math 123, 150, and 180 and also serve as the recitation instructors for Math 162, 163, and 264. We are stretched as far as we can with our current personnel and this continues to be a concern for the department as demands for our math classes remains consistently high. We continue to request additional funding for Teaching Assistantships to fill the need for additional math and stat teachers of lower level classes.

The following charts show the number of students taking the core and group mathematics courses and the total number of student hours for those courses over the last few years. The third chart shows the total number of student credit hours for all mathematics and statistics courses taken by majors, non-majors, and graduate students. It also compares those hours to another large department at UNM, Biology, for which we were able to get the student hour numbers. It should be noted that we do not have the total number of hours for Biology for 2007 academic year, but we did include those for our department.

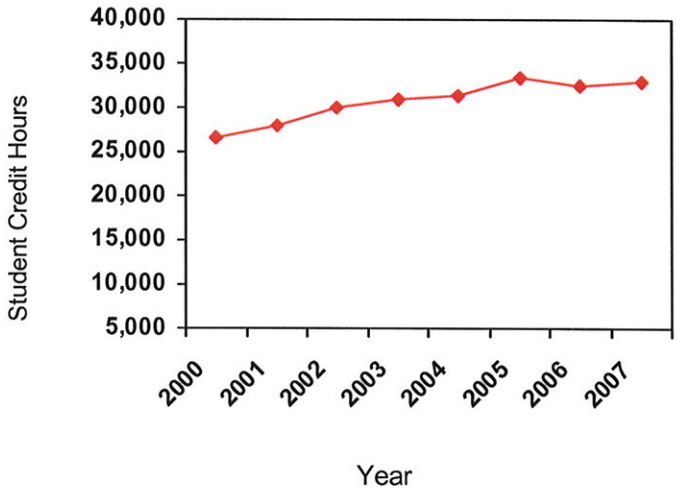
UNM Students Registered in Math Service Courses

Figure 1. Number of students in Math 120, 121, 123, 150, 162, 163, 180, 181, 129, and Stat 145 in fall and spring semesters from 2000 through 2007



Total Number of Student Credit Hours* for Students in Math Service Courses

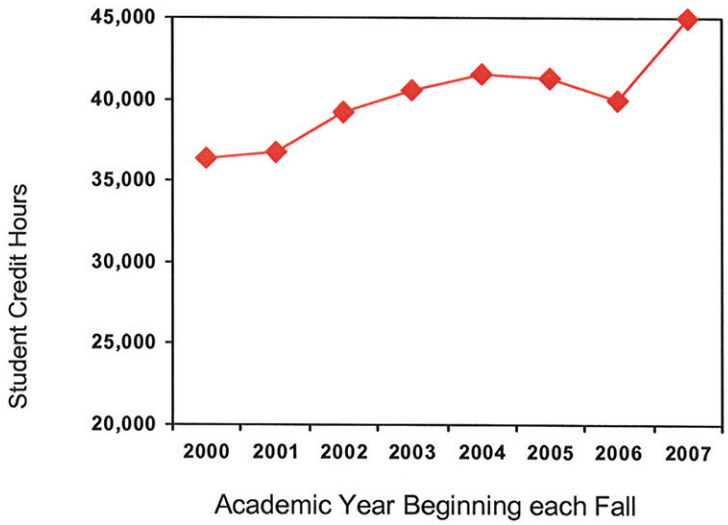
Figure 2. Number of student credit hours in Math 120, 121, 123, 150, 162, 163, 180, 181, 129, and Stat 145 in fall and spring semesters from 2000 through 2007



*Note there is an additional hour for Math 162 and 163 recitiations and one hour tutorial courses—these are not included in this graph.

Total Number of Credit Hours* Taught including Majors and Graduates

Figure 3. Mathematics and Statistics credit hour numbers of all major hours plus the additional hours of non-major service courses.



* Illustrates the hours added to the department teaching course load from UNM service courses.

Curriculum Assessment

Department faculty have thoroughly revised the content of each of the core courses and have been able to identify student learning outcomes for each of them. The Pre-Calculus team along with other faculty in the department is currently working together on developing assessment tools for each of those sets of learning outcomes. The report on outcomes to Dr. Mark Ondrias, Associate Dean of Arts and Sciences is included in Appendix B (see Appendix B).

It must be noted that this effort was initially launched to comply with the mandate of the administration to assess our core curriculum but it has been difficult to decide what exactly needs to be reported since there have not been clear guidelines of what information or in what format this needs to be done. Although this project takes a lot of time and resources from the faculty, it will help determine if the expectations of the department and the university are being met. Furthermore, it will identify which areas of our core sequence need improvement and what changes need to be implemented.

As of spring of 2008, the first battery of assessment items as outlined by the assessment directives is being tested in two of the core classes (math 121 and math 150) and the results from those items will be analyzed at the end of the spring. We expect to implement changes as a result of the analysis of these data as early as summer of 2008. The assessment project is being conducted under the direction of Adriana Aceves by the coordinators of the different core courses.

The following is a sample the department is using for the learning outcomes for Math 162 that is one of the courses to be assessed. This plan will give an idea of the assessment we are doing with our classes. It is the department's belief that these outcomes are probably overly specific.

Course Goal #1: Communication Student Learning Outcomes (SLOs)

- SLO 1: Students will use correct mathematical notation and terminology
- SLO 2: Students will be able to read a mathematical text and reproduce its main ideas
- SLO 3: Students will be able to verbalize the steps needed to solve a problem
- SLO 4: Students will read and interpret graphs

Course Goal #2: The Concept of Limit Addresses UNM core area 2/ HED area II: Mathematics (Calculus)

- SLO 1: Student will be able to determine when the limit of a function exists and when it doesn't
- SLO 2: Student will be able to choose an appropriate value of *x* sufficiently close to *c* for the function to get arbitrarily close to *l*
- SLO 3: Student will be able to find limits algebraically and also from the graph of a function
- SLO 4: Student will be able to find limits for various types of functions including radical, trigonometric and piece wise-defined
- SLO 5: Student will recognize when a function grows without bound and find vertical, horizontal and slant asymptotes.

Course Goal #3: Continuity Addresses UNM core area 2/ HED area II: Mathematics (Calculus)

- SLO 1: Student will learn that a function is continuous at a point if the limit of *f* as *x* approaches *c* equals the function value at c, as well as its graphical implications
- SLO 2: Student will be able to determine when a function is continuous from its graph and also algebraically
- SLO 3: Student will be able to find continuous extensions and apply the Intermediate and Extreme Value Theorems

Course Goal #4: Derivatives Addresses UNM core area 2/ HED area II: Mathematics (Calculus)

SLO 1: Students will understand the connection between the derivative, instantaneous rates of change and slopes of graphs
SLO 2: Students will estimate derivative from the graph of a function and from tabulated values
SLO 3: Students will be able to explain in their own words the steps used to define the derivative
SLO 4: Using the rules for differentiation, students will compute derivatives of various types of functions, including trigonometric, exponential and logarithmic functions, and functions defined implicitly
SLO 5: Students will use the concept of derivatives to address various applications: finding maximum and minimum values of a function, solving optimization problems, using the first and second derivatives to graph functions, finding limits using L'Hopital's rule

Course Goal #5: Differential Equations
Addresses UNM core area 2/ HED area II: Mathematics (Calculus)
SLO 1: Students will be able to find anti-derivatives
SLO 2: Students will be able solve simple differential equations
SLO 3: Students will be able to derive differential equations from applied problems

Course Goal #6: Integration Addresses UNM core area 2/ HED area II: Mathematics (Calculus)
SLO 1: Students will clearly state the steps used to obtain the area under a graph as a limit of a sum.
SLO 2: Students will state the definition of an integral as the limit of a sum, rewrite limits of sums as integrals and approximate integrals by finite sums.
SLO 3: Students will be able to use the Fundamental Theorem of Calculus and the rules of integration to evaluate definite integrals.
SLO 4: Students will explain the steps used to derive the Fundamental Theorem of calculus in their own words
SLO 5: Students will be able to find areas under curves, and use the definite integral to solve applied problems

Clearly, this outcome assessment plan has required a great deal of time and attention. Multiply that by ten additional classes that fit core curriculum at UNM and the amount of time dedicated to this project alone is staggering.

Undergraduate curriculum

The responsibility for the undergraduate curriculum is that of the Undergraduate Committee. The recommendations of the committee are forwarded to the Chair for implementation, or in some circumstances, to the whole departmental faculty for consideration.

The pre-calculus curriculum is supervised by the Director of the Precalculus Program, Adriana Aceves, Lecturer II. She is responsible for the preparation of the final semester core examinations, supervision of the coordinators for each Math segment, and ultimate supervision of all instructors, teaching assistants, and part time instructors. She also supervises the hiring of all part time instructors. The Director is a member of the Undergraduate Committee. Over the past few years, the position has evolved into a representation of the department as a liaison at many levels throughout the UNM community and beyond. Ms. Aceves is currently the chair of the statewide articulation committee for Mathematics and Statistics.

The requirements for an undergraduate degree in mathematics require the completion of a minimum of 27 hours in coursework at the 300 level or above. In Statistics the requirement is 21 credit hours in Statistics at the 300 level or above and an additional 6 hours at the 300 level

or above from approved supporting disciplines. The department currently offers four concentrations in Mathematics: pure, applied, mathematics education, mathematics of computation, and the B.S. in Statistics. A fifth concentration was the distributed major that is being discontinued Fall 2008.

Upper division curriculum—All of our majors take the three calculus sequence courses, CS 151L, and Linear Algebra. Depending on the concentration students must take at least one 400-level course and generally two or more courses at the 400 level. As mentioned previously, faculty continues to monitor the major concentrations and make appropriate changes to the required coursework. This past year the Mathematics Education curriculum was changed to include an additional new class, calculus for teachers, and the electives were removed making the curriculum more defined. That curriculum now includes Math 322 (Modern Algebra) and Math 327 (Discrete Mathematics).

Support for undergraduate students and undergraduate research opportunities
Financial—Three years ago the department reinstated the Honors Program and sought funding from the College of Arts and Sciences for this program. The first year we had one honors student, the second year none, and last year we had eight honors students. We look forward to growth of this program as students pass the information to others of the benefits of this program and as faculty observe the benefits of working with undergraduate students on honors research topics. Our funding has been renewed each year, and we are able to sponsor speakers for our honors students and to fund travel to conferences for networking and enhancement of their learning experiences. Faculty is tasked with promoting our honors program, and the Coordinator of Program Advisement is also very active in telling students about the honors program.

The department received an endowment for scholarships for undergraduates, the Eleanor Marron and J. Jospeh Lopez Memorial Scholarship. This scholarship was created with an endowment of $50,000 and is given to qualified Math majors. Preference is for New Mexico residents who do not qualify for the New Mexico Lottery Scholarship because of time off between high school and college, or for students for whom the scholarships were not available at time of graduation. The preference is for the scholarship to remain with the student until graduation, but not to exceed four years. The scholarship awards will be supervised by the Chairman of the Undergraduate Committee.

Extracurricular— Kappa Mu Epsilon (KME), the mathematics honor society, was founded for the following purposes: (1)To further the interests of mathematics in those schools which place their primary emphasis on the undergraduate programs; (2) To help the undergraduate realize the important role that mathematics has played in the development of civilization; (3) To develop an appreciation of the power and beauty possessed by mathematics, due, mainly, to its demand for logical and rigorous modes of thought; (4) To provide a society for the recognition of outstanding achievement in the study of mathematics at the undergraduate level; and (5) To disseminate the knowledge of mathematics and to familiarize the members with the advances being made in mathematics. Each year a faculty member supervises the club, and the students host an awards banquet inducting new members.

In addition, students in the department created their own math club, the UNM Society for Undergraduate Math Students. Otherwise known as Math Club, this is a group of math students and is for anyone with a passion for math. The club was founded in the Fall of 2007 to create a stronger knit community between undergraduates in the Math Department, but has grown to

include anyone who enjoys mathematics. Since the club is so new, we currently do not have solid numbers for the current membership.

Advising—The Department of Mathematics and Statistics employs a full time staff member whose duties include undergraduate and graduate advising and recruitment. She handles the bulk of the advising, but one advisor is obviously not enough for the 345 or more undergraduate and graduate majors in Mathematics and Statistics as well as the thousands of walk-in students taking the core courses at UNM. Additional advising is provided by faculty and staff who offer some advising support throughout the semester. This support includes signing pink late registration cards, lifting prerequisite holds, checking for prerequisites, and other minor advisement efforts as necessary. This is supplemented by information on our web site and by handouts that explain the required coursework.

The staff advisor, Donna George, Ph.D., has a number of duties in addition to working directly with both graduate and undergraduate students. She is involved in transfer evaluations, catalog revisions, curriculum development and implementation through curriculum form tracking, registration issues, recruitment events, training of faculty advisors, scholarship and honors programs, publications and data acquisition. She is responsible for graduate recruitment, graduate application and admissions process, as well as ensuring that the graduate paperwork is on time and completed so our students graduate with Masters or Ph.D. degrees. She also represents the department on various committees and professional associations.

Because of the large number of students within the department as well as the great number of walk-in students who are simply taking mathematics or statistics classes for the core it is difficult for the advisor to get to know all the students, especially the undergraduates. A second part or full-time staff advisor who could devote themselves to either the graduate or undergraduate advisement program would certainly help. The department works very closely with both University College Advisement Office and the College of Arts and Sciences Advisement Office. Students are directed by those offices to our department for advisement via walk-in students, email, and phone calls from the advisement center advisors. In general, the advisor sees 25 to 30 students a day, about 150 students a week—very few of these students are repeat customers. During peak times, the department receives visits from approximately twice that number each day. Peak times are prior to the beginning of each semester, during registration, mid-terms, finals, and throughout the summer for Loborientations. The department estimates that we see as many as 500 to 1000 students per month during these times.

Students are required to seek advice when they declare a major and when they do a degree check after 80 hrs of work. In addition, our advisor must go into the system and put academic holds on all majors at the graduate and undergraduate level so that they see their faculty advisor each semester before they register for the next semester. The department's advising workload has increased due to the complications of a new university-wide database system that includes problems with prerequisites being improperly applied. This is causing additional work as the advisor must lift prerequisite restrictions for students affected by this problem. This past semester there were 287 students who needed to have their prerequisite restrictions checked and restrictions lifted for students who had the prerequisite, but the system was not recognizing those prerequisites. Advisors do additional work in evaluating transfer credit, in helping student obtain overrides in the new system, and in communicating to the administration about problems with the new system.

The department Coordinator of Program Advisement plays a key role in working through issues regarding student needs. Worthwhile to note that there has been participation in problem solving for degree audits and the student Banner system by this Coordinator.

Graduate degrees

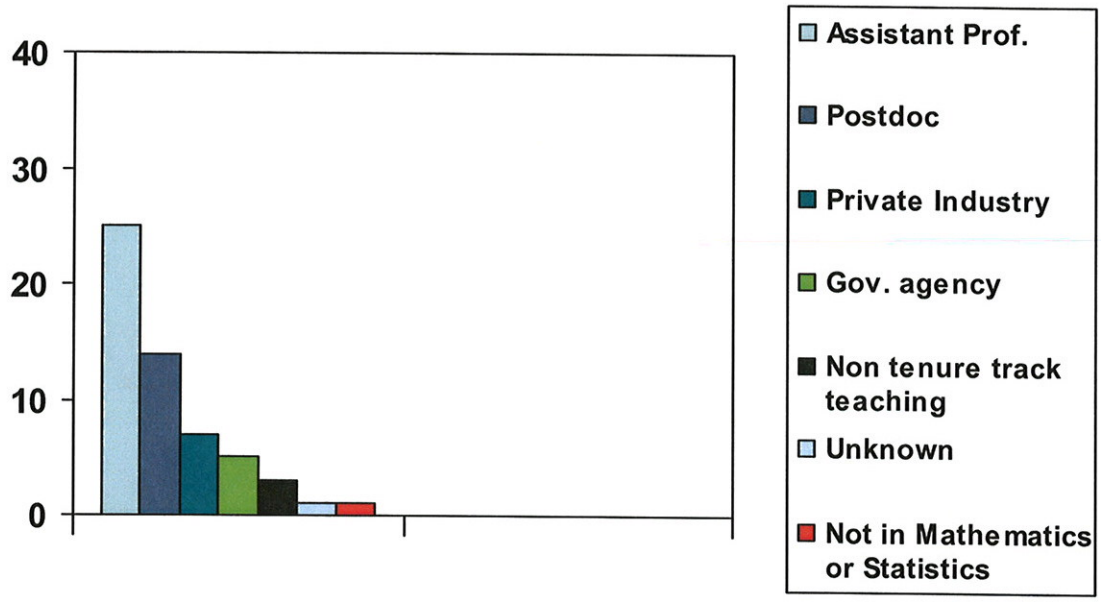
Our graduate program is based on specialization and concentration—we offer concentrations in Applied Mathematics, Pure Mathematics, and Statistics. More recently we are developing students who are focusing on education in their mathematics graduate degree under the direction of Dr. Kristen Umland and Dr. Richard Kitchen (.50 FTE). The goal is to eventually be able to offer an M.S. in Mathematics Education as was recommended in the 1995 review process. We have consciously tried to maintain a faculty whose research interests span much of the breadth of mathematics and statistics in these major areas. This enables us to recruit graduate students with diverse backgrounds, and to encourage them to pursue a wide variety interests and research. Much of our faculty is internationally and nationally renowned and many students come to UNM to study under these professors. The loss of these renowned professors will no doubt have serious impacts on our future recruitment efforts.

Ph.D. Degree—The majority of our doctoral students still aspire to obtain jobs in academia that require some combination of teaching and research; these range from primarily teaching positions at community colleges and small private colleges to research and teaching positions at major state and private universities. Increasingly, however, our students are first seeking and obtaining positions in postdoctoral research at prestigious universities around the world including Harvard in the U.S. and universities in Australia, Europe, Brazil, and Canada. Some of our doctoral students are finding employment in the government and private sectors as well, especially our graduates in Statistics. This information comes from our student's self reports on their positions to the department through their faculty or the advisor.

The following chart shows post-graduation positions of our Ph.D. students beginning with those who graduated in 1998. There were 50 Ph.D. graduates from 1998 to spring 2006. We anticipate a large number of graduates this spring and summer. As can be seen from this chart, in 10 years there were only 50 Ph.D.'s from this department. Clearly, the number of graduates although impressive, shows in all likelihood none of these graduates at this point in time would be considered senior faculty. Thus, the continued problem of finding experienced faculty remains persistent if the numbers at peer institutions are consistent to ours. The bottom line is that we are not turning out enough faculty fast enough to meet the turnover demand today and for the near future.

Master's Degree—Some students in the Master's degree program aspire to obtain additional training to prepare themselves for further graduate study in Mathematics, Statistics, or related fields. Many M.S. students seek employment in education, with government agencies, and in the private sector—again this is anecdotal evidence provided by our own graduate students to their faculty advisors or directly to the department.

Ph.D. Students from the Department of Mathematics and Statistics Post-graduation 1998-2006



Graduate student training—Students are required to complete a specified number of hours of coursework depending on the degree. The details are listed in our graduate handbook athttp://www.math.unm.edu/advisement/GradHB/handbookGrad07-08.doc. Required coursework includes both lecture courses and problems courses and must be completed with more than one faculty member. The department has experimented with various requirements for coursework across disciplines and many of our Applied Mathematics students are adding the Computer Certification course offered through the School of Engineering Computer Science Department. Some of our students are fortunate enough to be awarded Research Assistantships and Internships at the National Labs, thus increasing their training under the guidance of research faculty and research labs.

Courses available to graduate students fall into four categories: 1) Courses that were originally developed at the 400-level (senior undergraduate) but are available for graduate credit if some extra work is done, 2) Courses originally developed at the 500-level (graduate student only) that may or may not allow advanced undergraduates to enroll, 3) Special topics courses that usually focus on reading the literature, and 4) seminar and colloquia focusing on special areas of mathematics and statistics.

Faculty offer seminars and colloquia in specialty fields for students, including Geometry and Topology, Algebra, Statistics, Analysis and Partial Differential Equations, Applied Math, and our graduate students present their own colloquia on research topics. Experts in each field are invited to our Department for many of these seminars and colloquia and we offer in the area of one per month in several different areas. This offers our students exposure to a large number of areas of interest and a chance to network with experts in the field from many universities around the world.

In the past two years, the department suffered a sudden loss of a number of the Statistics faculty—from 8.3 faculty to 3.3 and currently 5.3, with the hiring of two junior faculty last year. This has created a problem with the ability to offer the variety in number of graduate level Statistics courses we once offered. It has also created a problem for our Ph.D. graduate program. For a year the department was forced to drastically reduce the number of Ph.D. students admitted to the Statistics program, due to the limited number of senior faculty who are able to chair dissertation committees. Since the program uses an examination system as well as thesis, the affect on our M.S. students was minimal. However, unfortunately the program lost several good Ph.D. students in the past year who were unable to find senior faculty who could chair their dissertations. Currently, the program has 2.3 senior faculty who can chair these committees and each of them currently chair a minimum of four dissertation committees—quite a load for any full-time faculty to deal with. This will remain a continuing problem as the demand for statistics faculty makes it extremely difficult for us to hire senior faculty. Although our recently hired statistics faculty is excellent, they are junior faculty and not currently at the level of chairing dissertation committees—we were unable to hire a senior statistics faculty person in the last hiring. This does not bode well for our graduate program in Statistics, which had been growing at a very rapid pace. We curtailed admissions in the last three semesters of graduate admissions to try and keep the numbers from rising too rapidly. Currently our optimal number of graduate students in 120-125 with 40-50 of those students in Statistics graduate programs, however that number may need to be drastically reduced if we cannot add senior faculty to our department.

An identical problem is now occurring in our mathematics program as we lose senior level faculty to new positions at other universities and to retirement. Recently we suffered the tragic unexpected death of one of our most prolific Pure Mathematics faculty, Dr. Kris Galicki. These losses continue to deplete our senior faculty and make it extremely difficult to replace these esteemed colleagues with new faculty that is as experienced as the professors we are losing—especially recognizing the financial constraints we function under from the university.

In addition, some of these departing faculty members are responsible for the bulk of research dollars in our department and when they leave their funding leaves with them. This causes a downward spiral that affects our overall departmental budget, and eventually will impact our graduate program, especially the Ph.D. program as we lose senior faculty to chair their dissertation committees and offer them Research Assistantships for training. It is for this reason the university must realize the importance of ensuring that departments have the funding to hire specialized senior faculty and offer incentives to lure them to UNM. We must also be competitive and offer matching funds to keep our experienced faculty at UNM.

Graduate student demographics—The total number of graduate students in the program has remained at over 120 for a number of years. Numbers of female graduate students have increased over time and now the percentage of our students who are female is around 33%. Likewise, the percentage of minority students has increased over time and we now have 43% minorities among our graduate students. The following chart shows the number of female graduate students in the department.

Female Graduate Students in the Department of Mathematics and Statistics

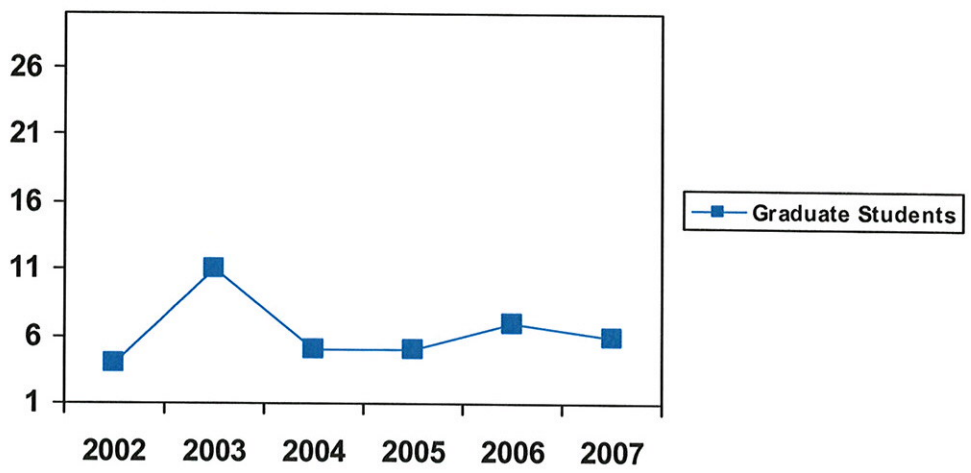


Figure 4. The number of female Mathematics and Statistics graduate students.

Graduate student financial support—The department offers graduate support in the form of teaching assistantships and research assistantships for graduate students who meet our criteria for financial assistance. This criterion includes strong letters of recommendation, exceptional grades in undergraduate or graduate programs, and a strong letter of intent from the applicants. They must also meet our deadlines for applications seeking financial support. Each application is reviewed by the selection committees from each of the three programs, and students are ranked in order of receiving funding. Since we are not as competitive as we would like to be, we often go down to the third or fourth ranked candidate to offer the first TA after our first choices turn down our offers. Only after students are admitted to the program are any Research Assistantships available and the faculty sponsoring those assistantships select qualified students.

Occasionally we admit students with guaranteed outside support from another agency such as Fulbright or an academic agency from their own country. Ph.D. and M.S. students are admitted as full-time or part-time students and some are admitted with full support with an Assistantship. If support is guaranteed, it is for a maximum of six semesters for M.S. students. Students who are without support may ask to be in the Teaching Assistant (TA) pool. These students may be offered Assistantship support on a semester-by-semester basis if TA slots are available after all students on guaranteed support have been accommodated. In recent semesters, we began offering some special TA's to students under our PTI budget, and have accommodated students in this way. They receive a small stipend and health insurance, but must still pay their own tuition. In fact, we often hire a few special TA's from outside the department and thanks to funding from Arts & Sciences are able to offer one TA to a graduate student in another department. We currently have 44 full-time TA's on our budget and five half-time Graduate Assistants (GA's) in the budget. Clearly, we could use more funding for TA's as there is a need for instructors for the lower level math classes that seems to be ever increasing.

The workload for TA's is one course per student, because students awarded TA's must maintain a 9 credit hour graduate load to ensure they make progress toward their degree. Typical course enrollment is 55 to 60 students and the students must prep the class, grade homework, quizzes, and exams. The students work under the direction of a faculty coordinator who prepares all exams and the final. Our recitation TA's teach two recitation sections of a maximum of 25 students per section, and we have recitations with all three of our calculus sequence for science

and engineering. They are under the direct supervision of the faculty teaching the calculus course.

The size of the TA stipend has increased over time making our financial support more competitive with other schools, but is not as competitive as it needs to be. At the time of our last review in 1995, no support for health insurance was available to TA's and this was a major concern for graduate students. Currently, the stipend for Ph.D. students who passed their comprehensive exams is $16,268 for the academic year. The TA contract also includes tuition and the supplemental student health insurance. Incoming TA's receive $15,720 and the same benefits.

Fellowship support—Our limited ability to offer graduate research fellowships has been a continuing source of concern. This is particularly a problem because many students teach every semester, limiting their ability to conduct research and write manuscripts. The other important aspect of this problem is the need for summer support. While a few summer TA positions are always available, graduate students need time free from teaching to conduct their research. A dramatic improvement in summer support was achieved through the Efromysn grant to support four dissertation students with awards of $2,500 each to work on their dissertations rather than having to teach in the summer.

Applications—One area of concern for our graduate program has been a decline in the number of applications received. After peaking around the 70's and 80's for the last few years and then going over 110 in fall 2007, this year's applications for Fall 2008 appear to be down dramatically. We don't fully understand the reason for this decline—but are concerned that new restrictions on foreign students and the prohibitive costs of applying for U.S. schools has contributed to the decline. We are also concerned that new admissions processes at UNM may be contributing to the decline of the number of domestic applications received in the department. We have adjusted our deadlines in anticipation of late receipt of applications—we were informed that Admissions will run an audit on our applications, but that occurs two weeks after our posted deadline. The Interim Dean of Graduate Studies at UNM reports that applications are down in almost all programs here at the university. This is cause for a great deal of concern, and a call to begin recruiting efforts anew to attract high caliber graduate students to our programs. Although the quality of the applications remains fairly high, the best of the applicants rarely choose to come to UNM even though we admit and offer funding.

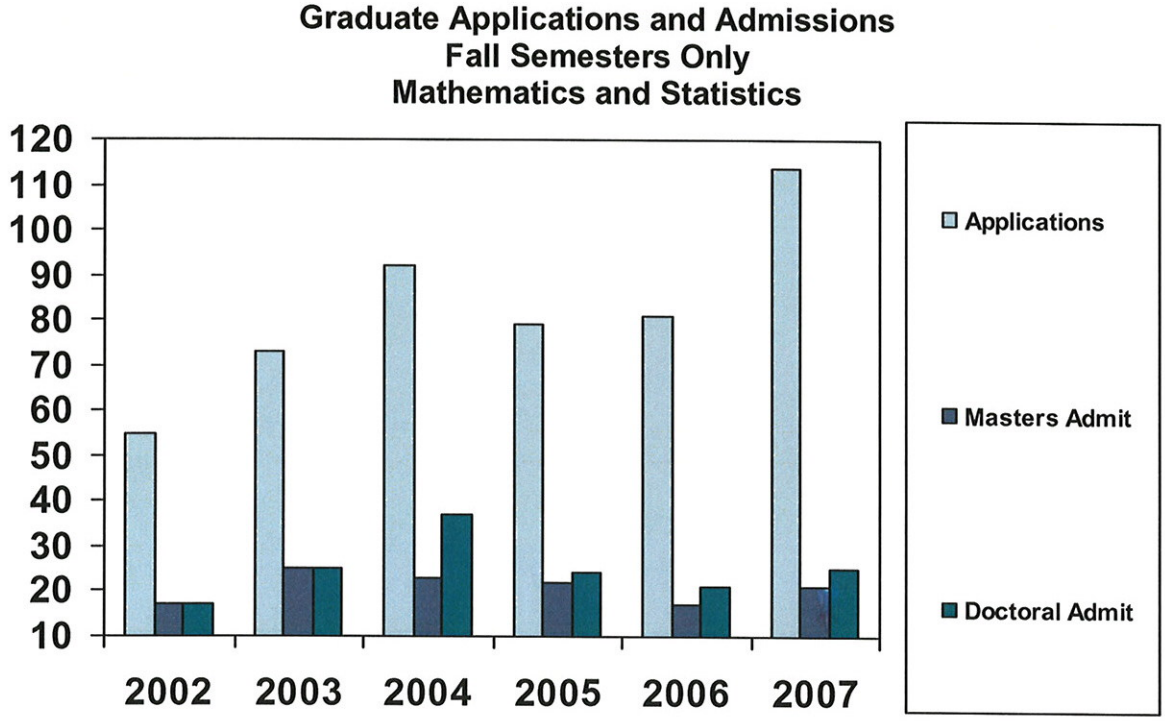
The chart on the following page indicates the number of students applying to our graduate program and the numbers admitted. According to the Office of Graduate Studies, the number of admitted students is the actual number of students who register and attend UNM after admission. These numbers include both domestic and foreign applicants. The date range for these numbers is Fall 2002 through Fall 2007. It should be noted that the department has two admissions each year, fall and spring. The chart on graduate admissions does not include 2008, since those numbers are not available at the time of this self-study.

Graduate student outcomes—By and large, the faculty view appropriate measure of graduate student outcomes as gathering information on the fates of our students. Because of the individual nature of graduate student programs, shorter term measures of outcomes during the training process have not generated much enthusiasm among the faculty.

For the 54 students who completed the Ph.D. program between 1997 and 2006, the average time to complete the degree was 6 years (calculation of the mean, mode and median give the same result). This spring and summer 2008 we have approximately 20 Ph.D. students who will

be completing their degrees. This is the largest contingent of graduating Ph.D.'s the department has had at one time and is occurring in part due to funding limitations imposed several years ago. Students who are now meeting the 10 semester limitations instituted by Dr. Kapitula, with a few exceptions granted additional time to degree, are finishing in a more timely fashion than in the past. Thus the average seems to remain around 6 years to complete the degree. We are hopeful that we can shorten that time, especially for students coming into the Ph.D. program with M.S. degrees by limiting funding to those students to a total of six semesters.

Our master's students typically take two years to complete the degree. Their fates are more diverse than those of the Ph.D. students. Some of these students continue on to Ph.D. programs here or at other universities, some are employed by government agencies or the national labs, some are teaching at community and junior colleges, some are working in research in health and other areas, and some are working in the private sector. We rely heavily on the students' self reporting back to faculty and to the department to determine where they are currently employed.



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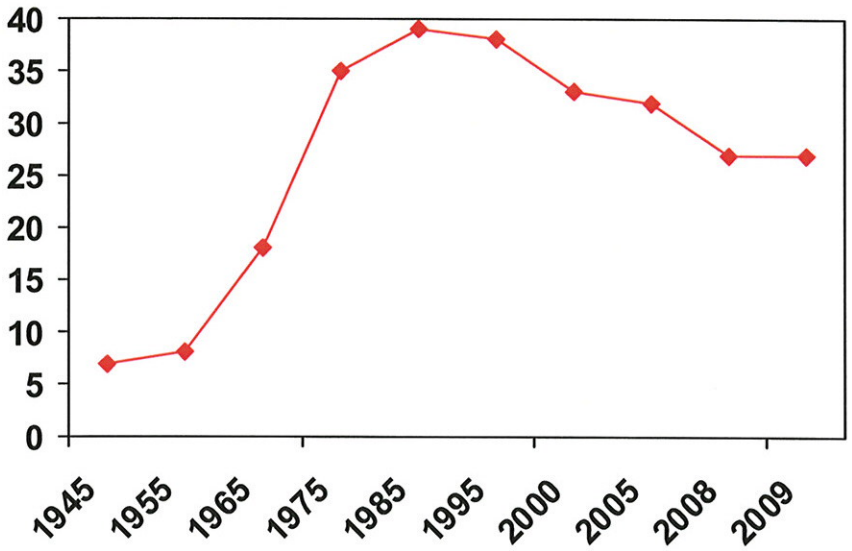
3. Faculty – Brief CV's for all faculty are in Appendix A (see Appendix A)

Faculty demographics

As of January 2008 our faculty includes 14.3 Professors (one of whom is leaving for a faculty position elsewhere, one who is retiring, and one who has several offers for faculty positions elsewhere), 8 Associate Professors (two of whom are on extended leave and we do not expect to return to UNM), 4 Assistant Professors, and 8 lecturers, (one vacancy and one who will leave should the spouse accept a position elsewhere). See the CV's of faculty in Appendix A for their areas of expertise.

Over the years from 1995 to 2008, the number of graduate and undergraduates for the department more than doubled, however our number of tenure track professors has declined from 38 faculty to 26.3. Our faculty has changed dramatically over the last 13 years, with few of that faculty still at UNM.

Figure 5. Number of tenure track faculty by the year. Faculty on long term leave are not included, nor is faculty in the Office of Research.



In 1995, we only had three full-time Lecturers, and we were able to increase that number to 8 at the present. These Lecturers serve an invaluable service to the department as coordinators of the lower level mathematics courses and as faculty for those courses.

Table 2. Frequency and percent of male and female faculty by rank in February 2008.

Rank	Number of female faculty	Number of male faculty	% female faculty
Professor	1	13.3	More than 1%
Associate Professor	2	4.5	33%
Assistant Professor	2.5	3	45%
All tenure track	5.5	21.5	20%
Lecturers	3	5	37.5%

The number of female faculty has declined over the past three years as we lost two female statistics faculty to other faculty positions. We continue to attempt to hire female faculty, however historically it has always been difficult to hire female faculty because they are highly desirable to Mathematics programs around the country. This is another instance where competitive hiring packages would be extremely beneficial to the university as a whole.

The number of minority faculty in the department is historically low. We have hired minority faculty over the intervening years, which has lead to a higher percentage of minority faculty. Once more we face the same hiring problem as with female faculty, minority faculty is highly sought after at universities across the country and we do not compete favorably with those universities in salary and hiring incentives.

The faculty currently includes two emeriti faculty who continue to teach one upper level course apiece. The rest of our coursework load is carried by adjunct faculty in the form of part-time instructors. It is our contention that the university does not honor these part-time instructors, and we find it difficult to understand why this faculty is not offered benefits of some kind to reward them for their unstinting service to the university for relatively low pay.

Table 3 . Number and percentage of minority faculty by rank.

Rank	Number of minority faculty	Number of non-minority faculty	% minority faculty
Professor	2	12.3	More than 1%
Associate Professor	5	6.5	43%
Assistant Professor	2	8.5	19%
All tenure track	9	18	33%
Lecturers	1	7	More than 1%

Faculty areas of expertise—The CV's in Appendix A indicate that the faculty expertise in the Department of Mathematics and Statistics spans the entire range of mathematics and statistics, with a few minor exceptions. Having lost faculty whose focus was on genetics, fluid dynamics, industrial statistics, and now numerical analysis we struggle to offer our students the best range of expertise in the fields. We must be able to find experienced faculty to replace those who leave gaps in our mathematical and statistical range to be able to continue to recruit and educate the best and brightest mathematics and statistics graduate students. It is our duty to produce students who can in the future fill the many faculty openings that will occur as more and more of the current faculty age and retire.

Teaching assignment patterns—A standard teaching load for tenure track faculty is two and two. All faculty teach upper level undergraduate courses in addition to a graduate level course. Many of the faculty offer Readings and Research and almost every faculty member has someone taking either thesis hours or dissertation hours each semester. On occasion, faculty will double up and teach four courses in one semester in order to be able to travel for research, teach as an exchange, etc. Generally, we only have 1 or 2 faculty who choose this type of buying time.

Lecturers teach two classes per semester. Several lecturerers are also a coordinator for one of the large lower level courses or sections. There is a coordinator for Math 120, 121, 123 and 150, Stat 145, and Math 180-181. A tenured faculty member coordinates the calculus series, Math 162, 163, and 264. The lectures do receive additional compensation for these roles. One of the lecturers handles all the scheduling for the department and another lecturer is in charge of the UNM-PNM Math Contest.

The teaching load is meant to be the same for all faculty, however the experience of teaching these courses varies from course to course. All the upper level undergraduate courses generally have 20 to 35 students enrolled. Most of the upper level math courses are required for Physics majors, majors in engineering programs, and the secondary mathematics education program in the College of Education. All 300 level mathematics courses are taught by tenure track faculty with two courses of Math 375 taught by adjunct retired Ph.D. UNM faculty or visiting professors with specialty in that area. At the graduate level some of the courses are heavily in demand because they are required for the degree concentration, while other courses are far less popular as they cater to very specific mathematics interest areas. Courses required for the degrees can be found in the student handbooks.

All the graduate statistics courses are very much in demand, and the lack of experienced faculty has resulted in the inability to offer the Math 425/525 for the past three semesters. This definitely affects students adversely in not being able to take the basic SAS programming class. Our Biostatistics and Industrial Statistics courses have suffered from the loss of faculty as well. In all, our statistics graduate students are becoming very frustrated as they attempt to complete their graduate degrees in the department. Recently, we have resorted to outsourcing some of the graduate coursework to other departments like Economics, Business Management, and Engineering so that our students can acquire the 32 credit hours they need for an M.S. degree.

Publications—Faculty in Mathematics and Statistics are expected to publish regularly and our faculty take that expectation seriously. As can be seen by the CV's in Appendix A, our faculty maintains a high level of publications. Table 1 on page 15 indicates the number of publications through 2005-2006 by our faculty. Most tenure track faculty publish in peer reviewed journals. If a faculty member does not publish in one year, they generally publish the next. From Table 1

it can be seen that even though faculty has declined in the past few years, our publications remain high.

Our faculty earn awards and honors each year. Dr. Michael Nakamaye and Dr. Gabriel Huerta won prestigious awards in 2006-2007. Dr. Nakamaye received the 2006-2008 Presidential Teaching Fellowship. This award is the University's highest teaching honor. Dr. Gabriel Huerta won the designation of Regents' Lecturers in Arts and Sciences, an appointment that spans three years. Adriana Aceves, Director of the Precalculus Program, was honored as an Outstanding Teacher at UNM in 2007. Statistics Full Professors Bedrick and Christensen are Fellows of Professional Societies. Full Professors Hagstrom and Sulsky recently delivered plenary lectures at International Research Conferences.

Review of faculty—In addition to normal university procedures for tenure and promotion review, mathematics and statistics faculty are reviewed each year. Each year faculty submit a three year report summarizing accomplishments in research, teaching and service (Lecturers only report on teaching and service). Each member of the (EC) executive committee (one elected member from each unit: Pure, Applied, Statistics, and one Lecturer) reviews all colleagues from their own discipline and some from the other areas so that each faculty is evaluated by two members of the EC. A meeting of the EC with the Chair takes place to rank the faculty after which the Chair summarizes evaluation for each individual in written form. These reports are given to faculty and merit raises are determined based on the ranking. This evaluation is based on a weight of 40% research, 40% teaching and 20% service.

Lecturers are evaluated between the Chair and the Lecturer in the EC. For Lecturers the weight of teaching is 40% and service is 20%.

Faculty hires— Every academic year the Chair submits a hiring plan that results from discussions with all faculty. Positions are described by Area (Pure, Math. Ed., Applied, Statistics), at times with narrow parameters that respond to an immediate need to cover an area. Once the Dean responds to the plan, a hiring committee is formed. We assure that both expertise and diversity are well represented in these committees. After the approval process is completed, it is the charge of the committee to identify candidates to come for interviews. The committee recommends names to the tenure stream faculty for approval to interview. Once this is done and interviews take place, the hiring committee in consultation with faculty in the targeted discipline discuss and propose a ranking to be put for vote to the tenure faculty for approval.

At this time, the traditional pipeline for finding suitable applicants for faculty positions does not work. We are failing to get the number of interested senior faculty to apply for our positions, and those who do apply are not being attracted to accept due to low faculty salaries. The department is relying more and more on junior faculty to fill our vacancies and this means that we are not keeping up with the losses our department is suffering. Very few of our grant winning faculty are remaining with us, and we fear a greater loss of department funds through this attrition.

Roles for retiring faculty— Most retiring faculty receive the title of Prof. Emeritus. The department has a simple policy in line with the Faculty Handbook where Full Professors vote for or against the granting of this status.

Historically many retiring faculty return to teach on a part time basis. They are given, to the best of our abilities, office space. Access to materials and supplies is similar to what regular faculty

receive. One recent retired faculty (Steinberg) and an upcoming retiring faculty (Ellison) continue to do research and mentor students. Retiring and Emeritus faculty do not have voting rights in the department. They can, if they so wish to do so, attend faculty meetings.

Faculty workload analysis—The number of student credit hours continues to increase steadily each year. We are currently teaching around 9,000 more students in academic year 2007 than we did in academic year 2000, with a loss of 8 tenured faculty. The only thing that saves us is that we were able to increase the FTE faculty line from 3 to 8. As mentioned earlier, the majority of those 32,976 student hours are taught for the lower level mathematics and statistics courses that fill core and group requirements at UNM.

Support for faculty development— We provide a modest sum for travel, usually enough for one domestic trip. This support is extended to tenured stream faculty and to Lecturers. For the most part we rely on development efforts from the College of Arts and Sciences. In such cases, the Chair seeks nominations to recommend faculty for awards such as the Summer Research or Semester Research awards. Unfortunately, the College was forced to put these programs on hold. There is also very little to no support for faculty teaching development. This is true for the department and the University as a whole.

4. Facilities and resource bases

Support staff—the department staff includes 7 members all paid from I&G funds. Our support staff functions efficiently as a unit and manages to keep the department on track and productive despite the demands of the new university accounting, student, and human resources system and auditing increasing in difficulty each year. State support for staff lines is not adequate.

Space—space remains critical for the Department of Mathematics and Statistics. Each year is a struggle for scheduling and the department to find enough classrooms for the many sections we must teach of the lower level mathematics classes. The department location in Humanities only provides two classroom spaces, often faculty use our conference room for seminar classes. This creates a scheduling nightmare for the Admin in charge of the rooms. Often we must rearrange thesis and dissertation defense times around the usage of the classrooms.

Although we have the promise of a new building, we are somewhat skeptical as to the actual benefits of this building. As the budget is cut, so is the space allocation in that building. We could essentially end up with a lot less space than we currently have in our Humanities location. We would urge those in charge of this building to consider the validity of asking us to downsize, measures should be taken to create a building in which we and our students can be comfortable.

Physical Plant has agreed to re-carpet and tile the main office area and all the hallways on the second floor. We are requesting capital improvement funds to enclose unused space into an additional staff office. At this time, we plan to make the best of the space we currently use, knowing that any new building will now take 3-5 years at a minimum to complete.

Library Resources—The University Libraries (UL) is a member of the Association of Research Libraries, and is composed of four separate facilities on the University of New Mexico's main campus in Albuquerque: Zimmerman Library (education, social sciences, and humanities); Centennial Science and Engineering Library; Parish Memorial Library (business and economics); and the Fine Arts and Design Library.

The four branches of the UL hold over 2 million print volumes in their collections. The UL currently has over 8,000 subscriptions to print journals and nearly 17,000 subscriptions to electronic journals in all disciplines. The UL provides 24/7 remote electronic access to over 300 electronic databases, electronic journals, electronic reference sources and other books, and the library catalog (LIBROS) of print holdings.

There are several electronic sources which specifically support research in mathematics and statistics at all levels. The UL subscribes to both MathSciNet and the Current Index to Statistics and has subscriptions to the major indexes in related fields such as physics, biology, and computer science. Also available are subscriptions to most SIAM journals and AMS journals as well as the collections provided by our journal packages from Springer and Blackwell and the JSTOR archive. The UL also has standing orders to major book series such as Lecture Notes in Mathematics and we buy the essential research books in our faculty research areas.

Borrowing of materials not held at UNM is accessed through the Inter-library Loan system. UNM belongs to a consortium of libraries which delivers most journal articles within 24 hours and books within 4 days. This is a free service to students, faculty and staff.

The mathematics and statistics librarian provides additional assistance to the department by selecting books for the library's collections and handling reference questions directly for any students, faculty, and staff in the department. Additional reference and instruction support is provided by the staff at Centennial library. Reference services desks are open approximately 50 hours per week and staffed with professionals who help with research problems, devising search strategies, and using various print and electronic resources. Services include customized instruction sessions that assist students and faculty in utilizing the library's resources and collections. Individualized library instruction/tours are also available upon request. Faculty can work with the instruction, reference or subject specialists to design classroom assignments that teach students how to conduct research.

5. Financial resources

The department has four main sources of funding, (1) state funding--the Instructional & General budget and tuition (I&G) that is allocated to the department by the College of Arts and Sciences. (2) Course fees that are collected from students. (3) Overhead funds generated by grants, and (4) Gifts that are managed by the UNM Foundation. The faculty in the department also hold grants funded by a variety of agencies. These funds, of course, are for research projects and not for the general operation of the department. This section provides an overview of our financial situation.

I&G budget—The state funded budget includes two parts: (1) salaries and (2) materials and supplies. Starting in fiscal year 2004-2005, a 1% tax was imposed on all transactions in the I&G budget. This tax funds implementation and operation of a new data base system Banner. The listing of the total I&G budget below is shown after the Banner tax is imposed, since the effect is to reduce the funds we receive. Generally speaking, while the department's I&G budget has increased overall, the increase is entirely in salaries (Figure 6). The materials and supplies budget has remained static for the last four years (Figure 7).

Figure 6. Total I&G budget for the past 5 fiscal years. Budget amounts are after the Banner tax has been removed.

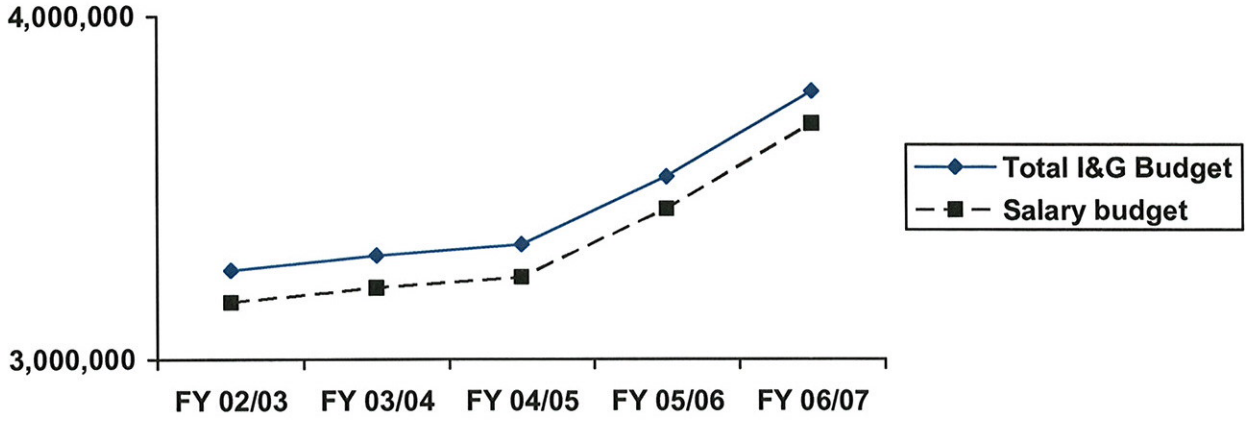
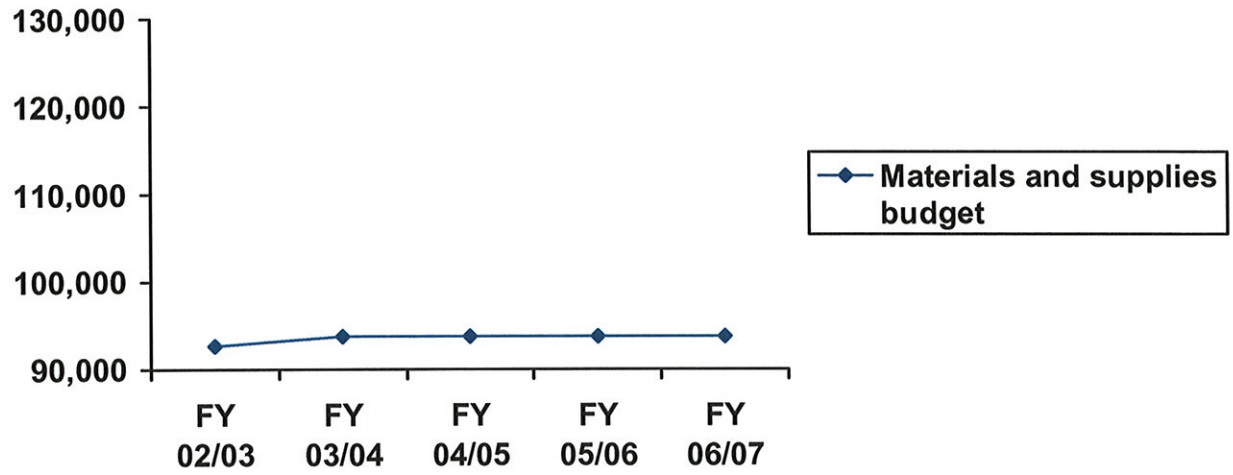


Figure 7. Materials and supplies budget provided by state funds in the last 5 fiscal years. Available amounts in the last 3 fiscal years are actually less than shown due to a 1% Banner tax.



Course fees—The department charges fees for some courses to cover the cost of software used to teach the courses. Although some departments are able to use the course fees for enhancing the department teaching budget, the fees raised in this department usually are consumed by the high cost of software licensing for the supplemental computer programming used in our courses. We accrued $14,740.00 in 2006/2007 from student course fees. Of this amount, $14,359 went to software licensing. Typical course fees are $15 per course requiring a fee. Not all upper level mathematics courses require a fee.

We could follow the lead of other departments that institute course fees for all their courses, but at this time we feel that it would become onerous on students to have additional fees imposed on them to simply support the inadequate teaching budget granted by the state. The true answer to this problem is for the administration of the university to continue to forcefully lobby for additional funds for teaching budgets. As with faculty salary increases, the department

knows that institutions and the state focus on educational spending as a priority. Again, the idea is there, but the will to implement these changes does not materialize. With continued tuition rate raises, why burden students with additional course fees when the state should recognize the importance of a decent teaching budget for the largest university in the state.

Overhead funds—A portion of the overhead generated from grant accounts is returned to the department from the Office of Research. These funds are used for startup costs, research support, faculty development, graduate student support, etc. In FY 2006-2007, the department's overhead allocation was $45,872. The money was used as listed as follows:

General Category Expenditures

Faculty Travel Support:	$ 2,600
Start-up Packages:	$ 3,185
Office and Computer Exp:	$15,400
Faculty Moves:	$10,000
Green Card/Visas:	$ 5,509
Salary Support:	$ 1,920
Recruitment	$12,140
Dues and Memberships	$ 3,782

The reason our expenditures can be covered since they obviously exceed our allocated budget is that we strive to maintain a carry-forward balance each year. We understand that our allocated budget will remain relatively the same so we budget accordingly throughout the year.

Current and projected costs—The bulk of our annual I&G budget is for salaries. We expect salaries to continue to increase and worry about the slow rate at which the state budget increases. Salaries need to rise to be competitive with our peers and to retain our faculty. The department would benefit from both and increase in the number of staff lines and an increase in the rate of pay for staff. Essential duties are still supported by overhead funds. Number of guaranteed TA lines has shown little increase in the last few years. Additional TA's are supported each year by special allocations, but these allocations do not cover all of the costs of TA support, e.g., tuition is not paid. By increasing the number of TA positions available we could completely support the additional TA's who work for us as Special TA's.

We also expect materials and supplies costs to continue to rise, likely at higher than the rate of inflation. This budget has not reflected the change in the cost of doing business in recent years.

Grant revenues are difficult to predict. Given the current funding climate and the state of the federal budget, it is more likely that these funds will decrease rather than increase in the near future. Due to the loss of our more prolific research faculty as they retire or move to other institutions, we face the potential of lower federal grant funding with focus on areas related to Mathematics and Statistics. This trend will have far reaching effects on the department creating two problems. First, faculty are likely to experience gaps in funding and ask for more support from the departmental overhead funds. Second, fewer grant dollars means a smaller overhead budget. Yet, we expect the demands on the overhead budget to be even greater as travel costs for faculty, gaps in funding, and requirements for startup funds all increase.

We are currently apprehensive concerning our overhead budget. Our department depends on this budget to keep us going through the tight financial times at UNM. Our budget is allocated from the Office of the Vice President for Research (OVPR) and unfortunately this past year, a multimillion dollar shortfall in the budget of the OVPR was exposed. Trying to cover that deficit is

likely to affect all units that rely on overhead funds—fairly or unfairly the departments will be asked to make up those shortfalls. This will have a devastating effect on our departmental budgets.

Relationship between the budget and the department's mission and goals—There is little departmental control over the I&G budget, however this budget is essential for us to carry out our primary missions of teaching, service, and research. Annual increases in salary, as provided by the state, are limited to very small amounts and this creates the inability to offer anything but small merit awards. Larger increases in salary come from counteroffers to those faculty members who seek jobs elsewhere and from adjustments based on administrative responsibilities. This is characteristic across the entire university. Many of our staff members are under the collective bargaining unit and we are unable to offer small merit increases to this dedicated staff. Our concerns are that they will begin to look elsewhere for better paying positions. The necessity for additional staff lines are not easy to address and extra TA lines do not appear in a manner that lets us to plan for recruiting new graduate students.

With the continuing implementation of the Banner System we feel an increasing need for additional staffing that includes accounting support for the department. We recommend a minimum of a .50 FTE Accountant II to assist in the preparation of financial reports and transactions. Sharing an Accountant II with another department, such as English, would be one way to provide the necessary financial support to two large academic departments.

6. Comparison to Other Programs

Within UNM the Department of Mathematics and Statistics has several comparable STEM peer departments such as Chemistry, Earth and Planetary Sciences, and Physics. These departments have similar numbers of undergraduate majors in the STEM areas and therefore the department considers these to be our peer departments. The problem with the Department of Mathematics and Statistics does not lie with the faculty to student ratio so much as the excessive demand on our department to provide a core curriculum course that is required of every single student at UNM. This means that at one time or another, almost every UNM student takes at least one mathematics or statistics course from us and on occasion several classes. This makes our teaching load unique among our UNM Arts & Sciences peers.

Table 4. Numbers of tenure track faculty and majors in science departments at UNM

Department	Tenure track faculty – Fall 2007	Majors from Feb 2008 Hyperion report	Ratio of majors to faculty
Chemistry	16	289	18
Earth and Planetary Sciences (includes Environmental Sciences majors)	21	183	8.7
Mathematics and Statistics	26.3	225	8.6
Physics and Astronomy	28	130	4.6

Comparison to other Institutions

The following is a table that compares our graduate student to faculty ratio with peer institutions having the same student enrollment as UNM. From the table it is clear that we have a higher ratio of graduate students to faculty than all the other schools. The University of Iowa comes close, but then we far exceed the student to faculty ratio for the other three institutions. Having our faculty at the number we had in 1995 would reduce that ratio and make us equivalent to the University of Iowa or 3 to 1.

Table 5. Number of Mathematics Faculty, Graduate Students, and Ratio of Graduates: Faculty at some of UNM's peer institutions. Data was obtained through graduate and faculty lists on the institutions' web pages.

University	Number of tenure track Mathematics faculty	Number of Mathematics graduate students	Ratio of Mathematics graduates to faculty
UNM	26.3	122	4.6 to 1
University of Iowa	40	122	3.1 to 1
University of Utah	46	75	1.6 to 1
University of Missouri	42	80	1.9 to 1
University of Oklahoma	33	70	2.1 to 1

Clearly, we need to strive to increase faculty as much and as quickly as possible should we wish to stay competitive with other institutions around the country. UNM has much to offer students, but unless and until we recognize that we must be competitive we will always just be the state school that attracts our own students. Why would a graduate student choose to come to a school that cannot guarantee graduate advisement, when other schools clearly have a much lower ratio of student to faculty to entice recruits? We need to answer this question with a positive trend in reducing graduate to faculty ratios across the UNM campus.

Salaries—Average faculty salaries at the University of New Mexico fall below those of peer institutions. A 2006 study by the New Mexico Secretary of Higher Education found that there are fundamental and large gaps in total compensation for UNM faculty compared to peer institutions: Full professors make on average $18,000 less than their peers, Associate professors make $7,000 less than their peers, and Assistant professors make $6,000 less. The longer faculty remains at UNM the greater that gap becomes. Is it any wonder that our faculty, especially junior faculty are leaving UNM for better paying jobs elsewhere? For years this has been the same lament; however the university appears to never take heed to the request for increasing faculty salaries. Almost all the faculty that left over the past three years indicates that salary is a high priority in the decision to move. The department understands that every year,

compensation is at the top of the institution's and the state's priority list, however the fact remains that we are still far below our peers in this area.

Average faculty salaries continue to decrease in the Department of Mathematics and Statistics as our more highly paid faculty retire, move to other institutions, or as in one case die. Since we can only hire junior faculty due to the dwindling applicant pool, our faculty salaries are lowered as we hire these new faculty members at much lower salaries.

7. Recent efforts in Mathematics and Statistics

The department joined other UNM departments in the College of Arts and Sciences in 2004 in creating a plan around the themes of Success, Excellence, and Distinction. See Appendix D for our reports on Excellence in Undergraduate Education, our Document on Distinction, and our Document on Success all submitted in spring 2005. In our Agenda for Excellence in Undergraduate Education prepared by our undergraduate committee, the department states that "Recruiting New Mexico's youth and providing them with the education and growth that will give them a good life is our primary mission" (2005). The report focuses on methods to increasingly improve our excellence noting the underlying restrictions of limited resources as a chronic problem at the University of New Mexico. See the final page of the report for the areas that would benefit from special funding from the College of Arts and Science to increase the services we could offer our students.

The Document on Distinction was also a response to the Dean of Arts and Sciences call for more systematic planning across the College of Arts and Sciences. In that document, the main focus of maintaining our department's distinction revolved around sustainability of that distinction through targeted hires of faculty to maintain our standards of distinction. In that report, department faculty reported the loss of two junior faculty, but by the time the report was published we had indeed lost another two junior faculty and two senior faculty, one to retirement and one to a peer university. Since those departures, the department lost another five senior faculty with one of those to retirement and one to death. Clearly, we are not meeting the recommendations of the Document on Distinction and are on shifting ground in trying to sustain our department's distinction based on our faculty specializations.

The final document developed for the College of Arts and Sciences was a Document on Success. This document addressed the problems of the prerequisite Mathematics class, Math 120. The most pressing problem with this class was and still is the high failure rate in this course and the necessity of students repeating the course multiple times. The fallout from students failing to make progress forward in their mathematics courses contributes to problems in retention and graduation. In an effort to support early intervention in the public school system, we developed two initiatives to support school teachers and high school students. The first initiative was an off-site Math class of Math 120 at two public schools Eldorado High School and Highland High School in Albuquerque. In addition, we proposed the creation of a Visiting Program for High School Math teachers. Other initiatives included the creation of a combination Math 120/121 course, which has now expanded to two sections and is extremely successful. The final initative was the use of technology in the classroom and to that end we are now offering a Math 120 course that is web based.

For the last year, the department working under specific instructions from several administrative areas found itself inundated with tasks. Among those were this self-study and the assessment protocols from the Provost's Office as well as a Departmental Performance Review for the College of Arts and Sciences Accreditation. The assessment protocols is an extremely

important and time consuming project, requiring a great deal of faculty participation. Appendix E contains the Accreditation Report for the Department from the College of Arts and Sciences.

8. Conclusion

At times when the current Chair is asked to describe the department, a good characterization would be, "This is the best kept secret at UNM." What he refers to in this statement is the many facets of the department that are not seen at the overall university level. There are many things that the department does to ensure that our students receive the best service available through our tireless efforts--LIST. There are elements with demonstrated evidence of much talent in faculty, students, and staff. Activities and initiatives ongoing in the department bring visibility, pride, and excitement. At the same intensity level, there is anxiety, low morale, attrition, and frustration. Thirteen years have passed since the last APR review and no real action was taken. With reserved optimism, the conditions are in place so that this does not repeat. A stable Administration with vision and high goals (including UNM becoming AAU) and a soon to be built facility is a start. Getting a sense of how the department (or departments) should look 5 years from now or even 10 years from now, and working on it from day one is what this department expects from the APR strategic plan.

Appendix A

FACULTY NAMES BY CONTRACT TYPE AND CATEGORY

Feb-08

Tenure/Tenure Track - Full Professor
ACEVES,ALEJANDRO BORBOLLA
BEDRICK,EDWARD JOHN
BOYER,CHARLES PLACE
BUCHNER,MICHAEL ANTHONY
BUIUM,ALEXANDRU
CHRISTENSEN,RONALD RICHAR
COUTSIAS,EVANGELOS A
ELLISON,JAMES AUBY
EMBID,PEDRO FERMIN
HAGSTROM,THOMAS M
KUCHARZ,WOJCIECH
LORENZ,JENS
LORING,TERRY A
STONE,ALEXANDER PAUL
SULSKY,DEBORAH

Tenure/Tenure Track - Associate Professor
HUERTA,GABRIEL
KITCHEN, RICHARD
LUSHNIKOV,PAVEL
NAKAMAYE,MICHAEL J
NITSCHE,MONIKA
PEREYRA,MARIA C
SIMANCA,SANTIAGO R

Tenure/Tenure Track - Assistant Professor
GUINDANI, MICHELE
LU, YAN
STORLIE, CURTIS
VASILEV, DEMETER
UMLAND,KRISTIN L
WEARING, HELEN

Non-Tenure Track Faculty - Instructional
ACEVES,ADRIANA H
BOLLI,JURG CHRISTOF
BRIAND,CATHY D
DUDLEY,JAMES F
HAMM,JOHN M
HERLAN,PHILIP PAUL
KAUFFMAN,VICTORIA C

Non-Tenure Track Faculty - Visiting
CRANDALL,WINSTON K
MATA, LUIS

Other Faculty - Temporary
ALLEN JR,RICHARD C
BERKOPEC,TIMOTHY LOUIS
BOUCHERON,SUSAN E
BURNS,KEVIN
BUSER,PASCAL P
CASSON,DEBORAH
CHAMPINE,KAREN K
DAVIS,JEFFREY SCOTT
DEVER,MARY F
FAWCETT,PAUL M
HAGSTROM,ROZA
HARRIS,CLIFF A
JADALLA,NIDAL M
KOMAGATA, DAISHU
MCBETH,NEIL D
NIEMCZYK,SUSAN J
NOREN,PAUL
SCHWARTZ,DAVID G
SCHWARTZ,DOUGLAS R
UNNEVER,GREGORY
VASSILIEVA,IRINA
WATTS,GALINA V

Other Faculty - Temporary
CISNEROS, LUIS
LOZANO, GUADALUPE
ZHANG, GUO

Biographical Sketch : **Alejandro Aceves**

Education:

- Ph.D. University of Arizona, Tucson, Arizona, Applied Mathematics, 1988: M.Sc., California Institute of Technology, Pasadena, CA, Applied Mathematics, 1983

Current and Prior Professional Positions:

- Department Chair (8-04-), Professor (8/01-), Associate Prof. (7/95-8/01), Assistant Prof. (8/89-7/95). The University of New Mexico
- Visiting Associate Professor (9/96-5/97), Brown University, Applied Mathematics.
- Visiting Research Associate (1/90-6/90), Heriot-Watt University, Scotland.

Research Interests:

- Nonlinear optics
- Nonlinear wave propagation, soliton theory
- Epidemiology.

Awards and Honors:

- University of New Mexico Regents Lecturer (1998-2001).
- "David Alcaraz" Annual Lecture, Universidad Nacional Autonoma de Mexico, Mexico, November 2001.

Selected Publications (of a total of over 60 with around 1,300 citations):

1. Olivier Chalus, Alexey Sukhinin, Alejandro Aceves and Jean-Claude Diels (2007) "Propagation of non-diffracting intense ultraviolet beams" submitted.
2. A. B. Aceves, G. Fibich and B. Ilan (2004) "Gap-soliton bullets in waveguide gratings". Physica D **189** 277-286.
3. T. Dohnal, A. Aceves (2005), "Optical soliton bullets in (2+1)D nonlinear bragg resonant periodic geometries", Studies in Applied Mathematics, **115** 209-232.
4. A. B. Aceves, T. Dohnal (2006) "Finite-dimensional model for defect-trapped light in planar periodic nonlinear structures", Optics Letters, **13**, 3013-3015.
5. A. B. Aceves (2007) "Localization and trapping of light in one and two dimensional periodic structures", In press, Wave Motion, doi:10.1016/j.wavemoti.2007.04.007.

Other publications

1. Aceves, A. B. and Wabnitz, S. (1989) "Self Induced Transparency Solitons in Nonlinear Refractive Periodic Media", Phys. Lett. A **141**, 37-42.
2. Aceves A. B., De Angelis C., Luther G. G., Rubenchik A. M. and Turitsyn S.K. (1995), "Energy Localization in nonlinear fiber arrays: Collapse effect compressor". Physical Review Letters **75**, 73-76.
3. A. B. Aceves (2000), "Optical gap solitons : Past, present and future; theory and experiments", Chaos **10**, 584.
4. A. Aceves, C.M. deSterke and M. Weinstein (2003), Book chapter: "Theory of nonlinear pulse propagation periodic structures " *Nonlinear Photonic Crystals*, B. Eggleton and R.E. Slusher. Springer series in Photonics, Vol 10. Springer Eds.
5. A. B. Aceves, T. Dohnal (2004) "Stopping and bending light in 2D photonic structures". Special volume paper in NATO Series II: Mathematics, Physics and Chemistry, Kluwer Eds.

Synergistic Activities:

• Faculty Member of two UNM Interdisciplinary degree programs (Optical Science and Engineering, Nanoscience and Micro-systems).
• Affiliate scientist at the Los Alamos National Laboratory (since 2003).
• Chair of the Nonlinear Waves and Coherent Structures of the Society for Industrial and Applied Mathematics (SIAM), 2005-06.
• Member of the Editorial Board the Book series on Mathematical Modeling and Computation, the Society for Industrial and Applied Mathematics (SIAM), 2005-08.
• Alliance for Faculty Diversity Commissioner for the Commission on Professionals in Science and Technology.

Former PhD students:

Prof. Anjan Biswas (PhD 1998, Associate Prof., Delaware Sate U.)
Dr. Paul Bennett (PhD 2000, Computer Scientist, Computer Science Corporation, Vicksburg Mississippi)
Dr. Tomas Dohnal (PhD 2005, Postdoctoral fellow ETH, Zurich Switzerland).

Current PhD students:

Gowri Srinivasan, Ernesto Sobrevilla, Alexei Sukhinin, Shadi Naderi, Bea Yu.

Postdoctoral Fellows:

Dr. Gregory Luther (Adaptive Optics); Prof. Gustavo Cruz-Pacheco (University of Mexico); Prof. Costantino De Angelis (University of Brescia, Italy); Dr. Marco Santagiustina (University of Padova, Italy).

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Edward J. Bedrick, Ph.D.	Professor
eRA COMMONS USER NAME	Dept of Internal Medicine
Bedrick	Dept of Mathematics and Statistics

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
SUNY, Buffalo	B.A.	1976	Statistics
University of Minnesota	Ph.D.	1984	Statistics

A. Positions and Honors.

Positions and Employment

1982-1991 Assistant Professor, Department of Mathematics and Statistics, University of New Mexico
1992-1998 Associate Professor, Department of Mathematics and Statistics, University of New Mexico
1998-2001 Director, University of New Mexico Statistics Clinic
1998- Professor, Department of Mathematics and Statistics, University of New Mexico
2002- Professor, Department of Family and Community Medicine, University of New Mexico
2002- Professor, Department of Internal Medicine, University of New Mexico

Other Experience and Professional Memberships

2001 President, Western North American Region, International Biometric Society
2002-2006 NIH Biostatistics Review Panel (BMRD: Biostatistical Methods and Research Design)

Honors

1997 - Regents' Lecturer, College of Arts and Sciences, University of New Mexico
2002 Elected Fellow of the American Statistical Association

B. Selected peer-reviewed publications (in chronological order).

(Publications selected from 75 peer-reviewed publications)

1. Bedrick EJ: Adjusted Chi-Squared Tests for Cross-Classified Tables of Survey Data. *Biometrika*, 70: 591-595, 1983
2. Bedrick EJ: Estimating the Variance of Empirical Logits and Contrasts in Empirical Log Probabilities. *Biometrics*, 40: 805-809, 1984
3. Bedrick EJ: A Family of Confidence Intervals for the Ratio of Two Binomial Proportions. *Biometrics*, 43: 993-998, 1987
4. Bedrick EJ and Hill JR: Outlier Tests for Logistic Regression: A Conditional Approach. *Biometrika*, 77: 815-827, 1990
5. Bedrick EJ: On the Large Sample Distributions of Modified Sample Biserial Correlation Coefficients, *Psychometrika*, 55: 217-228, 1990
6. Bedrick EJ: A Comparison of Generalized and Modified Sample Biserial Correlation Coefficients. *Psychometrika*, 57: 183-201, 1992
7. Bedrick EJ and Hill JR: An Empirical Assessment of Saddlepoint Approximations for Testing a Logistic Regression Parameter. *Biometrics*, 48: 529-544, 1992
8. Bedrick EJ and Hill JR: Assessing the Fit of the Logistic Regression Model to Individual Matched Sets of Case-Control Data. *Biometrics*, 52: 1-9, 1996
9. Osler T, Rutledge R, Deis J and Bedrick EJ: ICISS: An International Classification of Disease 9

Based Injury Severity Score (with discussion). The Journal of Trauma, 41(3): 380-388, 1996
10. Bedrick EJ and Breslin F: Estimating the Polyserial Correlation Coefficient. *Psychometrika*, 61: 427-443, 1996
11. Bedrick EJ, Christensen R and Johnson W: A New Perspective on Priors for Generalized Linear Models. *Journal of the American Statistical Association*, 91: 1450-1460, 1996
12. Christensen R and Bedrick EJ: Testing the Independence Assumption in Linear Models. *Journal of the American Statistical Association*, 92: 1006-1016, 1997
13. Bedrick EJ, Christensen R and Johnson W: Bayesian Binomial Regression: Predicting Survival at a Trauma Center. *The American Statistician*, 51:211-218, 1997
14. Osler T, Nelson L and Bedrick EJ: Injury Severity Scoring. *Journal of Critical Care Medicine*, 14: 9-19, 1999
15. Bedrick EJ and Hill JR: Properties and Applications of the Generalized Likelihood as a Summary Function for Prediction Problems. *Scandinavian Journal of Statistics*, 26: 593-609, 1999
16. Bedrick EJ and Christensen R: The Effect of Non-Normality on Near Replicate Lack of Fit Tests. *Canadian Journal of Statistics*. 27: 471-486, 1999
17. Bedrick EJ, Lapidus J and Powell JF: Estimating the Mahalanobis Distance with Mixed Continuous and Discrete Data. *Biometrics*. 56: 394-401, 2000
18. Bedrick EJ: Checking for Lack of Fit in Linear Models with Parametric Variance Functions. *Technometrics*. 42: 227-236, 2000
19. Tollestrup K, Frost F, Stidley C, Bedrick EJ, McMillan G, Kunde T and Petersen H: The Excess Costs of Breast Cancer Health Care in a Managed Care Organization. *Breast Cancer Research and Treatment*, 66, 25-31, 2001
20. Stidley CA, Tollestrup K, Frost FJ, Bedrick EJ and Petersen H: Mammography Utilization Following a Benign Breast Biopsy Among Hispanic and Non-Hispanic Women. *Cancer*, 91: 1716-1723, 2001
21. Bedrick EJ: An Efficient Scores Test for Comparing Several Measuring Devices. *Journal of Quality Technology*. 33: 96-103, 2001
22. Hanson T, Bedrick EJ, Johnson WO and Thurmond MC: A Mixture Model for Bovine Abortion and Foetal Survival, *Statistics in Medicine*. 22, 1725-1739, 2003.
23. Smith, HO., Hilgers, R. D., Bedrick, EJ, Qualls, CQ, Wiggins, CL, Rayburn, WF, Waxman, AG, Stephens, ND, Cole, LW, Swanson, M, and Key, CR: Ethnic Differences at Risk for Gestational Trophoblastic Disease in New Mexico: A 25Year Population-Based Study. *American Journal of Obstetrics and Gynecology*, 188: 357-366, 2003.
24. Thackaberry, EA., Bedrick, EJ, Goens, MB, Danielson, L, Lund, AK, Gabaldon, D, Smith, SM, and Walker, MK: Insulin Regulation in AhR-null Mice: Embryonic Cardiac Enlargement, Neonatal Macrosomia, and altered Insulin Regulation and Response in Pregnant and Aging AhR-null Females. *Toxicological Sciences*, 76: 406-417, 2003.
25. Mullins, PG, Rowland, L, Bustillo, J, Bedrick, EJ, Lauriello, J, and Brooks, WM: Reproducibility of H-1-MRS Measurements in Schizophrenic Patients, *Magnetic Resonance in Medicine*,50, 704-707, 2003
26. Arbogast, P. G. and Bedrick, E.J.:Model-Checking Techniques for Linear Models with Parametric Variance Functions, *Technometrics*, 46, 404-410, 2004
27. Rubin, R.L., Hermanson, T.M., Bedrick, E. J., McDonald, J.D., Burchiel, S.W., Reed, M. D., Sibbitt, W.L. Jr: Effect of Cigarette Smoke on Autoimmunity in Murine and Human Systemic Lupus Erythematosus, *Toxicological Sciences*, 87, 86-97, 2005
28. Brainard, A. H., Raynovich, W., Tandberg, D., and Bedrick, E. J: The Pre-Hospital 12-LeadElectrocardigrams Effect on Time to Initiation of Reperfusion Therapy: A Systematic Review and Meta-Analysis of Existing Literature, *The American Journal of Emergency Medicine*, 23, 351-356, 2005
29. Mayer, A. R., Kosson, D. S., and Bedrick, E. J.. Neuropsychological Implications of Selective Attentional Functioning in Psychopathic Offenders. *Neuropsychology,* 20(5): 614-624, 2006.

SHORT CURRICULUM VITAE

CHARLES P. BOYER

1. Professional Record

(1) 1988-present, Professor of Mathematics, University of New Mexico.
(2) 1983-1988, Associate Professor of Mathematics, Clarkson University.
(3) 1981-1983, Researcher (Titular C), Instituto de Investigaciones en Matematicas y en Sistemas (IIMAS), Universidad Nacional Autonoma de Mexico (UNAM).
(4) 1981-1982, Visiting Research Fellow, Harvard University.
(5) 1978-1981, Researcher (Titular B), Instituto de Investigaciones en Matematicas y en Sistemas (IIMAS), Universidad Nacional Autonoma de Mexico (UNAM).
(6) 1975-1978, Researcher (Titular A), Instituto de Investigaciones en Matematicas y en Sistemas (IIMAS), Universidad Nacional Autonoma de Mexico (UNAM).
(7) 1974-1975, Researcher (Asociado C), Instituto de Investigaciones en Matematicas y en Sistemas (IIMAS), Universidad Nacional Autonoma de Mexico (UNAM).
(8) 1973-1974, Visiting Researcher, Le Centre de Recherches Mathematiques, Universite de Montreal.
(9) 1972-1973, Visiting Researcher, Instituto de Investigaciones en Matematicas y en Sistemas (IIMAS), Universidad Nacional Autonoma de Mexico (UNAM).

2. Grants/Awards

(1) NSF DMS-0504367: Einstein Manifolds,Sasakian Geometry, and Kähler Orbifolds (with K. Galicki).
(2) NSF DMS-0203219: Contact Geometry, Fano Orbifolds, and Einstein Manifolds (with K. Galicki).
(3) NSF DMS-9970904: Contact Geometry and Einstein Manifolds (with K. Galicki).
(4) NSF DMS-9423752: Quaternionic Geometry, Einstein Manifolds, and the Topology of Moduli Spaces (with K. Galicki and B. Mann).
(5) NSF DMS-9200995: The Geometry and Topology of Moduli Spaces (with B. Mann).
(6) NSF DMS-9004076: The Geometry and Topology of Instanton Moduli Space (with B. Mann).
(7) NSF DMS-8815581: Moduli Problems and Iterated Loop Spaces in Mathematical Physics.
(8) NSF DMS-8508950: Geometrical Methods in Mathematical Physics.

• I was awarded the 'El Premio de Investigación en Ciencias Exactas' by La Academia de la Invesitigación Científica de México in 1981. With this award I was elected a member of La Academia de la Invesitigación Científica.

3. Publications

• Currently I have 103 publications. Here I list 30 of what I and others (e.g. citations in Scholar Google and MathSciNet) consider my most important as well as recent ones:

(1) Killing Vectors in Self-dual Euclidean Einstein Spaces. **Journal of Mathematical Physics**, Vol. 23, No. 6, pp. 1126-1130 (1982) with J.D. Finley, III.
(2) An Infinite Hierarchy of Conservation Laws and Nonlinear Superposition Principles for Self-dual Einstein Spaces, with J.F. Plebanski. **J. Math. Phys.** 26, 229-234 (1985).
(3) Conformal Duality and Compact Complex Surfaces, **Mathematische Annalen** 374, 517-526 (1986).
(4) A Note on Hyperhermitian Four-Manifolds, **Proc. Amer. Math. Soc.** 102, 157-164 (1988).
(5) Homology Operations on Instantons, with B. Mann, **J. Differential Geometry** 28, 423-455 (1988)
(6) Monopoles, Non-Linear σ Models, and Two-Fold Loop Spaces, with B. Mann, **Comm. Math. Phys.** 115, 571-594 (1988).
(7) The Topology of Instanton Moduli Spaces. I: The Atiyah-Jones Conjecture, with J.C. Hurtubise, B.M. Mann, and R.J. Milgram, **Annals of Mathematics** 137 (1993) 561-609.
(8) Algebraic Cycles and Infinite Loop Spaces, with H.B. Lawson, P. Lima-Filho, B.M. Mann, and M.-L. Michelsohn, **Inventiones Mathematicae** 113 (1993) 373-388.
(9) Quaternionic Reduction and Einstein Manifolds, with K. Galicki, and B.M.Mann, **Communications in Analysis and Geometry** 1 (1993) 229-279.
(10) Topology of Holomorphic Maps into Generalized Flag Manifolds, with J. Hurtubise, B.M. Mann, and R.J. Milgram, **Acta Mathematica** 173 (1994) 61-101.
(11) The Geometry and Topology of 3-Sasakian Manifolds, with K. Galicki and B.M. Mann. **J. reine und Ange. Math.** 455 (1994) 183-220.
(12) Hypercomplex Structures on Stiefel Manifolds, with K. Galicki and B.M. Mann. **Ann. of Global Anal. and Geom.** 14 (1996) 81-105.
(13) The Twistor Space of a 3-Sasakian Manifold, with K. Galicki, **International Journal of Mathematics** 8 (1997) 31-60.
(14) Compact 3-Sasakian 7-Manifolds with Arbitrary second Betti Number, with K. Galicki, B.M. Mann, and E.G. Rees, **Inventiones Mathematicae** 131 (1998) 321-344.
(15) A Note on Smooth Toral Reductions of Spheres, with K. Galicki and B.M. Mann, **Manuscripta Mathematica** 95 (1998) 149-158.
(16) 3-Sasakian Manifolds, with K. Galicki. Invited paper for book, Essays on Einstein Manifolds, C. LeBrun and M. Wang Editors, **Surveys in Differential Geometry Vol VI**, International Press, 1999.

(17) A Note on Toric Contact Geometry, with K. Galicki, **J. of Geometry and Physics** 35 (2000), 288-298.
(18) On Sasakian-Einstein Geometry, with K. Galicki, **International Journal of Mathematics** 11 (2000), 873-909.
(19) Contact Geometry and Einstein Manifolds, with K. Galicki, **Proc. Amer. Math. Soc.** 129 (2001), no. 8, 2419–2430.
(20) New Einstein Metrics in Dimension Five, with K. Galicki, **J. Diff. Geom.** 57 (2001) 443-463.
(21) Einstein Metrics on Rational Homology 7-Spheres, with K. Galicki and M. Nakamaye, **Ann Inst. Fourier** 52 (2002), 1569-1584.
(22) On the Geometry of Sasakian-Einstein 5-Manifolds, with K. Galicki and M. Nakamaye, **Mathematische Annalen** 325 (2003), 485-524.
(23) Sasakian Geometry, Homotopy Spheres, and Positive Ricci Curvature, with K. Galicki and M. Nakamaye, **Topology** 42 (2003), 981-1002.
(24) On Positive Sasakian Geometry, with K. Galicki and M. Nakamaye, **Geometriae Dedicata** 101 (2003), 93-102.
(25) Einstein Metrics on Spheres, with K. Galicki and J. Kollár, **Annals of Mathematics** 162 (2005), 557-580.
(26) On Eta-Einstein Sasakian Geometry, with K. Galicki and Paola Matzeu, **Commun. Math. Phys.** 262 (2006), 177-208.
(27) Einstein Metrics on Rational Homology Spheres, with K. Galicki, **J. Differential Geometry** 74 (2006) 353-362.
(28) Highly Connected Manifolds with Positive Ricci Curvature, with K. Galicki, **Geometry and Topology** 10 (2006) 2219-2235.
(29) Constructions in Sasakian Geometry, with K. Galicki and L. Ornea, **Mathematische Zeitschrift** 257 (4) (2007) 907-924.
(30) **Book**: Sasakian Geometry, **Oxford Mathematical Monographs**, Oxford Univ. Press, 2008, with K. Galicki.

4. Invited Talks

• I have given over 130 invited talks at many different universities and conferences including Harvard, MIT, the Institute for Advanced Study, MSRI, École Polytechnique, etc. Perhaps the most prestigious are:

(1) Invited Plenary Address at a Regional Meeting of the American Mathematical Society in 1997. This is number 11 on my list.
(2) I gave the "Goldberg Memorial Lecture" at the University of Illinois in 2002. This is 29 on my list.
(3) I was an invited speaker for the Conference on Differential Geometry–in honor of Paul Gauduchon, École Polytechnique, Palaiseau, France, in May of 2005.

5. Teaching

I have over 30 years experience teaching mathematics in both Spanish and English.

• Curriculum Development: I have designed much of our current graduate program in puremath, especially the geometry part. In particular, I have recently developed

a course that is partly based on the research monograph/graduate text that K. Galicki have written recently for Oxford University Press.

• Students: I have graduated 4 Ph.D students, (Y. Tian, G. Hernandez, E. Gasparim, W. Kehowski) and currently have 6 Ph.D students (C. Castañeda, J. Cuadros, R. Gomez, J. Kania, J. Pati, R. Sanchez-Silva), 2 of whom (R. Gomez and J. Cuadros) should graduate in May of 2008.

(1) My first student Youliang Tian had post-doc positions at such prestigious places as The Institute for Advance Studies in Princeton and Courant Institute in NYU, as well as a one year NSF post-doc fellowship which he spent at Harvard.
(2) My former student Elizabeth Gasparim is currently Associate Professor of Mathematics at New Mexico State University, and Lecturer at University of Edinburgh.

• Awards: I was awarded the Department's Outstanding Graduate Teacher award in 2000.

6. Service

• University Service:

(1) I served as Interim Chair of the Department for the Academic Year 2003/2004.
(2) I have served twice on the A&S Senior Promotion Committee, once as Chair of that committee.
(3) I served on many department committees including Chair of the Graduate Committee from 1989 to 1992, and frequently on the department's Executive Committee.

• Mathematical Community:

(1) Review NSF proposals and served on one Panel.
(2) Review for journals
(3) Associate Editor of the Rocky Mountain Journal of Mathematics
(4) Organizer of Special Sessions in several American Mathematical Society Regional Meetings
(5) Organizer of Special Sessions in two of the Joing American Mathematical Society/Mexican Mathematical Society Meetings
(6) Member of the American Mathematical Society
(7) Member of the National Academy of Scientific Research of Mexico

CURRICULUM VITAE

NAME: Michael Anthony Buchner

ADDRESS: Department of Mathematics & Statistics
The University of New Mexico
Albuquerque, NM 87131

EDUCATION:

A.B. Mathematics	Princeton University	1969
M.A. Mathematics	Harvard University	1970
Ph.D. Mathematics	Harvard University	1974

EMPLOYMENT:

Visiting Professor	Northwestern University	2001-2002
Professor	University of New Mexico	1993 - present
Guest Professor	Max Planck Institut fur Mathematik, Bonn (Jan 1992 - July 1992)	
Guest Professor	Departamento de Algebra, Universidad Complutense, Madrid (April 1991 - Dec. 1991)	
Guest Professor	Sonderforschungsbereich, Mathematik 170 Goettingen (Oct. 1990 - March 1991)	
Associate Professor	University of New Mexico	1986 - 1993
Assistant Professor	University of New Mexico	1984 - 1986
Assistant Professor	University of Maryland College Park	1978 - 1984
Guest Professor	Sonderforschungsbereich fur Theoretische Mathematik 40 Bonn, W. Germany	1982 - 1983
Visiting Assistant Professor	Institute of Physical Science and Technology University of Maryland	1981 - 1982
Guest Researcher	Sonderforschungsbereich fur Theoretische Mathematik 40 Bonn, W. Germany	1976 - 1978

Visiting Assistant Professor	University of Michigan Ann Arbor, Michigan	1974 - 1976
Teaching Assistant	Harvard University	1971 -1974

PUBLICATIONS

Research Articles:

1. "On the Generic Nature of Property H1 for Hamiltonian Vector Fields, A.M.S. Proceedings of Symposia in Pure Mathematics," Global Analysis, 14 (1970), pp. 51-54.

2. "Simplicial Structure of the Real Analytic Cut Locus," Proceedings of the American Math. Soc., 64 (1977), pp. 18-21.

3. "Stability of the Cut Locus in Dimensions Less Than or Equal to 6," Inventiones Math., 43 (1977), pp. 199-231.

4. "Structure of the Cut Locus in Dimensions Less Than or Equal to 6," Compositio Mathematicae, 37 (1978), pp. 103-119.

5. "Geometry and Cohomology of Certain Domains in the Complex Projective Space," (with K. Fritzsche, T. Sakai), J. Reine Angew. Math., 323 (1981), pp. 1-52.

6. "On the Dimension of Analytic Cohomology," (with K. Fritzsche), Math Zeitschrift, 197 (1982), pp. 375-385.

7. "The Cohomological and Analytic Completeness of $P(\div^2 |^n)\backslash G_{2,n}$," (with K. Fritzsche), Math. Annalen, 261 (1982), pp. 327-338.

8. "Applications of the Blowing-Up Construction and Algebraic Geometry to Bifurcation Problems," (with J. Marsden, S. Schecter), J. of Differential Equations, 48, No. 3, June 1983, pp. 404-433.

9. "Examples for the Infinite Dimensional Morse Lemma," (with J. Marsden, S. Schecter), SIAM J. Math. Anal., 14, No. 6, November 1983, pp. 1045-1055.

10. "A Note on C1 Equivalence," J. of Mathematical Analysis and Applications, 121, No. 1, January 1987, pp. 91-95.

11. "Almost Analytic Local Algebraicity of Analytic Sets and Functions," (with W. Kucharz), Math. Zeitschrift, 196 (1987), pp. 64-74.

12. "Algebraic Vector Bundles Over Real Algebraic Varieties," (with W. Kucharz), Bulletin of the American Mathematical Society, 17, No. 2, October 1987, pp. 279-282.

13. "Topological Triviality of a Family of Zero-Sets," (with W. Kucharz). Proceedings of the American Mathematical Society, 102, No. 1, January 1988), pp. 1-7.

14. "On Relative Real Holomorphy Rings," (with W. Kucharz), Manuscripta Mathematics 63, 303-316 (1989).

CURRICULUM VITAE - ALEXANDRU BUIUM

Mathematics Education

- M.S. from the University of Bucharest, 1980.
- Ph.D. from the University of Bucharest, 1983.

Mathematics Positions

- 1999-: Professor, University of New Mexico (Albuquerque).
- 1998-1999: Professor, University of Illinois (Urbana-Champaign).
- 1997-1998: Professor, University of New Mexico (Albuquerque).
- 1995-1997: Associate Professor, University of New Mexico (Albuquerque).
- 1994-1995: Visiting Professor, Max Planck Institut für Mathematik (Bonn).
- 1993-1994: Member, Institute for Advanced Study (Princeton).
- 1993: Humboldt Fellow, Max Planck Institut für Mathematik (Bonn).
- 1992: Humboldt Fellow, University of Essen.
- 1991: Visiting Scholar, University of Paris VII.
- 1991: Visiting Professor, Columbia University (New York).
- 1990-1995: Senior Researcher at the Institute of Mathematics of the Romanian Academy (Bucharest).
- 1983-1989: Researcher at the National Institute for Scientific and Technical Research (Bucharest).

Grants

- NSF Grant DMS 9500331, 1995-1998: Differential algebra and diophantine geometry (University of New Mexico).
- NSF Grant DMS 9730183/9996078, 1998-2001: Arithmetic analogue of differential algebraic geometry (University of New Mexico and University of Illinois).
- GIG NSF Grant, 1997-2002: Center for Arithmetical Algebraic Geometry (University of Arizona).
- NSF Grant DMS 0096946, 2001-2004: Fermat adeles and differential modular forms (University of New Mexico).
- NSF Grant DMS 0552314, 2006-2009: Fermat quotients, correspondences, and uniformization (University of New Mexico).

Graduate students

- Christine Hurlburt (1999)
- Mugurel Barcau (2001)
- Ken Zimmerman (2003)
- Derek Martinez (2004)
- Andrey Glubokov (2005)

SELECTED PUBLICATIONS BY ALEXANDRU BUIUM

Research Monographs

- Differential Function Fields and Moduli of Algebraic Varieties, Lecture Notes in Math. 1226, Springer 1986.
- Differential Algebraic Groups of Finite Dimension, Lecture Notes in Math. 1506, Springer 1992.
- Differential Algebra and Diophantine Geometry, Hermann, Paris, 1994.
- Arithmetic Differential Equations, Mathematical Surveys and Monographs 118, AMS, 2005. AMS bookstore
  / Preface (pdf)

Research papers (1992-present)

- Intersections in jet spaces and a conjecture of S.Lang, Annals of Math. 136 (1992), 583-593.
- Geometry of differential polynomial functions I: algebraic groups, Amer J. Math. 115, 6 (1993), 1385-1444.
- Effective bound for the geometric Lang conjecture, Duke Math. J., 71, 2 (1993), 475-499.
- A finiteness theorem for isogeny correspondences, in: Journes de Geometrie Algebrique d'Orsay 1992, Asterisque 218, 1993.
- (with F.Voloch) Integral points on abelian varieties over function fields of characteristic zero, Math. Ann. 297 (1993), 303-307.
- Geometry of differential polynomial functions II: algebraic curves, Amer J. Math. 116, 4, (1994), 785-819.
- The abc theorem for abelian varieties, Intern. Math. Research Notices 5 (1994), 219-233.
- On a question of B.Mazur, Duke Math. J., 75, 3, (1994), 639-644.
- Geometry of differential polynomial functions III: moduli spaces, Amer J. Math. 117 (1995), 1-73.
- (with F.Voloch) Reduction of the Manin map modulo p, Crelle J., 460 (1995), 117-126.
- Differential characters of abelian varieties over p-adic fields, Invent. Math., 122, 2, (1995), 309-340.
- Uniform bound for generic points of curves in tori, Crelle J., 469 (1995), 211-219.
- (with F.Voloch) Mordell conjecture in characteristic p: an explicit bound, Compositio Math., 103, (1996), 1-6.
- Geometry of p-jets, Duke Math. J., 82, 2, (1996), 349-367.
- An approximation property for Teichmuller points, Math. Research Letters, 3 (1996), 453-457.
- Differential characters and characteristic polynomial of Frobenius, Crelle J., 485 (1997), 209-219.
- (with A. Pillay) A gap theorem for abelian varieties over differential fields, Math. Research Letters 4, 211-219 (1997).
- Differential algebraic geometry and diophantine geometry: an overview, in: Symposia Math. 37, Cambridge U.P., 1997.
- Arithmetic analogues of derivations, J. Algebra, 198, (1997), 290-299.
- Intersection multiplicities on abelian varieties, Math. Ann. 310 (1998), 653-659.
- Differential subgroups of simple algebraic groups over p-adic fields, Amer. J. Math. 120 (1998), 1277-1287.
- (with P. Cassidy) Differential algebraic geometry and differential algebraic groups, in: Collected Works of Ellis Kolchin, AMS, 1999.
- Differential Modular Forms, Crelle J., 520 (2000), 95-167.
- Continuous p-adic functions and p-derivations, J. Number Theory, 84 (2000), 34-39.
- Infinitesimal Mordell-Lang, J. Number Theory 90 (2001), 185-206.
- (with M. Barcau) Siegel differential modular forms, International Math. Res. Notices, 2002, No. 28,

pp.1459-1503.

- Quotients of algebraic varieties by Zariski dense equivalence relations, in: Parshin Festschrift, Zarhin and Vostokov Eds., Contemporary Math., Vol. 300, AMS (2002), 59-97. file.dvi.
- (with K. Zimmerman) Homogeneous p-differential polynomials, J. Algebra, 269 (2003), 492-507. file.dvi
- Differential modular forms on Shimura curves,I, Compositio Math. 139 (2003), 197-237. file.dvi.
- Differential modular forms on Shimura curves, II: Serre operators, Compositio Math. 140 (2004), 1113-1134. file.dvi.
- Pfaffian equations satisfied by differential modular forms, Math. Res. Letters 11 (2004), 453-466.
- Geometry of Fermat Adeles, Trans. AMS 357, 3 (2005), 901-964. file.dvi.
- (with K. Zimmerman) Differential orbit spaces of discrete dynamical systems, Crelle J. 580 (2005), 201-230. file.dvi
- Complex dynamics and invariant forms mod p, International Math. Res. Notices 31 (2005), 1889-1899.
- Finiteness results in differential algebraic geometry and diophantine geometry, in: On Finiteness in Differential Equations and Diophantine Geometry, CRM Monograph Series 24, AMS, 2005.
- A differential equation satisfied by the arithmetic Kodaira-Spencer class, J. Number Theory 119 (2006), 297-306.
- Correspondences, Fermat quotients, and uniformization, in: Groupes de Galois arithmetiques et differentiels, Seminaires et Congres 13, Societe Mathematique de France, (2007), 70-89.
- Differential eigenforms, to appear in J. Number Theory.
- Differential characters on curves, submitted to the Serge Lang Memorial Volume.
- (with B. Poonen) Independence of points on elliptic curves arising from special points on modular and Shimura curves, I: global results, submitted to Duke Math. J. (see arxiv)
- (with B. Poonen) Independence of points on elliptic curves arising from special points on modular and Shimura curves, II: local results, submitted to Compositio Math. (see arxiv)
- (with S. Simanca) Arithmetic partial differential equations, submitted to Amer. J. Math. (see arxiv)
- (with S. Simanca) Arithmetic partial differential equations II: modular curves, preprint.
- (with S. Simanca) Arithmetic partial differential equations III: several primes, preprint.

Other publications

- Serge Lang's early work on Diophantine and algebraic geometry, Notices of the AMS 54, 4 (2007), 479-484.

Return to:

- Dr. Buium's Homepage
- Department of Mathematics and Statistics

Ronald Christensen

Professor of Statistics
University of New Mexico
Department of Mathematics and Statistics

EDUCATION:

Ph.D., Statistics, University of Minnesota, 1983.

M.S., Statistics, University of Minnesota, 1976.

B.A., Mathematics, University of Minnesota, 1974.

EXPERIENCE:

1994-	Professor, Department of Mathematics and Statistics, University of New Mexico.
1998-2001, 2003-	Founding Director, Statistics Clinic, University of New Mexico.
1988-1994	Associate Professor, Department of Mathematics and Statistics, University of New Mexico.
1982-1988	Assistant Professor, Department of Mathematical Sciences, Montana State University.
1994	Visiting Professor, Department of Mathematics and Statistics, University of Canterbury, Chch., N.Z.
1987	Visiting Assistant Professor, Department of Theoretical Statistics, University of Minnesota.

RESEARCH INTERESTS:

Linear Models

Bayesian Inference

Log-linear and Logistic Regression Models

Statistical Methods

SOCIETIES AND HONORS:

Fellow of the American Statistical Association, 1996

Fellow of the Institute of Mathematical Statistics, 1998

International Biometric Society

American Society for Quality

Phi Beta Kappa

PUBLICATIONS:

1. Christensen, Ronald and Johnson, Wesley (2006). "A Conversation with Seymour Geisser." *Statistical Science*, accepted.

2. Christensen, Ronald (2006). "Comment on Monahan (2006)." *The American Statistician*, **60**, accepted.

3. Christensen, Ronald (2006). "General prediction theory and the role of R^2." *The American Statistician*, under revision.

4. Christensen, Ronald (2006). "The life and times of Seymour Geisser: A subjective interpretation." *Proceedings of the 2005 Joint Statistical Meetings*, to appear.

5. Christensen, Ronald (2006). "Comment on Friedman and Wall (2005)." *The American Statistician*, **60**, 101-102.

6. Christensen, Ronald (2005). "Reply to a comment on Christensen (2005)." *The American Statistician*, **59**, 353.

7. Johnson, Wesley and Christensen, Ronald (2005). "Seymour Geisser." *Encyclopedia of Statistics in Behavioral Science*, **3**, 2045-2048.

8. Christensen, Ronald (2005). "Testing Fisher, Neyman, Pearson, and Bayes." *The American Statistician*, **59**, 121-126.

9. Christensen, Ronald (2005). "Logistic Regression." In Everitt, B. & Howell, B.C. (Ed.s) *Encyclopedia of Behavioural Statistics.*

10. Johnson, Wesley O, Su, Chun-Lung, Gardner, Ian A., and Christensen, Ronald (2004). "Sample Size Calculations for Surveys to Substantiate Freedom of Populations from Infection Agents." *Biometrics*, **59**, 165-171.

11. Christensen, Ronald (2003). 'Comment on "Could Fisher, Jeffreys, and Neyman Have Agreed About Testing."' *Statistical Science*, **18**, 12-13.

12. Christensen, Ronald (2003). "Significantly Insignificant F Tests." *The American Statistician*, **57**, 27-32.

13. Christensen, Ronald (2002). *Plane Answers to Complex Questions: The Theory of Linear Models*, Third Edition. Springer-Verlag, New York.

14. Fugate, Michael L., Christensen, Ronald, Hush, Don, and Scovel, Clint (2002). "An equivalence relation between parallel calibration, Q matrix, and principal component regression." *Journal of Chemometrics*, **16(#1)**, 68-70.

15. Greenland, Sander and Christensen, Ronald (2001). "Data-augmentation priors for Bayesian and semi-Bayes analysis of conditional-logistic and proportional-hazards regression." *Statistics in Medicine*, **20**, 2421-2428.

16. Christensen, Ronald (2001). "Linear hypothesis." *International Encyclopedia of the Social and Behavioral Sciences*, **13**, 8874-8881.

17. Christensen, Ronald (2001). "Analysis of variance and generalized linear models." *International Encyclopedia of the Social and Behavioral Sciences*, **1**, 473-480.

18. Christensen, Ronald (2001). Letter to the Editor, *Journal of Quality Technology*, **33**, 127.

19. Christensen, Ronald (2001). *Advanced Linear Modelling: Multivariate, Time Series, and Spatial Data, Nonparametric Regression, p^n Factorials, and Response Surfaces*, Second Edition. Springer-Verlag, New York.

20. Christensen, Ronald (2001). "Review of *Introduction to Graphical Modelling, Second Edition* by David Edwards." *Journal of the American Statistictical Association*, **96**.

21. Christensen, Ronald (2000). "Discussion of 'Invariance and factorial models' by Peter McCullagh." *Journal of the Royal Statistical Society, Series B*, **62**, 247-248.

22. Christensen, Ronald (2000). "Linear and log-linear models." *Journal of the American Statistical Association*, **95**, 1290-1293.

23. Bedrick, Edward J., Christensen, Ronald, and Johnson, Wesley (2000). "Bayesian accelerated failure time analysis with application to veterinary epidemiology." *Statistics in Medicine*, **19**, 221-237.

24. Christensen, Ronald and Bedrick, Edward J. (1999). "A survey of some new alternatives to Wald's variance component test." *Tatra Mountains Mathematical Publications*, **17**, 91-102.

25. Bedrick, Edward J. and Christensen, Ronald (1999). "The effect of nonnormality on near replicate lack of fit tests." *Canadian Journal of Statistics*, **27**, 471-484.

26. Gilbert, Steven and Christensen, Ronald (1999). "Review of *Statistical Tests for Mixed Linear Models* by Khuri, Mathew and Sinha." *Journal of Quality Technology*, **31**, 469-470.

27. Christensen, Ronald (1999). "Review of *Matrix Algebra from a Statistician's Perspective* by David A. Harville." *Metrika*, **50**, 269-270.

28. Christensen, Ronald (1999). "Discussion of 'Prediction of spatial cumulative distribution functions using subsampling' by Cressie et al." *Journal of the American Statistical Association*, **94**, 99-100.

29. Christensen, Ronald (1998). "Discussion of 'Some algebra and geometry for hierarchical models, applied to diagnostics' by James S. Hodges." *Journal of the Royal Statistical Society, Series B*, **60**, 531.

30. Christensen, Ronald (1997). *Log-linear Models and Logistic Regression*, Second Edition. Springer-Verlag, New York.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Evangelos A. Coutsias	Professor
eRA COMMONS USER NAME	
ECOUTSIAS	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
California Institute of Technology	B.S.	1975	Physics
California Institute of Technology	Ph.D.	1980	Applied Mathematics

A. Positions and Honors

Professional Experience:

1979-1985 Assistant Professor of Mathematics, Univ. of New Mexico, Albuquerque, NM
1982-1989 Consultant, Los Alamos National Laboratory, Los Alamos, NM
1983 Consultant, Mission Research Corporation, Albuquerque, NM
1987 Visiting Lecturer, Dept. of Mathematics SUNY-Buffalo, NY
1985-1995 Associate Professor of Mathematics, Univ. of New Mexico, Albuquerque, NM
1988-2001 Consultant, Risoe National Laboratory, Roskilde, Denmark
1989-1990 Research Visiting Professor, Risoe National Laboratory, Roskilde, Denmark
1990-1991 Senior Research Analyst, Phillips Laboratory, Albuquerque NM
1995-- Professor, Dept. of Mathematics, Univ. of New Mexico, Albuquerque, NM
2000-- Visiting Professor, Dept. of Pharmaceutical Chemistry, Univ. of California, San Francisco, CA

Service: occasional reviewer for (most recently) SIAM Journal on Scientific Computing, Applied Numerical Mathematics, SIAM Journal of Numerical Analysis, Journal of Computational Physics, Journal of Computational Chemistry, Journal of Chemical Theory and Computation.

Honors:

1975-1976 Caltech Graduate Fellowship
1993 NASA Minority Scholarship Program excellence in teaching award.
2003-2004 Outstanding Undergraduate Instructor

B. Publications:

Selected from 46 total publications.

1. Chaok Seok and E.A. Coutsias, Efficiency of Rotational Operators for Geometric Manipulation of Chain Molecules , Bulletin of the Korean Chemical Society, 28(10), p.1705-1708, (2007).
2. R. Lewis, E.A. Coutsias. Algorithmic search for flexibility using resultants of polynomial systems, p.68-79, Automated Deduction in Geometry: 6th International Workshop, Pontevedra, Spain, Aug.31-Sep.2, 2006, Lecture Notes in Artificial Intelligence, vol. 4869, F. Botana, T. Recio (Eds.), Springer, Berlin (2007).
3. E.A. Coutsias, C. Seok, M.J. Wester and K.A. Dill. Resultants and Loop Closure. (International Journal of Quantum Chemistry, 2005, 106(1):176-189)
4. G. von Winckel, S. Krishna, E.A. Coutsias. Spectral element modeling of semiconductor heterostructures. (Mathematical and Computer Modeling, 2006, 43:582-591)

5. E.A. Coutsias, C. Seok, K. Dill. Rotational Superposition and least squares: The SVD and Quaternions approaches yield identical results. (Reply to comment by G. Kneller). (Journal of Computational Chemistry, 2005, 26:1663-1665)
6. B. Burroughs, E.A. Coutsias, L. Romero. A reduced-order partial differential equation model for dynamics of the flow in a thermosyphon. (Journal of Fluid Mechanics, 2005, 543:203-237)
7. B. Ho, E.A. Coutsias, C. Seok, K. Dill. The flexibility in the proline ring couples to the protein backbone. (Protein Science, 2005, 14:1011-1018)
8. L.O. Sillerud, S.G. Popa , E.A. Coutsias, D. Sheltraw, D. Kuethe, N. Adolphi. Research Results on Biomagnetic Imaging of Lung Tumors. Proc. SPIE Vol. 5692, p. 1-10, Advanced Biomedical and Clinical Diagnostic Systems III; Tuan Vo-Dinh, Warren S. Grundfest M.D., David A. Benaron M.D., Gerald E. Cohn; Eds., April 2005
9. E. A. Coutsias, C. Seok, and K. A. Dill. Using Quaternions to calculate RMSD. *Journal of Computational Chemistry,* 25 (2004) 1849-1857.
10. E. A. Coutsias, C. Seok, M. P. Jacobson and K. A. Dill. A Kinematic View of Loop Closure. *Journal of Computational Chemistry,* 25 (2004) 510-528.
11. D.Sheltraw and E.A. Coutsias. Invertibilty of Current Density from Near-Field Electromagnetic Data. *Journal of Applied Physics,* 94 (2003) 5307-5315.
12. H.J.H. Clercx, A.H. Nielsen, D.J. Torres and E.A. Coutsias. Two-dimensional turbulence in square and circular domains with no-slip walls. *European J. of Mechanics B – Fluids,* 20 (2001) 557-576.
13. L. Ketai, C. M. Coutsias, S. Williamson and E. A. Coutsias. Thin-Section CT Evidence of Bronchial Thickening in Children with Stable Asthma: Bronchoconstriction or Airway Remodeling? *Academic Radiology,* 8 (2001) 257-264.
14. K. Bergeron, E. A. Coutsias, J. P. Lynov and A. H. Nielsen. Dynamical properties of forced shear layers in an annular geometry. *Journal of Fluid Mechanics,* 402 (2000) 255-289.
15. P. M. Alsing, E. A. Coutsias and J. C. McIver. The Interfacial Behavior of Liquid Water Near Hydrophobic Surfaces: A Parallel Force Decomposition Molecular Dynamics Code, in *Applications of High-Performance Computing in Engineering VI*, Eds. M. Ingber, C.A. Brebbia and H. Power, WIT Press, Boston (2000) 81-90.
16. D. J. Torres and E. A. Coutsias. Pseudospectral Solution of the Two-Dimensional Navier-Stokes Equations in a Disk. *SIAM Journal on Scientific Computing,* 21 (1999) 378-403.
17. E. A. Coutsias and N. D. Kazarinoff. The Approximate Functional Formula for the Theta Function and Diophantine Gauss Sums. *Transactions of the AMS,* 350 (1998) 615-641.
18. E. A. Coutsias, M. Wester and A. S. Perelson. A Nucleation Theory of Cell Surface Capping. *J. Statistical Physics,* 87 (1997) 1179-1203.
19. G. Harel, G. Kurizki, J. K. McIver and E. A. Coutsias. Optimized preparation of quantum states by conditional measurement. *Phys. Rev. A,* 53 (1996) 4534-4538.
20. E. A. Coutsias, T. Hagstrom and D. Torres. An efficient spectral method for ordinary differential equations with rational function coefficients. *Mathematics of Computation,* 65 (1996) 611-635.
21. B. S. Masson and E. A. Coutsias. Acoustic Wave nonlinearity in stimulated Brillouin scattering. *J.Opt.Soc.Am. B,* 11 (1994) 1367-1373.
22. H. L. Pecseli, E. A. Coutsias, T. Huld, J. P. Lynov, A. H. Nielsen and J. Juul Rasmussen. Coherent vortical structures in two- dimensional plasma turbulence. *Plasma Phys. Contr. Fusion,* 34 (1992) 2065-2070.
23. E. A. Coutsias and J. P. Lynov. Fundamental interactions of vortical structures with boundary layers in two-dimensional flows. *Physica,* D51 (1991) 482-497.
24. E. A. Coutsias and H. Segur. A new formulation for dendritic crystal growth in two space dimensions. Asymptotics beyond All Orders. H. Segur, H. Levin and S. Tanveer, eds., Plenum Press, New York (1991) 87-104.
25. E. A. Coutsias, F. R. Hansen, T. Huld, G. Knorr and J. P. Lynov. Spectral methods for numerical plasma simulation. *Physica Scripta,* 40 (1989) 270-279.

26. E. A. Coutsias. Caustics and virtual cathodes in electron beams. *J. Plasma Phys.*, 40 (1988) 369-384.
27. D. J. Sullivan, J. E. Walsh and E. A. Coutsias. Virtual cathode oscillator (Vircator) theory. High-Power Microwave Sources, Ch.13, V.L. Granatstein and I. Alexeff, eds., Artech House, Boston (1987) 441-505.
28. E. A. Coutsias and N. D. Kazarinoff. Disorder, renormalizability, theta functions and cornu spirals. *Physica*, 26D (1987) 295-310.
29. A. S. Perelson and E. A. Coutsias. A moving boundary model of acrosomal elongation. *J. Math. Biology*, 23 (1986) 361-379.
30. E. A. Coutsias and J. K. McIver. Non relativistic Kapitza-Dirac scattering. *Phys. Rev. A*, 31 (1985) 3155-3168.
31. E. A. Coutsias. Effects of thermal spread on the space charge limit of an electron beam. *J. Plasma Phys.*, 31 (1984) 313-320.
32. E. A. Coutsias and J. C. Neu. The aging of nuclei in a binary mixture. *Physica*, 12D (1984) 295-302.
33. E. A. Coutsias and D. J. Sullivan. Space charge limit instabilities in electron beams. *Phys. Rev. A*, 27 (1983) 1535.
34. E. A. Coutsias and B. A. Huberman. Long-time behavior of Ginzburg-Landau systems far from equilibrium. *Physical Rev. B*, 24 (1981) 2592.
35. D. S. Cohen, E. A. Coutsias and J. C. Neu. Stable oscillations in single species growth models with hereditary effects. *Mathematical Biosciences*, 44 (1979) 255-268.

E.A. Coutsias – Students

Victor Espino, "On point vortex solutions of the Euler equations", PhD 1987
Keith Bergeron, "Evolution of two-dimensional circular shear flows", PhD 1993
David Torres, "Integration operators in the spectral tau-method with Navier-Stokes applications", PhD 1996
Rob Wolverton, "Shear layer stability in a two-dimensional disk", PhD 2001
Elisaberth Burroughs, "Convection in a thermosyphon: bifurcation and stability analysis", PhD 2003
Sara Pollock, "Inverse kinematics and the conformations of cyclooctane", Undergraduate Honors Thesis, 2007

E.A. Coutsias – Current Research Support

2007-2010
GM081710 M. Jacobson(PI), K. Dill (Co-PI), E.A. Coutsias (Co-I)
National Institutes of Health
"Physics based methodologies for homology model refinement"
Development of new methodologies based on ideas and techniques from robotics and computational algebraic geometry to develop fast and efficient methods for sampling the conformational space of proteins. Application to the refinement of homology models.

2006-2007 T. Oprea (PI), E.A. Coutsias (Co-PI), M.J. Wester (Co-I)
University of New Mexico,
"Systematic enumeration of molecular scaffolds"
Systematic topological classification of molecular scaffolds of relevance to drug discovery and production of a complete library of scaffolds with up to 8 rings.

February 28, 2008

Biographical Sketch

James A. Ellison

Education:

Ph.D.	California Institute of Technology (Applied Mathematics)	1971
B.S. and M.S.	University of Wisconsin (Engineering Mechanics)	1964 and 1965
Ph.D. Advisor:	Professor T.K. Caughey, Cal Tech, Deceased	

Appointments:

1. Mathematics Faculty Member, UNM, 1970-present; currently Full Professor.
2. Guest Scientist at Deutsches Elektronen-Synchrotron (DESY) in Hamburg, May, 1997 to August, 1998 and summers of 1995 and 1996.
3. Guest Scientist at the Superconducting Super Collider Laboratory, 1/3 time academic years 1990-1993, summers 1991-1993 and full time academic year 1993-94.
4. Summer Research Appointments for Dynamical Systems Studies of Channeling, Naval Research Laboratory, Washington, D.C., Summers 1984 - 1988.
5. Guest Scientist, Institute of Physics, Aarhus University, Denmark, Academic year 1988-89 and Fall-Winter 1981-82. Particle Channeling in Crystals and Channeling Radiation.
6. Guest Scientist, CERN, Summer 1982. Channeling Radiation.
7. Guest Scientist, Physics Department, SUNY at Albany, 1976-77. Particle Channeling in Crystals.

Research Areas:

1. Mathematics of Beam Dynamics in Modern Particle Accelerators: Colliders, Light Sources and Free Electron Lasers.
2. Vlasov and Vlasov-Maxwell Equations: analysis, numerical analysis and scientific computing..
3. Coherent Synchrotron Radiation and related effects in accelerators.
4. Analysis of Spin Systems in Particle Accelerators.
5. Mathematics of Particle Channeling in Crystals with Applications in Materials Science and Particle Physics Technology.
6. Dynamical Systems with an emphasis on rigorous perturbation theory.
7. Stochastic Processes with an emphasis on random perturbation of dynamical systems, Ito SDEs and Fokker-Planck equations.
8. Applications of Ergodic Theory.

Selected Publications :

1. Self-Consistent Computation of Electrodynamic Fields and Phase Space Densities For Particles on Curved Planar Orbits. Invited talk and Paper, 22nd Particle Accelerator Conference, Albuquerque, June, 2007. `http://accelconf.web.cern.ch/accelconf/p07/HTML/AUTHOR.HTM` J.A. Ellison, G. Bassi, K. Heinemann, M. Venturini and R. Warnock
2. Polarization Fields and Phase Space Densities: Stroboscopic Averaging and the Ergodic Theorem. *Physica D* 234, 131-149(2007). J. A. Ellison and K. Heinemann.
3. A New Model for the Colective Beam-Beam Interaction. Invited article for a focus issue in *New Journal of Physics* 9, 32 (2007) 20 pages. J. A. Ellison, A.V. Sobol and M. Vogt.
4. Vlasov treatment of coherent synchrotron radiation from arbitrary planar orbits. *Nuclear Inst. and Methods in Physics Research*, A 558(2006) 85-89. R. Warnock, G. Bassi and J. A. Ellison
5. Coherent Synchrotron Radiation and Bunch Stability in a Compact Storage Ring, *Phys. Rev. ST Accel. Beams* 8, 014202 (2005). M. Venturini, R. Warnock, R.Ruth and J. A. Ellison (15 pages).
6. Impedance Description of Coherent Synchrotron Radiation with Account of Bunch Deformation, *Phys. Rev. ST Accel. Beams*, 8, 014402 (2005). R. Warnock, R.Ruth, M. Venturini and J. A. Ellison (11 pages).
7. First-Order Averaging Theorems for Maps With Applications to Accelerator Beam Dynamics. *SIAM Journal on Applied Dynamical Systems*, 3, 409-432, (2004). H. S. Dumas, J. A. Ellison and M. Vogt.

8. Quasiperiodic spin-orbit motion and spin tunes in storage rings, *Phys. Rev. ST Accel. Beams*, 7, 124002 (2004). D. P. Barber, J. A. Ellison and K. Heinemann (33 pages).
9. Equilibrium State of Colliding Electron Beams. *Phys. Rev. ST Accel. Beams* 6, 104401 (2003). R. L. Warnock and J. A. Ellison (16 pages).
10. Beam Extraction Studies at 900 GeV using a Channeling Crystal. *Phys. Rev. ST Accel. Beams* 5, 043501 (2002) [24 pages]. Fermilab collaboration.
11. Simulations of three 1-d limits of the strong-strong beam-beam interaction in hadron colliders using weighted macro-particle tracking. *Phys. Rev. ST Accel. Beams* 5, 024401 (2002) [21 pages]. M. Vogt, T. Sen and J. A. Ellison.
12. A Mathematical Theory of Planar Particle Channeling in Crystals, *Physica D*, 146(2000)341-366. H. S. Dumas, J. A. Ellison and F. Glose.
13. A general method for propagation of the phase space distribution,with application to the saw-tooth instability, *Proc. 2nd ICFA Workshop on High Brightness Beams*, UCLA, 1999, 322-348. R. L. Warnock and J. A. Ellison.
14. Orbital Eigen-analysis for Electron Storage Rings, in "Handbook of Accelerator Physics and Engineering", edited by A.Chao and M. Tigner, World Scientific, 1999, 53-55. (H. Mais, G. Ripken)
15. Accelerators and Probability: The Special Effect of Noise in Beam Dynamics. Invited paper for the proceedings of the workshop on "Nonlinear and Stochastic Beam Dynamics - A Challenge to Theoretical and Computational Physics", Lüneburg, 1997. DESY-Proceedings, 1998-03, 7-59.
16. From symplectic integrator to Poincaré map: spline expansion of a map generator in Cartesian coordinates, *Applied Numerical Mathematics*, 29 (1999)89-98. R. L. Warnock and J. A. Ellison.
17. Energy Dependence of the Stability Type of Periodic Orbits in a Two-Dimensional Channeling Model, *Physica D*, 106, 39-48(1997).(Saenz).
18. Transverse Beam Dynamics with Noise, *Particle Accelerators*, 54, 135-149 (1996). (Sen).
19. "The Method of Averaging in Beam Dynamics," invited paper in Accelerator Physics Lectures at the Superconducting Super Collider, AIP Conference Proceedings 326, edited by Yiton Yan and Mike Syphers (1995).
20. Effect of Betatron Motion on Particle Loss Due to Longitudinal Diffusion in High Energy Colliders, *Phys. Rev. Letters*, 71, 356- 359 (1993). (Newberger, Shih).
21. A Four-thirds Law for Phase Randomization of Stochastically Perturbed Oscillators and Related Phenomena, *Communications of Mathematical Physics*, 166, 317-336 (1994). (Cogburn).
22. Transcendentally Small Transversality in the Rapidly Forced Pendulum, *Journal of Dynamics and Differential Equations*, 5, 241- 277 (1993). (Kummer, Saenz).
23. A Stochastic Theory of Adiabatic Invariance, *Communications of Mathematical Physics*, Vol. 148 (1992) pp. 97-126. (Cogburn).
24. Axial Channeling, the Continuum Model and the Method of Averaging, *Annals of Physics*, 209, July 1991, (Dumas and Saenz).
25. Improved Nth Order Averaging Theory for Periodic Systems, *J. of Differential Equations*, 84, 383 (1990), (Saenz, Dumas).
26. Deflection of GeV Particle Beams by Channeling in Bent Crystal Planes of Constant Curvature, *Nucl. Phys. B* 318, 301 (1989)
27. Planar Channeling in Superlattices I: Theory, Ellison, Picraux, Chu, Allen, *Phy. Rev. B*, 37, 7290 (1988).
28. The Method of Averaging and the Quantum Anharmonic Oscillator, *Phy. Rev. Lett.*, 55, 1950 (1985). (A. Ben-Lemlih)
29. Channeling radiation from 2-55 GeV/C electrons and positrons. *Nucl. Phys. B* 254, 491 (1985). (CERN Collaboration)
30. Bending of GeV Particle Beams by Channeling in Bent Crystal Planes. *Nucl. Phys. B* 206 205 (1982).
31. Continuum Model Planar Channeling and the Tangent Squared Potential. *Phys. Rev. B* 18 5948 (1978).
32. Existence, Uniqueness and Stability of Solutions of a Class of Nonlinear Partial Differential Equations. *J. of Math. Anal. Appl.*, 51 1975. (T.K. Caughey)

Graduate and PostDoc Supervision:

1. Postdocs: Mathias Vogt, 2000-02, now at DESY, Hamburg; Gabriele Bassi, 2003-07, now at Cockcroft Institute, UK.
2. Ph.D. Students: Abdelali Ben Lemlih,1986, Univ. of Fez, Morroco; H. Scott Dumas, 1988, Univ. of Cincinnati; Julian Tapia, 1991, Departamento de Posgrado de ESCOM del IPN, Mexico City; David Steinbach, 1992; Dan Endres, 1992, University of Oklahoma; Miguel Gutierrez, 1994; Irina Vlaicu, 2005; Andrey Sobol, 2006, Tech-X; Klaus Heinemann, 2008 expected.
3. M.S. Students: Jing Su, 1982; Charles Seal, 1983; Khadija Ben Lemlih, 1986; Lee L. Emman-Wori, 1988; Vinay Boocha, 2003; Marc Salas, 2005.

Grant Support:

1. National Science Foundation. Theoretical Investigations of Particle Channeling in Crystals. 1980-1991. Single PI.
2. Naval Research Laboratory Grant. Nonlinear Dynamics Problems in Channeling Crystals, 1985-1989. Single PI.
3. Department of Energy. Investigations of Beam Dynamics Issues at Current and Future Accelerators. grant. 1999-2008. Single PI.
4. Department of Energy. Coherent Synchrotron Radiation effects on Next Linear Collider. Supplement to above grant. 2003-2008.

The single PI DOE grant and supplements brought in $1.5M in the nine year period of April 1, 2003-May 15, 2008. I have just learned that my renewal will be funded for another three years starting May 16, 2008. The level of funding will be known in the next two weeks.

CURRICULUM VITAE

Pedro Fermín Embid

PERSONAL INFORMATION

- Born December 2, 1955 in Caracas, Venezuela. U.S. citizen.
- Mailing address: Department of Mathematics and Statistics, Humanities Bldg. Room 415, MSCO3 2150, 1 University of New Mexico, Albuquerque, NM 87131-0001
- Work Phone: (505)277-2114
- Work Fax: (505)277-5505
- Work e-mail: pembid@math.unm.edu

Education History

- Ph.D. in Mathematics, U.C. Berkeley, 1984.
- M.A. in Mathematics, U.C. Berkeley, 1981.
- B.S. in Mathematics, Universidad Simón Bolivar, 1977.

Employment History

- Professor, University of New Mexico, 1998-present.
- Associate Professor, University of New Mexico, 1992-1998.
- Assistant Professor, University of New Mexico, 1985-1992.
- Visiting Professor, Tufts university, 2002-2003.
- Visiting Professor, Courant Institute, 1995-1996.
- Visiting Professor, Princeton University, 1989-1990, 1993-1996.
- Visiting Professor, Institute for Advanced Studies, 1993-1994.
- Research Assistant, U.C. Berkeley, 1983-1984.
- Teaching Associate, U.C. Berkeley, 1979-1983.
- Instructor, Universidad Simón Bolivar, 1977-1978.
- Teaching Assistant, Universidad Simón Bolivar, 1973-1977.

RESEARCH

- Collaboration with Dr. Wingate, COSIM group, CNLS-LANL.
- Consulting for Wave Front Sciences, Albuquerque.
- Consulting for US Geological Survey, Albuquerque.
- Guest Scientist, CNLS-LANL, from 2/21/2008 to 2/20/2009.

Patents

- "Algorithm to Form Composite Lenses from Microlenslet Arrays", provisional patent through the Science & Technology Corporation@UNM, July 2007.

Selected Publications

- *Introducción a los Fluidos Geofísicos.* Asociación Matemática Venezolana. 120 pgs. (1997).
- Averaging over fast gravity waves for geophysical flows with unbalanced initial data, with A. Majda, Theoretical and Computational Fluid Dynamics 11, 155-169 (1998).
- Low Froude Number Limiting Dynamics for Stably Stratified Flow with Small or Fixed Rossby Numbers, with A. Majda, Geophysical Astrophysical Fluid Dynamics 87, 1-50 (1998).
- Examples and Counterexamples in Huygens Principle For Premixed Combustion, with A. Majda and P. Souganidis, Combustion, Science and Technology 120, 273-303 (1996).
- Averaging Over Fast Gravity Waves For Geophysical Flows With Arbitrary Potential Vorticity,

with A. Majda, Communications in Partial Differential Equations 21, 619-658(1996).
• Comparison of Turbulent Flame Speeds from Complete Averaging and the G-Equation, with A. Majda and P. Souganidis, Physics of Fluids 7 (8), 2052-2060(1995).
• Effective Geometric Front Dynamics for Premixed Turbulent Combustion with Separated Velocity Scales, with A. Majda and P. Souganidis, Combustion, Science and Technology 103, 85-115(1994).
• Mathematical Analysis of a Two-Phase Continuum Mixture Theory, with M. Baer, Continuum Mechanics and Thermodynamics 4, 279-312(1992).
• A Theory for Transition to Detonation in Reactive Granular Flows, with A. Majda, Combustion and Flame 89, 17-36(1992).
• Simplified Asymptotic Model for Transition to Detonation in Reactive granular Flows, with J. Hunter and A. Majda, SIAM J. Applied Math. 52(5), 1199-1237(1992).
• Deflagration to Detonation Transition (DDT) in Reactive Granular Materials, with J. Nunziato and M. Baer, Progress in Aeronautics and Astronautics (AIAA series) 135, 481-512(1989).
• On the Reactive and Non-Diffusive Equations for Zero Mach Number Flow, Comm. in PDE 14(8 & 9),1249-1281(1989).
• Well-Posedness of the Nonlinear Equations for Zero Mach Number Combustion, Comm. in PDE,12(11),1227-1283(1987).
• Multiple Steady States for 1-D Transonic Flows, with J.Goodman and A.Majda, SIAM Journal on Scientific and Statistical Computing, 5(1),21-41(1984).

Reviewing
• NSF panel review member, Washington DC, February 2006.
• Journal of Atmospheric Sciences.
• Journal of Mathematical Analysis and Applications.
• SIAM Journal in Mathematical Analysis.
• SIAM Journal in Numerical Analysis.
• Communications in PDE.
• Combustion Theory and Modelling.
• Combustion and Flame.
• Proceedings of the Royal Society of London: Mathematical, Physical and Engineering Sciences.
• Journal of Differential Equations.
• Boletín de la Asociación Matemática Venezolana.

AWARDS AND RECOGNITIONS

• Nominated for the 2008-2010 Presidential Teaching Fellowship.
• Nominated for the 2007-2008 Outstanding Teacher of the Year Award.
• Nominated for the 2006-2008 Presidential Teaching Fellowship.
• Outstanding 2006-2007 Graduate Professor, Math. and Stat. Dept.
• Outstanding 2005-2006 Undergraduate Professor, Math. and Stat. Dept.
• Outstanding 2004-2005 Graduate Professor, Math. and Stat. Dept.
• Outstanding 2000-2001 Undergraduate Professor, Math. and Stat. Dept.
• Outstanding 2000-2001 Teacher of the Year Award, University of New Mexico.
• Outstanding 1996-1997 Instruction in Mathematics, Kappa Mu Epsilon Mathematics Honor Society.

TEACHING

Mathematics Instruction

Teaching a wide variety of courses offered in the program including differential equations, real and complex analysis, functional analysis, perturbation theory and applied mathematics. Students evaluations consistently ranging between 5.7 and 6.0 (on a scale from 1 to 6) during twenty two years of service at UNM.

Curriculum development

- Introduction to Geophysical Fluid Dynamics. Fall 2008.
- Summer training course for the Pure and Applied Mathematics Qualifying Exams, Summer 2006, 2007.
- Partial Differential Equations in Biology. Interdisciplinary course taught with Dr. Toolson from the Department of Biology. Spring 2007.

Recent Ph.D. students

- Alejandro Acuña
- Dae-Won Chung (jointly with Dr. Pereyra)
- Dan Topa

Recent M.S. students

- Bernadette Mendoza-Spencer, "A Study of the Discrete Hilbert Transform", April 2006 (jointly with Dr. Pereyra).
- Christin Gunning, "Study of Two-Dimensional Topographical Stresses in Ridges and Valleys", Summer 2007.
- Daishu Komagata, "Study of Shallow Water Waves with Topography", Summer 2007.
- Aaron Mora, "A Critical Analysis of Interaction Models in Mathematical Biology" (jointly with Dr. Toolson, Dept. of Biology, UNM).

Recent B.S. students

- Lane McConnell, "Reconstruction of Seismic Data in One and Two Space Dimensions", Honors Thesis, May 2007.

SERVICE

Kappa Mu Epsilon

Faculty Advisor for the UNM Chapter of Kappa Mu Epsilon, the National Mathematics Honor Society, Fall 2001 – Present.

Student Committees

Kara Peterson's Ph.D. committee (Dr. Sulsky, chair).
Dae-Won Chung's Ph.D. committee (Dr. Pereyra, chair).
Huynh Dinh's M.S. committee (Dr. Stone, chair).
Qiao Liang's M.S. commitee (Dr. Sulsky, chair).
Henry Moncada's M.S. committee (Dr. Wearing, chair).

Departmental Service

Member of the Graduate Committee. Preparation and grading of MS/PhD qualifying exams.

Thomas Hagstrom

Professional Preparation

Dartmouth College, A.B. summa cum laude in Mathematics, 1979.
California Institute of Technology, Ph.D. in Applied Mathematics, 1983 (Thesis title: Reduction of Unbounded Domains to Bounded Domains for Partial Differential Equation Problems, H.B. Keller advisor.)
University of Wisconsin-Madison, Postoctoral Research Associate at the Mathematics Research Center and Lecturer in Computer Science, 1983-84.

Appointments

Department of Mathematics and Statistics, The University of New Mexico, Albuquerque, NM; Associate Professor 1990-96, Professor 1996-present.

Visiting Research Positions: Center for Applied Scientific Computing, Lawrence Livermore National Lab, Spring 2005; Division of Applied Mathematics, Brown University, Fall 2004; Institute for Computational Mechanics in Propulsion, NASA Glenn Research Center, 1987-2003; Courant Institute of Mathematical Sciences, New York University, 1997-98; Mittag-Leffler Institute, 1997.

Consultant: Ecodynamics Research Associates, Fast Mathematical Algorithms and Hardware Corporation, Los Alamos National Laboratory, Rice University.

Department of Applied Mathematics, SUNY at Stony Brook, Assistant Professor 1984-90.

Significant and Recent Publications

1. Radiation boundary conditions for the numerical simulation of waves, *Acta Numerica*, (1999), 47-106.
2. Rapid evaluation of nonreflecting boundary kernels for time-domain wave propagation, (with B. Alpert and L. Greengard), *SIAM J. Num. Anal.*, 37, (2000), 1138-1164.
3. On the stability of approximate solutions of hyperbolic–parabolic systems and the all–time existence of smooth, slightly compressible flows, (with J. Lorenz), *Indiana Univ. Math. J.*, 51, (2002), 1339-1387.
4. Hermite methods for hyperbolic initial-boundary value problems, (with J. Goodrich and J. Lorenz), *Math. Comp.*, 75, (2006), 595-630.
5. On the spectral deferred correction of splitting methods for initial value problems (with R. Zhou), *Comm. Appl. Math. Comp. Sci.*, 1, (2006), 169-205.
6. Perfectly matched layers for hyperbolic systems: general formulation, well-posedness and stability, (with D. Appelö and G. Kreiss), *SIAM J. Appl. Math*, 67, (2006), 1-23.

7. Grid stabilization of high-order one-sided differencing. I. First-order hyperbolic systems, (with G. Hagstrom), *J. Comput. Phys.*, 223, (2007), 316-340.

8. On symmetrization and energy estimates using local operators for partial differential equations, (with D. Appelö), *Comm. Part. Diff. Eq.*, 32, (2007), 1129-1145.

9. Radiation boundary conditions for Maxwell's equations: A review of accurate time-domain formulations, (with S. Lau), *J. Comput. Math.*, 25, (2007), 305-336.

10. High-order local absorbing boundary conditions for the wave equation: Extensions and improvements, (with A. Mar-Or and D. Givoli), *J. Comput. Phys.*, 227, (2008), 3322-3357.

11. Author of 3 invited review articles, 21 refereed journal articles, and 19 proceeding papers/extended abstracts in the past ten years.

Research Support

1. NSF Grant DMS-0610067, "Numerical Methods for Wave Propagation Problems: Efficient Resolution of Multiple Scales", 8/06-7/09, $150,000.

2. ARO Grant DAAD19-03-1-0146, "Adaptive, High-Resolution Simulation Methods for Wave Propagation in Heterogeneous Media", 7/03-6/07, $320,000.

3. BSF 2002019, "High-Order Absorbing Boundary Conditions", 9/03-8/07, $60,000, (with D. Givoli, Technion, Haifa).

4. PI or CoPI on 19 grants and contracts since 1989.

Synergistic Activities

- Founder and current program coordinator for a graduate certificate program in Scientific and Engineering Computation at UNM. This program was adopted by Sandia National Laboratory as part of its retraining program in computational science.

- Offered a short course on radiation boundary conditions and absorbing layers, LMS-Durham Symposium, 2002.

- Developed benchmark problems, produced reference solutions, and organized the submissions of participants for NASA's 4th Computational Aeroacoustics Workshop on Benchmark Problems, 2004.

- Employed 7 undergraduate and 6 graduate RAs at UNM.

- Served on NSF review committees for ITR, SCREMS, CAREER, CSUMS, and fluid dynamics programs.

- Proposal review for NSF, Hong Kong Research Foundation (CERG), FSU Civilian Research and Development Fund, Israel-US Binational Science Foundation, Israel Science Foundation.
- Opponent for the dissertation defense of M. Svärd, Uppsala, Sweden and the habilatation of O. Vacus, U. Paris-Dauphine, 2004.
- Coorganizer of minisympoisia at ICIAM 2007 and WCCM 2006.
- Since 2006 invited participant in workshops at Banff International Research Station (Canada), Weihai (China), Mathematisches Forschungsinstitut Oberwohlfach (Germany), Xiamen (China) and the American Institute of Mathematics (Palo Alto).
- Since 2003, invited participant in minisymposia at the USNCCM, two SIAM national meetings, three Foundations of Compuatational and Applied Mathematics conferences, Finite Elements in Fluids 07, ICOSAHOM 07, ICIAM 07, and SIAM CSE 07.
- Plenary speaker at the International Conference on Mathematical and Numerical Aspects of Wave Propagation Phenomena, Reading, England, 2007.
- More than a dozen colloquia presented in the past 5 years.

Thesis Advisor/Coadvisor and Postgraduate-Scholar Sponsor

S. Lau, (Postdoctoral Scholar 2005-2006), T. Brown, (Ph.D. 1998), G. Kvernadze, (Ph.D. 1998), S. Buonincontri, (1989), L. Xu, (Ph.D. 2001), R. Zhou, (Ph.D. 2001), E. Andries (Ph.D. 2004), I. Nazarov (Ph.D. 2004), M. deCastro (Ph.D. 2005), C. Dodson (M.S. 2003), S. Rodriguez (M.S. 2003), A. Smith (M.S. 2006), D. Appelö (Ph.D. 2006, KTH Stockholm).
Current students: R. Chen (Ph.D.), J. Hernandez (Ph.D.), A. Quintana (M.S.).

CURRICULUM VITAE

NAME: **Wojciech Kucharz**
PRESENT POSITION: Professor
Dept. of Mathematics and Statistics
The University of New Mexico
Albuquerque, NM 87131, USA

EDUCATION

M.A. Mathematics	Jagiellonian University, Krakow (Poland)	1974
Ph.D. Mathematics	Jagiellonian University	1977

PRIOR EXPERIENCE

Assistant Professor	University of Katowice (Poland)	1977-1982
Visiting Professor	Vrije Universiteit of Amsterdam (The Netherlands)	1980 (Fall)
Visiting Professor	Vrije Universiteit of Amsterdam (The Netherlands)	1982 (Summer and Fall)
Visit. Asst. Professor	University of New Mexico	1984 (Spring)
Assistant Professor	University of New Mexico	1984-1987
Associate Professor (Tenured 1987)	University of New Mexico	1987-1990
Professor	University of Hawaii	1989-1991
Professor	University of New Mexico	1990-present

VISITING POSITIONS

Visited Research Institutes

Consejo de Investigationes Scientifiques, Spanish Academy of Sciences, Madrid (Spain)	1987 (Summer)
Max-Planck-Institut für Mathematik, Bonn (Germany)	1992 (June – July)
	1993 (May)
	2000 (January – June)
	2002 (April – June)
	2007 (January – June)
Erwin Schrödinger Institute, Vienna (Austria)	1995 (Summer)
The Fields Institute, Toronto (Canada)	1996 (Summer)
	1997 (January)
Institut des Hautes Études Scientifiques, (IHES), Bures-sur-Yvette (France)	1997 (June)

Banach Center, Polish Academy of Sciences, Warsaw (Poland)	1999 (January)
Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach (Germany) (Research in Pairs program with J. Bochnak)	1998 (June) 2001 (May – June) 2003 (May – June) 2005 (April – June)

Visited Universities

Vrije Universiteit of Amsterdam (The Netherlands)	1985, 1987, 1989, 1990, 1992 1994, 1995, 1996, 1997, 1998 (Summers), 1999 (May-June, November)
Pontificia Universidade Catolica do Rio de Janeiro (Brazil)	1988 (Fall)
Four universities in Japan: Tokyo Institute of Technology, Nagoya University, Kinki University, Hiogo University	1989 (February)
University of Toronto (Canada)	1993 (January)
Universidad Complutense de Madrid (Spain)	1993 (February-April)
Université de Rennes 1 (France)	1993 (June)
Université de Provence, Marseille (France)	1993 (July)
Université Montpellier II (France)	1994 (June)
Université de Savoie (France), CNRS	2004/2005 (December – March)

SHORT VISITS

University of Warwick, Warwick (England)	1989 (2 weeks)
University of Bern, Bern (Switzerland)	1991 (1 week)
Université de Lausanne, Lausanne (Switzerland)	1993 (1 week)
University of Gdańsk (Poland)	1993, 1999, 2005 (1 week each year)
University of Exeter (England)	1999 (1week)

LIST OF PUBLICATIONS (last 3 years)

96. "Vector bundles on a product of real algebraic curves," *Proc. Amer. Math. Soc.* **133** (2005), 1617-1620 (with J. Bochnak).

97. "Meromorphic functions and factoriality," *Proc. Amer. Math. Soc.* **133** (2005), 2013-2021.

98. "Homology classes represented by semialgebraic arc-symmetric sets," *Bulletin of the London Mathematical Society* **37** (2005), 514-524.

99. "Nash cohomology of smooth manifolds," *Annales Polonici Mathematici* **87** (2005), 193-205.

100. "On successive minima of indefinite quadratic forms," *L'Enseignement Mathematique* **51** (2005), 319-330 (with J. Bochnak).

101. "Rational functions without poles in a compact set," *Colloquium Mathematicum* **106** (2006), 119-125.

102. "Algebraicity of global real analytic hypersurfaces," *Geometriae Dedicata* **119** (2006), 141-149 (with K. Kurdyka).

103. "Stiefel-Whitney classes for coherent real analytic sheaves," *Advances in Geometry* 7 (2007), 101-112 (with K. Kurdyka).

104. "Real algebraic morphisms represent few homotopy classes," *Mathematische Annalen* **337** (2007), 909-921 (with J. Bochnak).

TO APPEAR:

105. "Homology classes of real algebraic sets," *Annales de l'Institut Fourier*

106. "Submanifolds of real algebraic varieties," *Proc. Amer. Math. Soc.*

107. "Curves on algebraic models of smooth manifolds," *Mathematical Research Letters.*

108. "Cycles on algebraic models of smooth manifolds," *Journal of the European Mathematical Society.*

SUBMITTED:

109. "Transcendental submanifolds of projective space," to appear in Comm. Math. Helvetici

110. "Rational surfaces in algebraic models of smooth manifolds," to appear in Arch. der Math.

111. "Transcendental manifolds in real projective space and Stiefel-Whitney classes" (with Joost van Hamel).

MAIN WORK IN PROGRESS:

112. Research monograph on real algebraic varieties (with J. Bochnak).

Curriculum Vitae, Jens Lorenz

Dept. of Mathematics and Statistics
The University of New Mexico
Albuquerque, NM 87131
lorenz@math.unm.edu

Professional Preparation

Vordiplom in Mathematics, University of Hamburg, Germany, 1971
Diplom in Mathematics, University of Münster, Germany, 1973
Ph.D. (Dr. rer. nat.), summa cum laude, University of Münster, Germany, 1975
Habilitation (Dr. habil.) in Mathematics, University of Konstanz, Germany, 1980

Appointments

Professor (94 -), Associate Prof. (90 - 94), The University of New Mexico
Professor, Lehrstuhl für Numerische Mathematik (94-95), RWTH Aachen, Germany
Assistant Prof. (85 - 90), Von Karman Instructor (83 - 85), Applied Math. Caltech
Visiting Professor (83), University of Trier, Germany
Visiting Assistant Prof. (77), University of Calgary, Canada

Research Interests

Numerical analysis, partial differential equations, modeling; Navier–Stokes equations, incompressible and low–Mach–number flows, aeroacoustics; stability theory; dynamical systems; invariant manifolds.

Recent Publications

1. Kreiss, G., Kreiss, H.–O., and Lorenz, J.: Stability of viscous shocks on finite intervals. Accepted for publication in: *Archive for Rat. Mechanics and Analysis.*

2. Nadiga, B., Taylor, M., and Lorenz, J.: Ocean modelling for climate studies: Eliminating short time–scales in long–term, high–resolution studies of ocean circulation. *Math. Comp. Modelling*, 44, (2006), pp. 870-886.

3. Goodrich, J., Hagstrom, T., and Lorenz, J.: Hermite methods for hyperbolic initial–boundary–value problems. *Math. Comp.* **75**, (2006), pp. 595-630.

4. Beyn, W.–J., Lorenz, J.: Stability of viscous profiles: Proofs via dichotomies. Journal of Dynamics and Differential Equations **18**, No. 1, (2006), pp. 141-195.

5. Kreiss, H.–O., Lorenz, J.: A priori estimates in terms of the maximum norm for the solutions of the Navier–Stokes equations. *J. Diff. Equations*, Vol. **203** (2004), pp. 216-231.

6. Kreiss, H.-O., Lorenz, J.: Initial-boundary value problems and the Navier-Stokes equations. Classics in Applied Mathematics **47**, SIAM, 2004.

7. Edoh, K.D., Lorenz, J.: Numerical approximation of rough invariant curves of planar maps. *SIAM J. on Scientific Computing*, Vol. **25**, No. 1 (2003), pp. 213.

8. Kreiss, H.–O., Hagstrom, T., Lorenz, J., and Zingano, P.: Decay in time of incompressible flows. *J. math. fluid mech.* **5** (2003), pp. 231-244.

9. Hagstrom, T., Lorenz, J.: On the stability of approximate solutions of hyperbolic–parabolic systems and the all–time existence of smooth, slightly compressible flows. *Indiana University Math. J.* **51** No. 6 (2002), pp. 1339-1387.

10. Edoh, K.D., Lorenz, J.: Computation of Lypunov–type numbers for invariant curves of planar maps. *SIAM J. Scientific Computing*, **23** No. 4 (2001), pp. 1113-1134.

Synergistic Activities

Associate Editor, Boletim da Sociedade Paranaense de Matemática, 2004 – present.
Associate Editor, Mathematical and Computer Modelling, 1992 – present.
Organizer (with H.–O. Kreiss) of three conferences on *Theory and Numerical Methods for Initial–Boundary Value Problems* in Oberwolfach, Germany.
Consulting on *Ocean Modelling for Climate Studies*, Los Alamos Nat. Lab., collaborator: Dr. B. Nadiga.
Consulting on *Modelling of the Sound Generated by a Turbulent Jet*, Ohio Aerospace Institute and NASA Glenn Research Center, collaborator: Dr. J. Goodrich.

Collaborators and Other Affiliations

Collaborators: W.J. Beyn (Bielefeld), K. Edoh (N. Carolina), J. Goodrich (NASA Glenn), T. Hagstrom (UNM), G. Kreiss (Uppsala), H.O. Kreiss (Royal Inst. Stockholm), B. Nadiga (LANL), M. Taylor (Sandia Nat. Lab.), P. Zingano (Porto Alegre).

Graduate Advisor: E. Bohl (Konstanz)

Former Ph.D. Students: Anne Morlet, Caltech, 1990. Richard Ammons, Caltech, 1992. Capt. Michael Stoecker, UNM, 1992. Peter Kindilien, UNM, 1995. Wangguo Qin, UNM, 2000. Pable Braz e Silva, UNM, 2003. Manuela L. De Castro, UNM, 2005.

Current Ph.D. Students: Oksana Guba (*spectral problems on large and infinite domains*); Pavlo Cherepanov (*multiscale methods for highly oscillatory and stochastic problems*); Yan Qiu (Cindy) (*PDEs with applications to financial math*); Michael R. Payne (*self–accelerating flows*).

CV TERRY A. LORING

http://www.math.unm.edu/~loring

Professional Preparation.

- B.A., **Wesleyan University**, Middletown Connecticut, Mathematics, Spring 1981.
- Ph.D. in Mathematics, **University of California at Berkeley**, Spring 1986. (Operator Algebras.)
- **Research Fellow**, Mathematical Sciences Research Institute, Berkeley, California, Fall 1986 to Winter 1987. (Operator Algebras.)
- **Research Fellow**, SERC, Mathematics Institute, University of Warwick, and University College of Swansea, U.K., Spring 1987 to Fall 1987. (Operator Algebras.)
- **Killam Postdoctoral Fellow**, Dalhousie University, Halifax, Canada (partially supported by NSERC), Winter 1988 to Spring 1990. (Operator Algebras.)
- **Postdoctoral Fellow**, National Science Foundation, University of New Mexico, Albuquerque, New Mexico, Fall 1990 to Spring 1993. (Operator Algebras.)

Appointments.

- **Professor**, University of New Mexico, Albuquerque, New Mexico, since Fall 1999.
- **Visiting Member**, The Fields Institute for Research in Mathematical Science, Toronto, Canada, Winter 1995 to Spring 1995.
- **Associate Professor**, University of New Mexico, Albuquerque, New Mexico, Fall 1993 to Spring 1999.
- **Assistant Professor**, University of New Mexico, Albuquerque, New Mexico, Fall 1990 to Spring 1993.

Publications (limited to ten).

(1) A Projective C^*-Algebra Related to K-Theory, preprint, 2007. (Submitted, http://front.math.ucdavis.edu/0705.4341)

(2) *Rényi Dimension and Gaussian Filtering II*, preprint, 2007. (Submitted, http://front.math.ucdavis.edu/0701.5795)

(3) *Rényi Dimension and Gaussian Filtering*, New York J. Math. **13** 175–198 2007. (http://nyjm.albany.edu/j/2007/13-11.html)

Date: 15th February 2008.

(4) *Modeling and Data Analysis for Biosignatures.* (with F. Gilfeather, P. Helman, T. Loring, R. Lyons, R. Veroff and V. Hamine) Comput. Biol. Med. **37**, (2007), 1539–52.
(5) Eilers, S., Loring, T. A. and Pedersen, G. K., *Morphisms of extensions of C^*-algebras: pushing forward the Busby Invariant,* Adv. Math., **147** (1999), 74–109.
(6) Eilers, S., Loring, T. A. and Pedersen, G. K., *Stability of anticommutation relations. An application of noncommutative CW complexes,* J. reine angew. Math, **499** (1998), 101–143.
(7) Dadarlat, M. and Loring, T. A., *The universal multicoefficient theorem for the Kasparov Groups,* Duke Math. J., **84** (1996), 355–377.
(8) Dadarlat, M. and Loring, T. A., Classifying C^*-algebras via ordered, mod-p K-theory, Math. Ann., **305** (1996), 601–616.
(9) Dadarlat, M. and Loring, T. A., *K-homology, asymptotic representations and unsuspended E-theory,* J. Funct. Anal., **126** (1994), 367–383.
(10) Loring, T. A., *K-theory and almost commuting matrices,* Canad. J. Math., **40** (1988), 197–216.

Synergistic Activities.

- Developed a lecture recording system that produces low-bandwidth, resolution-independent audiographics.
- Member of the UNM Faculty Intellectual Property Committee, Fall 2001.
- Department representative to the Minority Engineering, Mathematics and Sciences Program.
- Mentoring and teaching in Albuquerque Public Schools.

Collaborators & Other Affiliations.

Recent collaborators.

- Soren Eilers, University of Copenhagen.

Thesis advisor.

- Marc A. Rieffel (U. C. Berkeley).

Number of graduate students advised:

- 2

Number of postdoctoral scholars sponsored:

- 0

February 2008

CURRICULUM VITAE
(Abbreviated)

NAME: Alexander P. Stone

ADDRESS: Department of Mathematics and Statistics
Humanities 430
Albuquerque, NM 87131
(505) 277-5303

RESEARCH INTERESTS:

Differential Geometry, Electromagnetic Theory, Differential Equations

EDUCATION:

BSEE	Columbia University, New York, New York	1952
MSEE	Newark College of Engineering, Newark, N.J.	1956
Ph.D.	University of Illinois, Urbana, Illinois	1965

EMPLOYMENT/PROFESSIONAL EXPERIENCE:

Field Engineer	Western Electric/Bell Telephone Laboratories	1952 to 1956
Instructor in EE	Manhattan College, Riverdale, New York	1956 to 1958
Asst. Professor Physics	Dickinson College, Carlisle, Pennsylvania	1958 to 1960
Asst. Professor Mathematics	University of Illinois at Chicago Circle Chicago, Illinois	1965 to 1969
Assoc. Professor Mathematics	University of Illinois at Chicago Circle Chicago, Illinois	1969 to 1970
Assoc. Professor Mathematics	University of New Mexico Albuquerque, New Mexico	1970 to 1976
Professor of Mathematics	University of New Mexico Albuquerque, New Mexico	1976 to Present

SABBATICALS:

University of Warwick, Coventry, England, January, 1977 to August, 1977

University of Southampton, Southampton England, 1984-1985

Air Force Research Laboratory, January 1998 to August 1998

PUBLICATIONS (since 2000)

1. Synthesis of Inhomogeneous Dielectric Dispersionless TEM Lenses for High Power Application, (with C. E. Baum), Electromagnetics, v. 20, 2000, pp 17-28

2. Synthesis of Purely Dielectric Transient Lens, (with C. E. Baum), in Ultra-Wide Band, Short-Pulse Electromagnetics 4, Kluwer Academic/Plenum Publishers, 2001, pp. 203-212

3. Unipolarized Generalized Inhomogeneous TEM Plane Waves in Differential Geometric Lens Synthesis, (with C. E. Baum),Electromagnetics, v. 21, 2001, pp. 275-294.

4. Generalized TEM, E, and H Modes, (with C. E. Baum), Electromagnetics, v. 23, 2002, pp. 203-222.

5. Electromagnetic Lens Design, (with C. E. Baum), in Ultra-Wide Band, Short Pulse Electromagnetic 6, Kluwer Academic/Plenum Publishers, 2004, pp. 291-298.

6. Elecromagnetic Lens Design and Generalized E and H Modes, (with C. E. Baum), in Ultra-Wide Band, Short-Pulse Electromagnetics 8, Springer Publishers, 2007, pp. 89-96

BOOKS:

1. Ultra-Wideband, Short-Pulse Electromagnetics 3, co-editor with C. E. Baum, L. Carin. Plenum Publishing Corp., New York, 1997.

2. Transient Lens Synthesis - Differential Geometry in Electromagnetic Theory, (with C.E. Baum). Hemisphere Publishing Corp., New York and London, 1991.

3. Improperly Posed Boundary Value Problems, Co-editor with A. Carasso, Pitman Research Notes in Mathematics Series, No. 1, Pitman Publishing Co., London, 1975.

4. Mathematical History, Activities, Puzzles, Stories and Games (with N. Gonzales), published by NCTM, 2001 (a revision of M. Mitchell's workbook).

5. Ultra-Wide Band, Short-Pulse Electromagnetics 8, co-editor with C. E. Baum and S. Tyo, published by Springer, 2007

RECENT ACTIVITIES

1. Reviewer for Math Reviews
2. Referee for Mathematics Magazine
3. Chairman, Evaluation Committee for SUMMA Graduate Fellowships in Electromagnetic Theory (since 1995). The amount of these awards is $15,000 and the competition is world-wide
4. Member, Technical Program Committee, AMEREM 1996, Albuquerque, NM
5. Member, Technical Program Committee, Microwave Theory Confenerence, 1998, Kiev, Ukraine
6. Chairman, Technical Program Committee, EUROEM 2000, Edinburgh, Scotland
7. Chairman, Technical Program Committee, AMEREM 2002, Annapolis, MD.
8. Chairman, Technical Program Committee, EUROEM 2004, Magdeburg, Germany
9. Chairman, Technical Program Committee, AMEREM 2006, Albuquerque, NM.
10. Member, Technical Program Committee, EUROEM 2008, Zurich, Switzerland
11. Interviewer since 2003, for applicants for admission to Columbia University (College and School of Engineering)
12. Member of various university committees (Faculty Senate Curriculum Committee, Arts and Science Promotion Committee, Faculty-Staff Benefits,..)

BIOGRAPHICAL SKETCH: DEBORAH L. SULSKY

Department of Mathematics and Statistics
Department of Mechanical Engineering
University of New Mexico
Albuquerque, New Mexico 87131
Phone: (505) 277-4613 Fax: (505) 277-5505
E-mail: sulsky@math.unm.edu
URL: http://www.math.unm.edu/~sulsky

a. Professional Preparation

B.S., Mathematical Physics, Binghamton University, 1977
M.S., Mathematics, Courant Institute of Mathematical Sciences, 1979
Ph.D., Mathematics, Courant Institute of Mathematical Sciences, 1982
Postdoc, Appl'd Math ,Massachusetts Institute of Technology, 1982-1984

b. Appointments

1998-present	Professor, Department of Mathematics and Statistics, UNM
1998-present	Professor, Department of Mechanical Engineering, UNM
2000-2001	Visiting Research Associate, Caltech
1992-1998	Associate Professor, Department of Mathematics and Statistics, UNM
1997-1998	Associate Professor, Department of Mechanical Engineering, UNM
1987-1992	Assistant Professor, Department of Mathematics and Statistics, UNM
1984-1987	Adjunct Assistant Professor, Department of Mathematics, UCLA
1982-1984	Instructor, Applied Mathematics, MIT
1981-1982	Lecturer, Courant Institute of Mathematical Sciences
1980-1981	Graduate Research Assistant, Courant Institute of Mathematical Sciences

c. Selected Publications

D. Sulsky, S. Childress and J. K. Percus (1984) A Model of Cell Sorting, *J. Theor. Biol.*, 106, 275-301.

Richard R. Vance, William I. Newman and Deborah Sulsky (1988) The Demographic Meanings of the Classical Population Growth Models of Ecology, *Theor. Pop. Biol.*, 33, 199-225.

Deborah Sulsky, Richard R. Vance and William I. Newman (1989) Time Delays in Age Structured Populations, *J. Theor. Biol.*, 141, 403-422.

Deborah Sulsky and J. U. Brackbill (1991) A Numerical Method for Suspension Flow, *J. Comput. Phys.*, 96, 339-368.

D. Burgess, D. Sulsky and J. U. Brackbill (1992) Mass Matrix Formulation of the FLIP Particle-in-Cell Method, *J. Comput. Phys.*, 103, 1-15.

Deborah Sulsky (1993) Numerical Solution of Structured Population Models I. Age-Structure, *J. Math. Biol.*, 31, 817-839.

Deborah Sulsky (1994) Numerical Solution of Structured Population Models II. Mass-Structure, *J. Math. Biol.*, 32, 491-514.

Thomas Robey and Deborah Sulsky (1994) Row Ordering for a Sparse QR Decomposition, *SIAM J. Matrix Anal. Appl.*, 15, 1208-1225.

D. Sulsky, Z. Chen, H. L. Schreyer (1994) A Particle Method for History-Dependent Materials, *Comput. Meth. Appl. Mech. Engrg.*, 118, 179-196.

Deborah Sulsky, Shi-Jian Zhou, and Howard L. Schreyer (1995) Application of a Particle-in-Cell Method to Solid Mechanics, *Comput. Phys. Commun.*, 87, 236-252.

D. Sulsky and H. L. Schreyer (1996) Axisymmetric Form of the Material Point Method with Applications to Upsetting and Taylor Impact Problems, *Comput. Meth. Appl. Mech. Engrg.*, 139, 409-429.

Y.-L. Shen, W. Li, D. L. Sulsky, and H. L. Schreyer (2000) Localization of Plastic Deformation Along Grain Boundaries in a Hardening Material, *Int. J. Mech. Sci.*, 42, 2167-2189.

A.R. York, D. Sulsky and H. Schreyer (2000) Fluid-Membrane Interaction Based on the Material Point Method, *Int. J. Num. Meths. Engrg.*, 48, 901-924.

S. Bardenhagen, J. Brackbill and D. Sulsky (2000) A Numerical Study of Stress Distribution in Sheared Granular Material in Two Dimensions, *Phys. Rev. E*, 62, 3882-3890.

Gary Ayton, Scott Bardenhagen, Partick McMurtry, Deborah Sulsky, and Gregory A. Voth (2001) Interfacing Continuum and Molecular Dynamics: An Application to Lipid Bilayers, *J. Chem. Phys.*, 114, 6913-6924.

H. L. Schreyer, D. L. Sulsky, and S. J. Zhou (2002) Modeling delamination as a strong discontinuity with the material point method, *Comput. Meth. Appl. Mech. Engng.* 191, 2463-2481.

Adrian Lew, Patrizio Neff, Deborah Sulsky, and Michael Ortiz (2004) Optimal BV Estimates for a Discontinuous Galerkin Method in Linear Elasticity, *AMRX* **2004** No. 3, 73-106.

D. Sulsky and H. Schreyer (2004), MPM Simulation of Dynamic Material Failure with a Decohesive Constitutive Model, *European Journal of Mechanics A/Solids,* 23, 423-445.

E. Love and D. Sulsky (2006), An Energy Consistent Material-Point Method for Dynamic Finite Deformation Plasticity, *Comput. Meth. Appl. Mech. Engrg.* 195, 3903-3925.

E. Love and D. Sulsky (2006), An Unconditionally Stable, Energy-Momentum Consistent Implementation of the Material-Point Method, *Int. J. Num. Meth. Engrg.*, 65, 1608-1638.

H. Schreyer, L. Munday, D. Sulsky, M. Coon, and R. Kwok (2006) Elastic-Decohesive Constitutive Model for Sea Ice, *J. Geophysical Res.*, 111 C11S26 doi:10.1029/2005JC003334.

D. Sulsky, H. Schreyer, M. Coon, and R. Kwok (2007) Using the Material-Point Method to Model Sea Ice Dynamics, *J. Geophysical Res.*, 112 C02S90, doi:10.1029/2005JC003329.

Michael A. Gilchrist, Deborah L. Sulsky, and Anne Pringle (2006) Fitness and Optimal Life-History Stragegies in Filamentous Fung , *Evolution* 60(5),970-979.

Max Coon, Ron Kwok, Gad Levy, Matt Pruis, Howard Schreyer, and Deborah Sulsky (2007) Arctic Ice Dynamics Joint Experiment AIDJEX Assumptions Revisited and Found Inadequate, *Journal of Geophysical Research*, 112,C11S90, doi:10.1029/2005JC003393.

d. Synergistic Activities

Professional Affiliations: American Mathematical Society, American Physical Society, Society for Industrial and Applied Mathematics, US Association for Computational Mechanics.

Consulting: Affiliate: Los Alamos National Laboratory, 1998-present.

Educational Outreach: Helped establish the Computational Science and Engineerng (CSE) Graduate Certificate at UNM, providing interdisciplinary training in high-performance computing for students in 11 participating departments. Served as Chair of the Program Committee, 1995-1996, and A&S Coordinator, 1997-2000.

Reviewer: NSF, DoE, Cold Regions Science and Technology, Computational Mechanics, Computer Methods in Applied Mechanics and Engineering, Computer Physics Communications, International Journal for Numerical Methods in Engineering, IJOPE, Journal of Applied Mechanics, Journal of Computational Physics, Journal of Geophysical Research, Journal of Materials and Physics of Solids, Journal of Theoretical Biology, Journal of Statistical Physics, Numerical Algorithms, Ocean Modelling, Physical Reviews A, Physics of Fluids, Rocky Mountain Journal of Mathematics, SIAM Journal on Applied Mathematics, Theoretical and Computational Fluid Mechanics, Theoretical Population Biology,Wave Motion.

Department Committees: Executive 2003-4, Computer Use (Chair) 2006-8, Hiring (Chair) 2005-6, Undergrad 2005-6, Num. Anal. Comp. Exam 2003-6, ME Hiring 2003-5.

Professional Service: Organized Minisymposium on the Material-Point Method at the Society for Industrial and Applied Mathematics Annual Meeting, 2005. Member, Specialty Committee on Meshfree Methods, US Association for Computational Mechanics (USACM), January, 2001 - present. Vice-Chair, Specialty Committee on Meshfree Methods, US Association of Computational Mechanics (USACM), October, 2007 - present.

Invited Presentations: *The Material-Point Method,* SIAM Annual Meeting, Invited Plenary Address, New Orleans, LA, July 11-15, 2005. *Interfaces in Solids*, Plenary Address, Workshop on Multiphase Physical Flows and Applications (12-16 Mar 2007), Institute for Mathematical Sciences, National University Singapore. *Modeling Arctic Sea Ice*, Twenty-First Annual Pacific Northwest Numerical Analysis Seminar, 13 October, 2007.

e. Collaborators & Other Affiliations

Collaborators: G. Ayton (University of Utah), S.G. Bardenhagen (Los Alamos National Laboratory), J.U. Brackbill (Los Alamos National Laboratory), Z. Chen (University of Missouri), P. McMurtry (University of Utah), M. Ortiz (Caltech), H. Schreyer (University of New Mexico), Y.L. Shen (University of New Mexico), G. Voth (University of Utah)

Graduate and Postdoctoral Advisors: Professor Harvey Greenspan, Massachusetts Institute of Technology (Post-doctoral advisor); Professor Stephen Childress, Courant Institute (Graduate Co-advisor); Professor Jerome Percus, Courant Institute (Graduate Co-advisor).

Thesis Advisor and Postgraduate-Scholar Sponsor: Andrew Brydon, Flor Espinoza, Ann Kaul, Xiangping Li, Qiao Liang, Edward Love, David Montoya, Melissa Morris, Giang Nguyen, Kara Peterson, Renida Sharp, John Snyder, Allen R. York, Shijian Zhou

BIOGRAPHICAL SKETCH OF GABRIEL HUERTA

Professional Preparation

- National Autonomous University of Mexico, (U.N.A.M.), B.S. in Actuarial Sciences, 1991.
- National Autonomous University of Mexico, (U.N.A.M.), M.S in Statistics, 1994.
- ISDS, Duke University, M.S. in Statistics, 1996.
- ISDS, Duke University, Ph.D. in Statistics, 1998.

Appointments

- Associate Professor and Regents Lecturer, Department of Mathematics and Statistics, University of New Mexico. August 2007-
- Assistant Professor, Department of Mathematics and Statistics, University of New Mexico. August 2002 - July 2007.
- Researcher, Area of Probability and Statistics, Research Center in Mathematics (CIMAT), Guanajuato, Mexico. November 1999 - August 2002.
- Mellon Postdoctoral Fellow, Department of Statistics, Northwestern University. August 1998 - September 1999.

Selected Publications

- Huerta G. and Sanso B. (2007) Time-Varying Models for Extreme Values. *Environmental and Ecological Statistics* . Vol. 14, No. 3, pp. 285-299.
- Prado, R. , Molina, F. and G. Huerta (2006) Multivariate Time Series Modeling Classification via Hierarchical VAR Mixtures. *Computational Statistics and Data Analysis* Vol. 51 (3), pp. 1445-1462
- Huerta, G. and Prado, R. (2006). Structured priors for multivariate time series *Journal of Statistical Planning and Inference*, Vol. 136, 11, 3802-3821.
- Villagran, A. and Huerta, G. (2006). Bayesian Inference on Mixture-of-Experts for Estimation of Stochastic Volatility. *Econometric Analysis of Financial and Economic Time Series/Part B. Advances in Econometrics.* Vol. 20, 277-296.

Huerta, G. (2005). Multivariate Bayes Wavelet Shrinkage and Applications *Journal of Applied Statistics.* Vol. 32, 5, 529-542.

Huerta G. and Prado R. (2005) Finding common structure in multiple time series via structured priors for autoregressive processes *Estadistica, Instituto Interamericano de Estadistica.* Vol. 57, 123-139

- Huerta G., Sanso B. and Stroud J.R. (2004) A Spatio-Temporal Model for Mexico City Ozone Levels. *Journal of the Royal Statistical Society Series C* (Applied Statistics), vol. 53,2,231-248.

- Huerta G., Jiang W. and Tanner M.A. (2003) Time Series Modeling via Hierarchical Mixtures. *Statistica Sinica*, vol. 13, 4, 1097-1118.

- Prado R. and Huerta G. (2002). Time-varying Autoregressions with Model Order Uncertainty. *Journal of Time Series Analysis*, September 2002, vol. 23(5) pp. 599-618.

- Huerta G., Jiang W. and Tanner M.A. (2001). Discussion Article: Mixture of Time Series Models. Journal of Computational and Graphical Statistics , vol. 10 (1) pp. 82-89.

- Stangl D. and Huerta G. (2000). Using Bayesian Hierarchical Models to Assess the Impact of Managed-Care Strategies. Lifetime Data Analysis, vol. 6, pp. 123-139.

- Huerta G. and West M. (1999) Priors and Component Structures in Autoregressive Time Series Models. Journal of the Royal Statistical Society, Series B, vol. 61 pp. 881-899.

- Huerta G. and West M. (1999). Bayesian Inference on Periodicities and Component Spectral Structure in Time Series. Journal of Time Series Analysis, vol. 20 (4), pp. 401-416.

Synergistic Activities

- Treasurer for the International Society for Bayesian Analysis (ISBA) 2008-2010.

- Judge for the Intel International Science and Engineering Fair 2007, statistics award.

- Program committee member. 2006 Joint Statistical Meetings of the ASA, Seattle.

- Program and organizing committee. Second Bayesian Latin American Congress (COBAL 2), San Jose del Cabo, Mexico, February 2005.

- IMS Local Chair for the WNAR/IMS meeting, Albuquerque, NM, June 2004.

- Selection committee member for ACASA Mu Sigma Rho the National Honorary Society in Statistics.

- Representative for the Albuquerque Chapter of the American Statistical Association, 2003-2004.

- Associate Editor for the ISBA (International Society for Bayesian Analysis) Bulletin, News around the World Section and Software Review Section, 1998-2000, 2002-2004.
- WNAR Regional Advisory Board member 2004-2006
- Referee for NSF, Extremes, Bayesian Analysis, Annals of Statistics, Journal of the American Statistical Association, Journal of Statistical Planning and Inference, Biometrika, Canadian Journal of Statistics, Technometrics, Journal of Computational Statistics and Data Analysis, among others.

Collaborators

- S. Steinberg, Applied Mathematics, University of New Mexico.
- C. Jackson and M. Sen, Institute of Geophysics, University of Texas-Austin.
- H. Lopes, Graduate School of Business School, University of Chicago.
- R. Prado, Department of Applied Mathematics and Statistics, University of California, Santa Cruz.
- B. Sanso, Department of Applied Mathematics and Statistics, University of California, Santa Cruz.
- J. Stroud, Wharton School of Business, University of Pennsylvania

Graduate and Postdoctoral Advisors

- Graduate Advisor: Mike West, Duke University
- Postdoctoral Advisors: Martin A. Tanner and Wenxin Jiang, Northwestern University.

Thesis Advisor and Postgraduate Scholar Sponsor

Ph.D. advisees (current students)

- Wenxia Ying (to defend by Spring 2008).
- Alejandro Villagran (to defend by Summer 2008).

CURRICULUM VITA

RICHARD S. KITCHEN, JR.
Departments of Educational Specialties and Mathematics & Statistics
MSC05 3040
1 University of New Mexico
Albuquerque, NM 87131

ACADEMIC BACKGROUND

Ph.D. University of Wisconsin-Madison, Madison, WI. Major: Curriculum and Instruction, Minor: Mathematics. 1996
Thesis title: "Mathematics Pedagogy in Developing Nations: The Work of Two Inner City, Guatemalan Teachers"

M.A. University of Montana, Missoula, MT. Mathematics. 1990

B.A. University of Colorado-Denver, Denver, CO. Mathematics. 1984

PROFESSIONAL POSITIONS

Associate Professor, Department of Educational Specialties and Department of Mathematics & Statistics, University of New Mexico. July 2004 – present.

Assistant Professor, Department of Educational Specialties, University of New Mexico. August 1998 – June 2004.

Assistant Professor, Department of Mathematics and Computer Science, San José State University. August 1996 – August 1998.

SELECT PUBLICATIONS

Books:

Kitchen, R.S., DePree, J., Celedón-Pattichis, S., & Brinkerhoff, J. (2006). Mathematics Education at Highly Effective Schools that Serve the Poor: Strategies for Change. Mahwah, NJ: Lawrence Erlbaum Associates.

Rodriguez, A.J. & Kitchen, R.S. (Editors) (2005). Preparing Mathematics and Science Teachers for Diverse Classrooms: Promising Strategies for Transformative Pedagogy. Mahwah, NJ: Lawrence Erlbaum Associates.

Articles in refereed journals:

Kitchen, R.S. & Silver, E. (Editors) (2008). Promoting High Participation and Success in Mathematics by Hispanic Students: Examining Opportunities and Probing Promising Practices [A Research Monograph of *TODOS:Mathematics for All*]. Washington, DC: National Education Association.

Kulm, G., Wilson, L.D., & Kitchen, R.S. (2005). Alignment of Content and Effectiveness of Mathematics Assessment Items. *Educational Assessment Journal, 10(4)*, 333-356. Mahwah, NJ: Lawrence Erlbaum Associates.

Kitchen, R.S. & DePree, J. (2005). Closing the Gap through an Explicit Focus on Learning and Teaching. *Journal of Mathematics Education Leadership, 8(1)*. Lakewood, CO: National Council of Supervisors of Mathematics.

Kitchen, R.S. (2004). Challenges Associated with Developing Discursive Classrooms. *Mathematics Teacher, 97(1)*. Reston, VA: NCTM.

Kitchen, R.S. & DePree, J. (2004). Examining Prospective Teachers' Understanding of Proportional Reasoning. *Journal of the American Mathematics Association of Two-Year Colleges, 25, 2.* AMATYC.

Kitchen, R.S. & Wilson, L.D. (2004). Lessons Learned from Students about Assessment and Instruction. *Teaching Children Mathematics, 10, 8*, 394-399. Reston, VA: NCTM.

Kitchen, R.S. (November, 2003). Getting Real about Mathematics Education Reform in High Poverty Communities. *For the Learning of Mathematics, 23(3).*

Kitchen, R.S., Cherrington, A., Gates, J., Hitchings, J., Majka, M., Merk, M. & Trubow, G. (2002). Teachers Describe How Performance Assessment Supported Mathematics Education Reforms at their Middle School. *Mathematics Teaching in the Middle School, 8, 1.* Reston, VA: NCTM.

SELECT PROFESSIONAL PRESENTATIONS

Refereed Presentations at International Professional Meetings:

Mathematics Education Reforms in High Poverty Communities. Presented at the 11th Interamerican Conference on Mathematical Education, Blumenau, Brazil, July 2003.

Transforming Mathematics Education: Barriers to Reform in High Poverty, Diverse Schools. Presented at the Third International Conference on Mathematics Education and Society (MES3), Copenhagen, Denmark, April, 2002.

Refereed Papers/Presentations at National Professional Meetings:

Doctoral Programs in Mathematics Education: Breakout Session on Diversity and Equity **(invited)**. Led two sessions in collaboration with Edd Taylor at the National Conference on Doctoral Programs in Mathematics Education, Kansas City, MO, September 2007.

Mathematics Education and Equity. Conference Opening Session – Presented on Plenary panel at the Annual Meeting of the Association of Mathematics Teacher Educators in collaboration with Marta Civil, Megan Franke, Rochelle Gutiérrez, and Dorothy White. Irvine CA, January 2007.

The Assessment of Culturally and Linguistically Diverse Children. Presented at the 84th Annual Meeting of the National Council of Teachers of Mathematics, St. Louis, MO, April 2006.

Learning from High Achieving Schools that Serve High Poverty Communities with an Eye on Mathematics. Presented in collaboration with Heather Teel, Jerry France, and Jennifer Rosenthal at The Fourteenth Education Trust National Conference, "Zapping the Gap," Washington, DC, November 2003.

Assessing Quality Assessments: The Effectiveness of Alignment Procedures to Judge Instruments and Tasks. Presented as a symposium at the Research Presession of the Annual Conference of the National Council of Teachers of Mathematics, Orlando, FL, April 2001. Co-Chair of symposium.

Changing the Faces of Mathematics: Perspectives on Multiculturalism and Gender Equity. Invited panel presentation, 78th Annual Conference of the National Council of Teachers of Mathematics, Chicago, IL, April 2000.

SELECT SERVICE ACTIVITIES

Editorial Panel, *Journal for Research in Mathematics Education* (JRME). Spring 2008-present.

Board Member, *TODOS: Mathematics for ALL.* Spring 2006-present.

Chair, Research & Publications Committee. *TODOS: Mathematics for ALL.* Spring 2006-present.

Member, 11th International Congress on Mathematics Education Topic Study Group 33 (Mathematics Education in a multilingual and multicultural environment). Fall 2007 – present.

Mathematics Professional Development Coordinator for Teachers, UNM Mathematics Academy (2001-2004) and CEMELA Institute (2005).

President, New Mexico Council of Teachers of Mathematics. Fall 2002-Fall 2004.

Past and present consultant for numerous schools and school districts in New Mexico, the American Association for the Advancement of the Sciences Project 2061, and the Urban Institute.

SYNERGISTIC ACTIVITIES

- Co-Principal Investigator, "Center for the Mathematics Education of Latinos/as" (CEMELA). Funder: National Science Foundation (NSF), Center for Learning and Teaching (CLT). Amount funded as of August 1, 2004 is $10 million for four collaborating universities.

Biographical Sketch : **Pavel M. Lushnikov**

Associate professor
Department of Mathematics and Statistics
University of New Mexico
Albuquerque, NM 87131
Phone: (505) 277-2104
E-mail: plushnik@math.unm.edu
Home page: http://math.unm.edu/~ plushnik

Professional Preparation:

- M.S. Moscow Institute of Physics and Technology, Physics, 1994
- Ph.D. Landau Institute for Theoretical Physics of Russian Academy of Sciences, Theoretical Physics, 1997

Appointments:

2006–Present Associate Professor, Department of Mathematics and Statistics, University of New Mexico

2004–Present Visiting Scholar, Theoretical Division, Los Alamos National Laboratory

2004–2006 Kenna Visiting Assistant Professor, Department of Mathematics, University of Notre Dame

2004–Spring Visiting Assistant Professor, Department of Mathematics, University of Arizona

1999–2003 Postdoctoral Research Associate, Theoretical Division, Los Alamos National Laboratory

1998–1999 Visiting Researcher, Risø National Laboratory, Denmark

Publications in Refereed Journals:

- P.M. Lushnikov and H.A. Rose. *Collective stimulated Brillouin backscatter.* Submitted to Physical Review Letters (2007).
- M. Alber, N. Chen, P.M. Lushnikov, and S.A. Newman. *Continuous macroscopic limit of a discrete stochastic model for interaction of living cells.* Physical Review Letters, **99**, 168102 (2007).
- I. Gabitov, R. Indik, P.M. Lushnikov, L. Mollenauer, and M. Shkarayev. *Twin Families of Bisolitons in Dispersion Managed Systems.* Optics Letters, **32**, 605-607 (2007).
- P.M. Lushnikov and H.A. Rose. *How much laser power can propagate through fusion plasma?* Plasma Physics and Controlled Fusion, **48**, 1501-1513 (2006).

- M. Alber, N. Chen, T. Glimm and P.M. Lushnikov. *Multiscale dynamics of biological cells with chemotactic interactions: from a discrete stochastic model to a continuous description.* Phys. Rev. E, **73**, 051901 (2006).
- P.M. Lushnikov and V.E. Zakharov. *On optimal Canonical Variables in the Theory of Ideal Fluid with Free Surface.* Physica D, **203**, 9-29 (2005).
- P.M. Lushnikov. *Diffusion of optical pulses in dispersion-shifted randomly birefringent optical fibers.* Optics Communications, **245**, 187-192 (2005).
- P.M. Lushnikov and H.A. Rose. *Instability versus equilibrium propagation of laser beam in plasma.* Physical Review Letters, **92**, 255003 (2004).
- P.M. Lushnikov. *Exactly Integrable Dynamics of Interface between Ideal Fluid and Light Viscous Fluid.* Physics Letters A, **329**, 49-54 (2004).
- P.M. Lushnikov. *Oscillating tails of a dispersion-managed soliton.* J. of the Optical Society of America B, **21**, 1913-1918 (2004).
- P.M. Lushnikov. *Collapse of Bose-Einstein condensate with dipole-dipole interactions.* Physical Review A, **66**, 051601(R) (2002).
- P.M. Lushnikov. *Fully parallel algorithm for simulating wavelength-division-multiplexed optical fiber systems.* Optics Letters, **27**, 939-941 (2002).
- M. Chertkov, I. Gabitov, P.M. Lushnikov, J. Moeser, Z. Toroczkai. *Pinning method of pulse confinement in optical fiber with random dispersion.*, J. of the Optical Society of America B, **19**, 2538-2550 (2002).
- I.R. Gabitov and P.M. Lushnikov. *Nonlinearity management in dispersion managed system.* Optics Letters, **27**, 113-115 (2002).
- P.M. Lushnikov. *Dispersion-managed soliton in a strong dispersion map limit.* Optics Letters, **26** , 1535-1537 (2001).
- P.M. Lushnikov, and M. Saffman. *Collapse in a forced three dimensional nonlinear Schrödinger equation.* Phys. Rev. E, **62**, 5793-5796 (2000).
- P.M. Lushnikov.*Dispersion-managed soliton in optical fibers with zero average dispersion.* Optics Letters, **25**, 1144-1146 (2000).
- P.M. Lushnikov. *On the boundary of the dispersion-managed soliton existence.* JETP Letters, **72** , 111-114 (2000).
- P.M. Lushnikov, and A.V. Mamaev. *Spontaneous hexagon formation in photorefractive crystal with a single pump wave.* Optics Letters, **24**, 1511-1513 (1999).
- P.M. Lushnikov. *Light propagation in photorefractive crystals: from rings to hexagons.* Nature (Priroda Magazine of the Russian Academy of Science, in Russian), **999**(11), 29 (1998).
- P.M. Lushnikov, P. Lodahl, and M. Saffman. *Transverse modulational instability of counter-propagating quasi-phase-matched beams in a quadratically nonlinear medium.* Optics Letters, **23**, 1650-1652 (1998).

- P.M. Lushnikov. *Two mechanisms of surface wave generation: Kelvin-Helmholtz and Miles instabilities.* Izvestiya, Atmospheric and Oceanic Physics, **34**, 370-377 (1998).
- P.M. Lushnikov. *Hexagonal optical structures in photorefractive crystals with a feedback mirror.* JETP, **86**, 614-627 (1998).
- P.M. Lushnikov. *Dynamic criterion for collapse.* JETP Letters, **62**, 461-467 (1995).
- E.A. Kuznetsov, and P.M. Lushnikov. *Nonlinear theory of the excitation of waves by a wind due to the Kelvin-Helmholtz instability.* JETP 81, 332-340 (1995).

Book Chapters:

- M. Alber, N. Chen, T. Glimm, and P.M. Lushnikov. *Two-dimensional Multiscale Model of Cell Motion in a Chemotactic Field.* 53-76 In Single-Cell-Based Models in Biology and Medicine, Series: Mathematics and Biosciences in Interaction. Eds. A.R.A. Anderson, M.A.J. Chaplain, K.A. Rejniak. Birkhauser Verlag Basel/Switzerland (2007).

Synergistic Activities:

2008 Development of Graduate topical course "Nonlinear Waves", University of New Mexico

2007 Organizer of the Special Session on Nonlinear Waves in Optics, Hydrodynamics and Plasmas at AMS meeting, University of New Mexico, 13-14 October, 2007.

2007 Organizer and Co-Organizer of 4 minisymposia at the 6th International Congress on Industrial and Applied Mathematics (ICIAM 07), Zurich, Switzerland, 16-20 July, 2007.

2006 Organizer of the Special Session on Nonlinear Waves at AMS meeting, University of Notre Dame, 8-9 April 2006.

Grants:

2007-2010 NSF 0719895, AMS-SS: Multiscale stochastic model of myxobacteria dynamic. $199,999. Co-PI.

2007 UNM RAC Grant #07-21, Collapse Turbulence in Plasma, Bose-Einstein Condensation and Oceanic Freak Waves. $4,000. PI

Collaborators and Other Affiliations:

Collaborators: M. Alber, (U. of Notre Dame) M. Chertkov (Los Alamos), I. Gabitov (U. of Arizona), E.A. Kuznetsov (Landau Institute), A.V. Mamaev (Inst. of Appl. Mech., Moscow), H.A. Rose (Los Alamos), M. Saffman (U. of Wisconsin, Madison), Z. Toroczkai (U. of Notre Dame), V.E Zakharov (U. of Arizona)

Graduate Advising at University of New Mexico

S. Dyachenko, L. Xu

MICHAEL NAKAMAYE

CORRESPONDENCE

(home) 3900 Moon St. NE
Albuquerque, NM 87111
(505) 296-0213
(work) Department of Mathematics and Statistics
Humanities Bldg. Room 415
University of New Mexico
Albuquerque, NM 87131–0001
505-277-2136
(e-mail) nakamaye@math.unm.edu

Date and Place of Birth: 11/22/1968 in Walnut Creek, CA

Citizenship: U.S.

EDUCATION

Yale University Department of Mathematics: Ph.D. in Mathematics received 1994.

Dissertation: *"Vanishing Theorems and Diophantine Approximation."*

Dissertation Advisor: Serge Lang. I spent the academic year 1992-1993 at MSRI (Berkeley) and the year 1993-1994 at Harvard. Awards: NSF Graduate Fellowship, 1991-1994.

Gonzaga University: B.S. in mathematics and B.A. in French received 1990.

JOB EXPERIENCE

University of New Mexico Mathematics and Statistics Department: Associate Professor of Mathematics, Fall 2004–present. Assistant Professor of Mathematics, Fall 1999– Fall 2004.

Harvard University Mathematics Department: Assistant Professor of Mathematics, Fall 1994 – Spring 1999. Awards: NSF Postdoctoral Fellow, 1995 – 1999.

TEN MOST RECENT PUBLICATIONS

1: *On the geometry of Sasakian–Einstein 5–manifolds*, Mathematische Annalen, **325**, 2003, pp. 485–524, with C. Boyer and K. Galicki.

2: *Base loci of linear series are numerically determined*, Transactions of the AMS, **355** No. 2, 2003, pp. 551–566.

3: *Seshadri constants and the geometry of surfaces*, Crelle, **564**, 2003, pp. 205–214.

4: *Seshadri constants at very general points*, to appear in Transactions of the AMS, 2005.

5: *Asymptotic Invariants of Line Bundles*, Pure Appl. Math Quarterly, **1** (A. Borel issue), 2005, pp. 379–403, with L. Ein, R. Lazarsfeld, M. Mustata, and M. Popa.

6: *Asymptotic Invariants of Base Loci*, Annales de l'Institut Fourier, **56**, 2006, pp. 1701–1734, with L. Ein, R. Lazarsfeld, M. Mustata, and M. Popa.

7: *Bornes uniformes pour le nombre de points rationnels de certaines courbes*, in Diophantine Geometry: Procedings of the Centro di Giorgi di Pisa, 2007, pp. 101–122, with P. Philippon and S. David.

8: *Multiplicity Estimates on Commutative Algebraic Groups*, Crelle, **607**, 2007, pp. 217–235.

9: *Lemmes de multiplicités et constante de Seshadri*, to appear in Mathematische Nachrichten, 2008, with Nicolas Ratazzi.

10: *Restricted volumes and base loci of linear series*, to appear in American Journal of Mathematics, 2008, with L. Ein, R. Lazarsfeld, M. Mustata, and M. Popa.

TEACHING

University Wide Awards:

a: Outstanding teacher of the year at Harvard University, 1999.

b: Outstanding teacher of the year at University of New Mexico, 2003.

c: Presidential teaching fellow at University of New Mexico, 2006– present.

Curiculum development: In the past few years I have developed several classes including an Honors calculus class designed to attract the brightest UNM undergraduates to mathematics as well as a general class for Honors students whose goal was to open their minds to the many ways in which knowledge of mathematics can enrich our lives. I am currently developing a course for advanced undergraduate and beginning graduate students focusing on the fundamental theorem of algebra, bringing together ideas from algebra, real and complex analysis, and topology.

Outreach: I have worked closely for the last four years with Kristin Umland who has developed a program, La Meta, designed to give middle school teachers in New Mexico the knowledge they need in order to be successful teachers. The long term goal of this program is of course to facilitate the transition of students from high school to college. I have also recently submitted a grant, with several other professors in our department, aiming at helping our advanced undergraduate students and beginning graduate students successfully make the transition from undergraduate to graduate studies. Finally, I have taught gifted middle school and high school students in an effort to expose them to abstract mathematical thinking at an early age.

Biographical Sketch: MONIKA NITSCHE

DEPARTMENT OF MATHEMATICS AND STATISTICS
UNIVERSITY OF NEW MEXICO
ALBUQUERQUE, NM 02155

505-277-5039 (o) 505-277-5505 (fax)
nitsche@math.unm.edu
http://www.math.unm.edu/~nitsche

PROFESSIONAL PREPARATION

Colorado State University, B.S. in Applied Mathematics, December 1986

University of Michigan, PhD in Mathematics, December 1992

APPOINTMENTS

University of New Mexico, Department of Mathematics and Statistics
Associate Professor, 2005-present
Assistant Professor, 1999-2005

Tufts University, Department of Mathematics
Assistant Professor, tenure-track, 1998
Assistant Professor, non tenure-track,1997-1998

Ohio State University, Department of Mathematics
Visiting Assistant Professor, 1996-1997

University of Minnesota, IMA, and **Siemens Corporate Research**
IMA Industrial Postdoc, 1994-1996

University of Colorado at Boulder, Program in Applied Mathematics
Instructor, 1992-1994

PUBLICATIONS

10 most significant publications:

- M. Nitsche & R. Krasny, A numerical study of vortex ring formation at the edge of a circular tube, *J. Fluid Mech.* **276**, 139-161 (1994).
- M. Nitsche, Axisymmetric vortex sheet motion: accurate evaluation of the principal value integral, *SIAM J. Sci. Comp.* **21** (3), 1066-1084 (1999).
- M. Nitsche, Scaling properties of vortex ring formation at a circular tube opening, *Phys. Fluids* **8** (7), 1848-1855 (1996).
- M. Nitsche, Singularity formation in a cylindrical and a spherical vortex sheet, *J. Comp. Phys.* **173**, 208-230 (2001).
- M. Nitsche, Self-similar shedding of vortex rings, *J. Fluid Mech.* **435**, 397–407 (2001).
- R. Krasny & M. Nitsche, The onset of chaos in vortex sheet flow, *J. Fluid Mech.* **454**, pp. 47–69 (2002).
- Nitsche, M. & Steen, P. H. Numerical simulations of inviscid capillary pinchoff, *J. Comp. Phys.* **200**, 299–324, 2004.
- M. Nitsche, Vortices, in *Encyclopedia of Mathematics and Physics*, eds. J.-P. Françoise, G. L. Naber, T. S. Tsun, Elsevier Science Ltd, 2006.
- Holm, D., Nitsche, M. & Putkaradze, V. The alpha-model and the vortex blob model for vortex sheet motion, *J. Fluid Mech.* **555**, 149–176, 2006.
- Ceniceros, H, Karniala, A. & Nitsche, M. High order quadratures for the evaluation of interfacial velocities in axi-symmetric Stokes flows, submitted, 2007.

RECENT AWARDS

[1] National Science Foundation, June 2008- May 2011. Project title: "EMSW21-MCTP Attracting, Motivating and Preparing Mathematics students in the Southwest by building an energetic community", coPI with Cristina Pereyra (lead PI), Mike Nakamaye and Jens Lorenz, $757,346

[2] National Science Foundation, Grant # DMS-0308061, Aug 2003 - July 2008 (incl no-cost extension). Project title: "On The Limiting Behaviour of Regularizations of the Euler Equations With Vortex Sheet Initial Data", PI: Monika Nitsche, $154,845.

[3] Sandia-University Research Grant, Oct 2001 - Sep 2002, $35,000.

SYNERGISTIC ACTIVITIES

(i) *Recent undergraduate and graduate student research supervision.*

- Olumyiwa Oluwasanmi, 2008, CS grad student doing research in fluid dynamics.
- Jeremy Johnson and Roman Wowk, 2006-2007, undergraduate honors students in NSF funded REU program. Project: singularity formation in toroidal vortex sheets. Research to be concluded and written up for publication this summer. Roman, interested in acoustic engineering, has been accepted to graduate school at Pennsylvania State University. Jeremy is a track-runner who will try out for the Olympics while beginning graduate study.
- Ian Sorensen, 2006-present, Math M.S. student. Project: viscous flow past cylinders using the particle strength exchange method. This work may easily develop into a PhD thesis.
- Brett Ecklund, Mario Valdez, Richard Brown, Spring 2007, undergraduate mathematics students. Held reading course in PDEs upon their request.
- Aino Kardiala, 2005-2006, Math M.S. student at UCSB. Worked with her on M.S. thesis based on my work.
- Jaime Hernandez, Spring 2006, Math Ph.D. student. Held reading course in fluid dynamics.
- Guangdong Zhu, Mechanical Engineering Ph.D. student, Summer 2004, 2005. NSF funded project: fast algorithms for vortex blob method. Guandong graduated and currently holds a postdoc position at UNM.

(ii) *Calculus Coordinator.*

Am coordinator of all our calculus courses for engineers, Fall 2000-present. Such coordination is necessary in view of the many students in these courses, and the many lecturers, part-timers and graduate student teaching assistants teaching them. Am responsible for all course material for all sections and am the main reference person for TAs, part-time instructors and lecturers. We are currently introducing a new textbook and completely changing our approach to these courses. I implement all changes, decide on syllabi and homeworks, and keep the webpage current, including exam reviews and homework and exam solutions. Please see

`www.math.unm.edu/nitsche/math163k.html`
`www.math.unm.edu/nitsche/math162.html`

My main guiding principle: instead of indiscriminately covering a 1200 page book, focus on certain topics, and cover those more in depth, so as to better convey the fundamental concepts.

(iii) *Other curriculum development.*

- Introduced new course on "Nonlinear Dynamics and Chaos", in part as response to interest expressed by faculty in biology. This course is attended by undergraduate

and graduate students of various science and engineering disciplines and is now offered on a regular basis.

- In Fall 2006, taught and developed much course material for an upper level undergraduate/graduate level course on "Introduction to Scientific Computing", including approximately 150 pages of lecture notes that introduce students to parallel programming, performance evaluation, discretization and roundoff errors, convergence of numerical methods and fast summation algorithms, in context of applications. All material is available on the web which will make the class available to be taken at a distance, for example by students at Los Alamos National Laboratory.
- With Adriana Aceves, explored alternative teaching methods for our precalculus program.
- With Adriana Aceves and Kristin Umland, lead teaching seminar for our entering graduate students, offered every fall.

(iv) *Graduate student committee member.* Ian Sorensen (MS 08, Appl Math), Jessica Deshler (PhD 08, Math Ed), Mariana Shedden (PhD 08, Physical Education, Sports and Exercise Science), Amol Palekar (MS 05, Mech Eng), Nicolas Robidoux (PhD 02, Appl Math)

(v) *Recent Service outside UNM*

- Reviewed journal papers for J. Fluid Mech (12), Phys. Fluids (8), J. Comp. Phys (6), J. Comp. Appl. Math (1), J. Mathematics and Computers in Simulation (1), Nonlinearity (1), Theor. and comp. fluid dyn. (1), J. Engin. Mech (1), Num. Methods for PDE's (1), Proc. Intern. Workshop on Vortex Flows and Related Numerical Methods (1); Applied Numerical Mathematics, proposals for NSF (3); articles in the series *Vortex Flows and Related Numerical Methods* (3); a report for Sandia National Laboratories;
- Reviewed 4 book proposals: *Calculus*, Lynn Garner (Addison-Wesley 02); *Elementary Differential Equations*, Werner Kohler and Lee Johnson (Addison-Wesley 01); *Vector Calculus*, Susan Colley (Prentice Hall 01); *Symposium on turbulence structure and vortex dynamics* (Cambride University Press 99).
- Reviewer for Mathematical Reviews (17 papers, 4 pending)
- Member of 4 NSF Panels (1/06, 7/06, 2/08, 3/08).
- Nominating Committee Member, American Physical Society, 2006-2008

COLLABORATORS & OTHER AFFILIATIONS

(i) *Collaborators on past and ongoing projects*
Andrew Belmonte, Pennsylvania State University
Hector Ceniceros, University of California at Santa Barbara
Bengt Fornberg, University of Colorado at Boulder
Michelle Ghrist, USAF Academy
Roger Grimshaw, Loughborough University
Robert Krasny, University of Michigan
Michael Shelley, New York State University
Paul Steen, Cornell University
Jim Strickland, Sandia National Laboratories
Patrick Weidman, University of Colorado at Boulder

(ii) *Graduate and postdoctoral advisors*
Robert Krasny, University of Michigan (graduate advisor)
no postdoctoral advisor

Biographical Sketch: MARIA CRISTINA PEREYRA

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Education

Universidad Central de Venezuela, Mathematics, B.S. 1987.
Yale University, Mathematics, Ph.D. 1993.

Professional Experience

2001–now: Associate Professor of Mathematics, University of New Mexico.
1996–2001: Assistant Professor of Mathematics, University of New Mexico.
Jan-July 1994: Member of the Institute for Advanced Study at Princeton.
1993–1996: Instructor, Department of Mathematics, Princeton University.

Recent Publications

1. *Haar multipliers meet Bellman functions.* Submitted. Available online at:
http://www.math.unm.edu/ crisp/papers/publications.html
2. *Extrapolation and sharp norm estimates for classical operators on weighted Lebesgue spaces*, with O. Dragicevic, L. Grafakos and S. Petermichl. Publ. Mat. **49** p. 73–91 (2005).
3. *Data-driven and optimal denoising of a signal and recovery of its derivative using multiwavelets*, with S. Efromovich, J. Lakey and N. Tymes Jr. IEEE Transactions on Signal Processing, vol 52, no. 3, p. 1-8 (2004).
4. *On the non-existence of certain divergence-free multiwavelets*, with Joseph D. Lakey. In 'Wavelet Transforms an Time-Frequency Signal Analysis' 425 L. Debnath ed. Vol 2, Chapter 3 p. 41-54 (2003).
5. *Lecture notes on dyadic harmonic analysis.* Contemporary Mathematics **289** AMS, Ch. I, p. 1-61 (2001).

Books to be published

(i) *Harmonic Analysis: from Fourier to Haar*, with Lesley Ward. Book (250 pages) to be published by the AMS (editor in charge Edward Dunne). Expected Publication date December 2008.
(ii) *Wavelets, their friends, and what they can do for you,* with Martin Mohlemkamp. Lecture Notes (120 pages) to be published by the European Mathematical Society. Expected Publication date Summer 2008.

Recent Grants

1. Awarded NSF Grant #0739417. PP Total costs - $757,346.00.
Title: *EMSW21-MCTP Attracting, Motivating and Preparing Mathematics students in the Southwest by building an energetic community.*
PI M. C. Pereyra, Co-PI Jens Lorenz, Co-PI Michael Nakamaye, Co-PI Monika Nitsche.

4. *New Mexico Math Contest:* Co-director of the high school mathematics competition sponsored by the department in New Mexico (Fall 1999 - 2006). In charge of writting and grading the exams. Information available online:

http://www.math.unm.edu/math_contest/contest.html

5. *Related Minicourses*

(i) Lectures on *From Fourier to Wavelets* at the III Panamerican Advanced Studies Institute in Computational Science and Engineering (PASI), Universidad Tecnológica de la Mixteca, Huajuapan de León, México, July 16-21, 2006.

(ii) Lectures on *Harmonic Analysis: From Fourier to Haar*, at the Program for Women in Mathematics at IAS, Princeton (May 2004).

(iii) Lectures on *Wavelets: Theory and Applications* at the I Panamerican Advanced Studies Institute in Computational Science and Engineering (PASI), Universidad Nacional de Córdoba, Argentina, June 24-July 5, 2002.

(iv) Lectures on *Dyadic Harmonic Analysis* at the Summer School on Analysis, Instituto de Matemática, Unidad Cuernavaca, UNAM, Mexico (June 2000).

Lecture notes available online: http://www.math.unm.edu/ crisp/papers/publications.html

Honors and Awards

(i) Department of Mathematics and Statistics, UNM: Outstanding Graduate Professor for academic years 2005-2006 and 2006-2007.

(ii) Member of the Venezuelan Olympic Team that participated in IMO in Washington, D.C. (1980), and in Budapest, Hungary (1981).

Collaborators & Other Affiliations

O. Dragicevic, Scuola Normale Superiore, Pisa, Italy.
S. Efromovich, Houston University.
L. Grafakos, University of Missouri, Columbia.
N. H. Katz, Indiana University.
J. Lakey, New Mexico State University.
M. Mohlenkampt, Ohio University.
S. Petermichl, Brown University.
A. Vargas, Universidad Autónoma de Madrid, Spain.
L. Ward, University of South Australia.

Graduate Advisor: P. Jones, Yale University.

F. BIOGRAPHICAL SKETCH OF SANTIAGO R. SIMANCA

A. PROFESSIONAL PREPARATION:

- Universidad Simón Bolívar (Caracas), Lic. in Mathematics, 1981.
- Massachusetts Institute of Technology, Ph.D in Mathematics, June, 1985.

B. APPOINTMENTS:

- 2005-present, Associate Professor, University of New Mexico.
- 2004, Profesor Visitante Estrangeiro, IMPA, Brazil.
- 2002-2003, Visiting Associate Professor, Institute for Mathematical Sciences, Stony Brook.
- 2001-2003, Director of Computing, Department of Mathematics & Institute for Mathematical Sciences, Stony Brook.
- 1996-2000, Research Scientist, Department of Applied Mathematics, Stony Brook.
- 1995-1996, Einstein Chair Visitor, Mathematics, CUNY, Graduate Center.
- 1994-1995, Assistant Professor, Mathematics, Polytechnic University.
- 1993-1994, Visiting Member, Mathematics, Courant Institute.
- 1985-1990, Assistant Professor, Mathematics, Stony Brook.

C 1. FIVE PUBLICATIONS MOST RELEVANT TO THIS PROPOSAL:

(1) C.P. Boyer, K. Galicki & S.R. Simanca, *Canonical Sasakian Metrics*, Comm. Math. Phys. (to appear) math.DG/0604325.
(2) C.P. Boyer, K. Galicki & S.R. Simanca, *The Sasaki cone and Extremal Sasakian metrics*, submitted to Proceedings of Conference Riemannian Topology and Geometric Structures on Manifolds.
(3) S.R. Simanca, *Heat Flows for Extremal Kähler Metrics*, Annl. Scu. Norm. Sup. Pisa 5, vol IV (2005), pp. 187-217.
(4) H. del Rio & S.R. Simanca, *The Yamabe problem for almost Hermitian manifolds*, Journal of Geometric Analysis, 13 (2003), pp. 185-203.
(5) S.R. Simanca, *Strongly extremal Kähler metrics*, Ann. Global Anal. Geom., 18, (2000) pp. 29-46.

C 2. FIVE ADDITIONAL PUBLICATIONS:

(1) S.R. Simanca & C. Tonnesen-Friedman, *The Energy of a Kähler class on admissible manifolds*, preprint 2007.
(2) S.R. Simanca & L. Stelling, *The dynamics of the energy of a Kähler class*, Commun. Math. Phys. 255 (2005), pp. 363-389.
(3) S.R. Simanca & L. Stelling, *Canonical Kähler classes*, Asian J. Math., 5 (2001), pp. 585-598.
(4) C. LeBrun & S.R. Simanca, *Extremal Kähler Metrics and Complex Deformation Theory*, Geom. Func. Analysis, 4 (1994), pp. 298–336.

(5) C. LeBrun & S.R. Simanca, *On the Kähler Classes of Extremal Metrics, in* Geometry and Global Analysis, (First MSJ Intern. Res. Inst. Sendai, Japan) eds. Kotake, Nishikawa & Schoen, 1993.

D. SYNERGISTIC ACTIVITIES:

(1) Regular reviewer for *Mathematical Reviews* and several professional mathematics journals.

(2) Teacher of specialized courses: Jan. 2003, minicourse *Canonical metrics on compact almost complex manifolds*, at IMPA, Brazil. Feb-Apr. 2005, mini graduate course *Kähler manifolds and canonical Kähler metrics* at the CMR, Barcelona, Spain. Apr. 2005, minicourse *Canonical Kähler Metrics* at CSIC, Madrid, Spain.

(3) Developer of the US version of the Gelfand Outreach Program in Mathematics to teach advanced K-12 students and train K-12 teachers.

(4) Organizer of scientific workshop and conferences: *Riemannian Topology and Geometric Structures on Manifolds*, a conference in honor of Charles P. Boyer's 65th birthday, Albuquerque, (Oct. 2006), *Minimal Varieties in Geometry and Physics*, conference in honor of Blaine Lawson's 60th birthday, Stony Brook (June 2002), and *Graphs and Patterns in Mathematics and Theoretical Physics*, conference in honor of Dennis Sullivan's 60th birthday, Stony Brook (June 2001)).

E. COLLABORATORS & OTHER AFFILIATIONS:

(1) Collaborators: C.P. Boyer (UNM, Albuquerque), C. Durán (Campinas, Brazil), D. Ebin (SUNY Stony Brook), K. Galicki (UNM, Albuquerque), J. Glimm (SUNY Stony Brook), Z. Haddad (JPL), D. Hill (SUNY Stony Brook), A. Hwang (Holy Cross), I. Kra (SUNY, Stony Brook), C. LeBrun (SUNY Stony Brook), M. Lyubich (SUNY Stony Brook), Maurizio Parton (Pisa, Italy), S. Popescu (SUNY Stony Brook), L. Recht (USB, Venezuela), Heberto del Rio, (CIMAT, México), Luisa Stelling (CIMAT, México), S. Sutherland (SUNY Stony Brook), Folkert Tangerman (SUNY Stony Brook), C. Tonnesen-Friedman (Union College, Schenectady).

(2) Graduate advisor: Richard B. Melrose (MIT); postgraduate advisor: none.

(3) Total number of Ph.D. Thesis and postdoctoral fellows advised: none.

Biographical Sketch

MICHELE GUINDANI

Department of Mathematics and Statistics
University of New Mexico
MSC03 2150, Albuquerque, NM, 87131-001

michele@stat.unm.edu
http://www.math.unm.edu/~michele
Voice/Fax 1 (505) 277-4744/5505

i. PROFESSIONAL PREPARATION

Università Commerciale Luigi Bocconi, Milano, Italy	Economics	BS (with honor)	2001
Università Commerciale Luigi Bocconi, Milano, Italy.	Statistics	Ph.D	2005
Duke University, Durham, NC			
Research Associate			Jun-Aug 2005
Department of Biostatistics, MD Anderson Cancer Center, Houston, TX			
Postdoctoral Fellow			2005-2007

ii. APPOINTMENTS

Aug 07 - present Assistant Professor in Statistics, Department of Mathematics and Statistics, University of New Mexico, Albuquerque, NM.

iii. PUBLICATIONS

J.A. Duan, M. Guindani, A.E. Gelfand (2007), Generalized Spatial Dirichlet Process Models, *Biometrika*, **94**, 4, 809-825.

A.E. Gelfand, M. Guindani, S. Petrone, Bayesian nonparametric modelling for spatial data using Dirichlet processes (with discussion) in J. M. Bernardo, M. J. Bayarri, J. O. Berger, A. P. Dawid, D. Heckerman, A. F. M. Smith and M. West (eds), *Bayesian Statistics 8* (2007). Oxford: Oxford University Press.

M. Guindani, K-A. Do, P. Müller and J. Morris. Bayesian Mixture models for Gene Expression and Protein Profiles. In *Bayesian Inference for Gene Expression and Proteomics,* Kim-Anh Do, Peter Müller, Marina Vannucci (Eds.), Cambridge University Press, 2006.

M. Guindani and A.E. Gelfand, Smoothness Properties and Gradient Analysis Under Spatial Dirichlet Process Models, *Methodology and Computing in Applied Probability*, 2006, 8, 159–189.

iv. PAPERS IN PREPARATION

Hybrid Dirichlet processes for functional data. (joint work with S. Petrone and A.E. Gelfand). Submitted to the '*Journal of the Royal Statistical Society*, Series B, currently under revision.

A bayesian Semi-parametric Analysis of SAGE data. (joint work with P. Müller.)

Bayesian Optimal Discovery Procedure. (join work with S. Zhang and P.Müller.)

v. COLLABORATORS

A.E. Gelfand (Duke University), P. Müller (MD Anderson Cancer Center), S. Petrone (Università Commerciale Luigi Bocconi, Italy), G. Rosner (MD Anderson Cancer Center),S. Zhang (UT Southwestern Medical Center), J. Duan (Yale School of Management), K.A. Do (MD Anderson Cancer Center), J. Morris (MD Anderson Cancer Center)

vi. RESEARCH INTERESTS

Bayesian nonparametrics modeling, spatial statistics, biostatistics, multiple comparisons problem, PK/PD modeling, inverse problems.

YAN LU
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Albuquerque, NM 87102
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505-243-1044 (home)
E-mail: luyan@math.unm.edu

EDUCATION

Ph.D. Mathematics, Arizona State University — 7/2002-5/2007
May 2007 — Tempe, AZ
Area: Statistics
GPA: 3.95

Sc. M. Mathematics, East China Normal University — 9/1999-6/2002
Area: Differential Geometry — Shanghai, China
GPA in Major: 4.0

B.S. Mathematics, Shandong Normal University — 9/1992-7/1996
GPA: 3.4 — Jinan, China

RESEARCH INTERESTS

Survey Sampling, Nonresponse, Mixed Models, Experimental Design, Nonparametric Regression

PROFESSIONAL EXPERIENCE

Assistant Professor — 8/2007-present
Department of Mathematics and Statistics, UNM — Albuquerque, NM

Statistical Consultant — 8/2005-5/2006
Department of Mathematics and Statistics, ASU — Tempe, AZ

Research Assistant — 7/2004-8/2004
Funded by NSF from Sharon L. Lohr, ASU — Tempe, AZ

Instructor — 8/2006-12/2006, 7/2006-8/2006, 1/2005-5/2005
Department of Mathematics and Statistics, ASU — Tempe, AZ

Teaching Assistant — 8/2002-12/2004
Department of Mathematics and Statistics, ASU — Tempe, AZ

Teaching Assistant — 2/2001-7/2001
Department of Physics, ECNU — Shanghai, China

PAPERS

Guoyi Zhang and Yan Lu, *Adjusted Confidence Bands in Nonparametric Regression, Communications in Statistics - Simulation and Computation,* Volume 37, Issue 1 January 2008 , pages 106 - 113

Yan Lu and Sharon Lohr, *Gross Flow Estimation in Dual Frame Surveys, will submit soon*

Yan Lu and Guoyi Zhang, *Likelihood Ratio Tests in Mixed Models, in preparation*

PROFESSIONAL MEMBERSHIP

American Statistical Association
Institute of Mathematical Statistics

CURTIS B. STORLIE

Department of Mathematics and Statistics,
MSC03 2150, 1 University of New Mexico,
Albuquerque, New Mexico, 87131-0001

EDUCATION

- PhD (Statistics) Colorado State University, Fort Collins, CO
- MS (Statistics) Arizona State University, Tempe, AZ
- BA (Mathematics) Saint Olaf College, Northfield, MN

RESEARCH INTERESTS

Nonparametric regression, Variable selection, Sensitivity analysis for large scale computer models.

RESEARCH GRANTS

1. Principle Investigator on SURP Grant 22858, "Advances in Sensitivity Analysis for Complex Computer Models", 2007–2009, $80,000 total (funded).
2. Principle Investigator on Sandia National Laboratories Contract PR 914050, "Sensitivity Analysis Enhancement and Implementation", 2007, $33,300 total (funded).

REFEREED PUBLICATIONS 2004-2008

1. CB Storlie, HD Bondell, BJ Reich, and HH Zhang (2008). The Adaptive COSSO for Nonparametric Surface Estimation and Model Selection. *Annals of Statistics* (in review).
2. BJ Reich, CB Storlie, and HD Bondell (2008). Bayesian Variable Selection for Nonparametric Regression Models. *Technometrics* (in review).
3. CB Storlie, J Hannig, and CM Lee (2008). The Asymptotic Properties of a Multiple Target Tracker. *Stochastic Processes and their Applications* (in review).
4. CB Storlie, CM Lee, J Hannig, and D Nychka (2008). Tracking of Multiple Merging and Splitting Targets with Application to Convective Storms and Turbulence Structures. *Statistica Sinica* (to appear).
5. CB Storlie and JC Helton (2007). Multiple Predictor Smoothing Methods for Sensitivity Analysis: Description of Techniques. *Reliability Engineering and System Safety* (to appear).
6. CB Storlie and JC Helton (2007). Multiple Predictor Smoothing Methods for Sensitivity Analysis: Example Results. *Reliability Engineering and System Safety* (to appear).
7. JC Helton, JD Johnson, WL Oberkampf, and CB Storlie (2007). A Sampling-Based Computational Strategy for the Representation of Epistemic Uncertainty in Model Predictions with Evidence Theory. Special issue of *Computer Methods In Applied Mechanics and Engineering* (to appear).
8. JC Helton, JD Johnson, CJ Sallaberry, and CB Storlie (2006). Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis. *Reliability Engineering and System Safety*, **91**,

1175-1209.

9. CB Storlie, CM Lee, D Nychka, B Whichter, C Davis, J Weiss (2004). Identifying and Tracking Turbulence Structures. *Proceedings of the 38th Asilomar Conference on Signals, Systems, and Computers*, **2**, 1700 - 1704.

INVITED LECTURES / PRESENTATIONS 2004-2008

1. Confidence Limits for Sensitivity Indices Estimated via Meta-Models, *Joint Research Commission Workshop*, Ispra, Italy (2008)
2. The Adaptive COSSO for Nonparametric Surface Estimation and Model Selection. *Los Alamos National Laboratory Seminar* (2007)
3. Reproducing Kernel Hilbert Spaces and Regularization Methods. *Computer Science Department, University of New Mexico* (2007)
4. Multiple Predictor Smoothing Methods for Sensitivity Analysis. *Winter Simulation Conference* (2005)
5. A Sampling-Based Computational Strategy for the Representation of Epistemic Uncertainty in Model Predictions with Evidence Theory. 8^{th} *US National Congress on Computational Mechanics* (2005)
6. Identifying and Tracking Turbulence Structures. *38th Asilomar Conference on Signals, Systems, and Computers* (2004)

COURSES TAUGHT

Multivariate Analysis, Regression Analysis, Nonparametric Regression, Introduction to Statistics for Engineers, Experimental Statistics for Biological Sciences, Introduction to Statistical Methods, and College Algebra.

SERVICE

- **Professional**
  - Manuscript Refereeing: Journal of Computational and Graphical Statistics, Statistica Sinica, Reliability Engineering and Systems Safety, Journal of Probability and Statistical Science, Ecotoxicology and Environmental Safety.
  - ASA representative for Albuquerque Chapter, 2007-2008.
  - Co-organizer and Mentor for SAMSI Undergraduate Workshop 2006. I helped to organize the presentations and activities and gave a lecture on the use of statistical techniques to aid in mathematical modeling of physical processes.
- **Departmental**
  - Statistics Graduate Committee at UNM, 2007-2010.
  - Search Committee at UNM for Assistant Professor in Statistics starting fall 2007.
  - Search Committee at UNM for Open Rank Statistics position starting fall 2007.

DIMITER NICKOLOV VASSILEV

The University of New Mexico
Albuquerque, NM 87131
Office Phone: (505) 277-2136

Email: vassilev@math.unm.edu
Home Phone: (951) 788-7926
Web Page: www.math.unm.edu/~vassilev

EDUCATION

Purdue University, West Lafayette, IN, Mathematics, Ph.D., December 2000.

Université Bordeaux I, Talence-Cedex, France, Mathematics, DEA, May 1994.

University of Sofia, Sofia, Bulgaria, Mathematics, B.S., 1993.

POSITIONS

Assistant Professor, University of New Mexico, Albuquerque, NM, August 2007–present.

Guest, Max-Planck-Institut für Mathematik, Bonn, Germany, July 2007.

Visiting Researcher, University of California, Riverside, CA, July 2007–present.

Visiting Assistant Professor, University of California, Riverside, CA, June 2005–June 2007.

CRM-ISM Postdoctoral Fellowship, Montréal, PQ, January 2003–December 2004.

Visiting Assistant Professor, University of Arkansas, Fayetteville, AR, 2000–2005.

TEACHING EXPERIENCE

2005–present, University of California, Riverside, CA.

2003, McGill University, Montréal, PQ.

2000–2005, University of Arkansas, Fayetteville, AR.

1995–2000, Teaching Assistant, Purdue University, West Lafayette, IN.

PAPERS

13) Ivanov, St., Vassilev, D., & Zamkovoy, S., *Conformal paracontact curvature and the local flatness theorem*, preprint, MPIM2007-90, arXiv:0707.3773, 2007, submitted for publication.

12) Ivanov, St. & Vassilev, D., *Conformal quaternionic contact curvature and the local sphere theorem*, preprint, MPIM2007-79, arXiv:0707.1289, 2007, submitted for publication.

11) Ivanov, St., Minchev, I., & Vassilev, D., *Extremals for the Sobolev inequality on the seven dimensional quaternionic Heisenberg group and the quaternionic contact Yamabe problem*, preprint, MPIM2007-22, math.DG/0703044, 2007, submitted for publication.

10) Ivanov, St., Minchev, I., & Vassilev, D., *Quaternionic contact Einstein structures and the quaternionic contact Yamabe problem*, International Centre for Theoretical Physics preprint IC/2006/117, math.DG/0611658, 2006, submitted for publication.

9) Vassilev, D., *L^p estimates, asymptotic behavior and extremals for some Hardy-Sobolev inequalities*, math.AP/0601662, 2005, submitted for publication.

8) Garofalo, N., & Vassilev, D., *Strong unique continuation for generalized Baouendi-Grushin operators*, Communications in Partial Differential Equations, 32(2007), no. 4, 643–663.

7) Vassilev, D., *Regularity near the characteristic boundary for sub-laplacian operators*, Pacific Journal of Mathematics, 227 (2006), no. 2, 361–397.

6) Vassilev, D., *A note on the stability of local zeta functions*, Proceedings of the American Mathematical Society, 134 (2006), no. 1, 81–91.

5) Khavinson, D., Solynin, A., & Vassilev, D., *Overdetermined boundary value problems, quadrature domains and applications*, Computational Methods and Function Theory, 5 (2005), no. 5, 19–48.

4) Garofalo, N., & Vassilev, D., *Strong unique continuation for generalized Baouendi-Grushin operators*, Advances in analysis, 255–263, World Sci. Publ., Hackensack, NJ, 2005.

3) Garofalo, N., & Vassilev, D., *Symmetry properties of positive entire solutions of Yamabe type equations on groups of Heisenberg type*, Duke Mathematical Journal, 106 (2001), no. 3, 411–449.

2) Garofalo, N., & Vassilev, D., *Regularity near the characteristic set in the non-linear Dirichlet problem and conformal geometry of sub-Laplacians on Carnot groups*, Mathematische Annalen, 318 (2000), no. 3, 453–516.

1) Garofalo, N., & Vassilev, D., *The non-linear Dirichlet problem and the CR Yamabe problem*, Boundary value problems for elliptic and parabolic operators (Catania, 1998), Matematiche (Catania) 54 (1999), suppl., 75–93.

FELLOWSHIPS AND AWARDS

February 2007 - October 2007, The National Academies Twinning Program grant, The Yamabe equation on the quaternionic sphere, $7,150 supplement.

February 2005–February 2007, The National Academies Twinning Program grant, *The Yamabe equation on the quaternionic sphere*, PI, $17, 750.

January 2003–December 2004, Centre de Recherches Mathématiques - Institut des Sciences Mathématiques (CRM-ISM) Postdoctoral Fellowship.

1998–2000, Purdue Research Foundation Grants.

1994, European Community Tempus Fellowship at Université Bordeaux I.

THESES

Yamabe type equations on Carnot groups, Ph.D. thesis Purdue University, 2000, advisor Professor Nicola Garofalo.

Opérateur à puissances bornées et decroissance de l'énergie locale, DEA thesis Université Bordeaux I, 1994, advisor Professor Vesselin Petkov.

Kristin L. Umland
Department of Mathematics and Statistics
University of New Mexico

Ph.D. Mathematics: "The Mod-2 Cohomology of the Lyons Sporadic Simple Group" supervised by Stephen D. Smith. May 1996 , University of Illinois at Chicago.

Publications:

Kristin Umland. "A reflection on mathematical cognition: how far have we come and where are we going?" Montana Mathematics Enthusiast, Vol. 5, no1 (January 2008)

Hersh, R. and Umland, K. "Mathematical discourse: the link from pre-mathematical to fully mathematical thinking," Philosophy of Mathematics Education Journal No.19 (December 2006)

Umland, K.: *College Algebra, second edition*; Kendall/Hunt Publishing Co. 4050 Westmark Drive, Dubuque, IA 52002; 443 pages; 2003

Adem, A., Karagueuzian, D., Milgram, J., and Umland, K. "The cohomology of the Lyons group and double covers of alternating groups," Journal of Algebra, Vol 208, pp. 452-479 (1998)

Smith, S.D., Umland, K.L. "Stability of cohomolgy via double-coset products and suborbit diagrams," Journal of Algebra, Vol. 182, pp. 627-652 (1996)

Other Scholarly Work:

Invited participant in NSF funded and MAA sponsored PMET workshop "Improving Instruction of Fractions in the United States," July 2007 (position paper forthcoming)

Co-author of "What do New Mexico Mathematics Teachers Need to Know?" a position paper about the mathematics content course for pre-service elementary teachers in New Mexico (To be completed January 2008)

Invited participant in The Mathematician's Corner, an NSF funded project organized by TERC designed to bring mathematicians and elementary school teachers together to write essays about mathematics for teachers. May 2006 and November 2006. Three essays written:

"Linear Thinking is full of Creative Possibilities"
"What is Abstraction?"
"What do Patterns and Sequences Have to do with Functions?

Mathematics content reviewer (whose role is to assess the quality of the mathematics in state standards across the US), "Grading the Systems: The guide to state standards, tests, and accountability policies;" Richard W. Cross, Theodor Rebarber, Justin Torres, Chester E. Finn, Jr.; January 2004

Mathematics item writer, Learning Mathematics for Teaching Project (a project to develop assessments for teachers' mathematical knowledge for teaching); Deborah Ball et al, University of Michigan; May 2003, May 2004, July 2007

Invited or Refereed Abstracts and/or Presentations at Professional Meetings:

"Teaching and learning about Linear Relationships as Viewed Through the Lens of CMP." Co-presented with Lisa Mathews of the MCC MSP project at NMSU, Nov 2007

"Use Your Powers for Good." Invited address, Cum Laude Society Induction Ceremony, Albuquerque Academy, May 2007

"Calculus for Teachers, a New Online Course at UNM." Presented at the NMAATYC meeting, Los Lunas, NM, April 2007

"Refining Use of Language: Speaking and Writing in a Mathematics Classroom" Success in the Classroom Conference, University of New Mexico, February 2007

"Lesson Study" Co-presented with Ted Stanford at the NMCTM meeting, Albuquerque, NM, November 2006

"Connecting Mathematical and Teaching Expertise: Two Mathematicians' Perspectives on Mathematical Knowledge for Teaching." Co-presented with Ted Stanford, NMSU at the Mathematics and Science Partnerships Program Regional Conference, March 2006

"In Polya's words: 'The student shall have a reasonable share of the work'" AMS Fall 2005 Central Section Meeting, Lincoln Nebraska, October 2005

"What Does Cognitive Science Have to Say About Mathematical Knowledge?" Colloquium at New Mexico State University, Las Cruces, NM, Sep 2005

"Two Perspectives on Teachers' Development of Mathematical Thinking." Co-presented with Ted Stanford, NMSU at *The Mathematical Knowledge for Teaching (K-8): Why, What and How?* Sponsored by the Mathematical Sciences Research Institute, May 2005

"The Hybrid Model-The Role of Mathematician Educators in Mathematics Departments," AMS Annual meeting, Atlanta Georgia, January 2005

"Success in mathematics: the need for a K-16 perspective," CETP annual conference, Ruidoso, New Mexico, September 2001

Funded Grants:

La Meta: Mathematics Educators Targeting Achievement
New Mexico Public Education Department
May 2004-September 2008, $1,455,992

(Anticipated continued funding of $640,000 for 2008-2010)

Teaching

Jessica Deshler, PhD thesis expected summer 2008; "Developing a Systematic Observation Protocol that Correlates to Student Outcomes"

Pablo Delgado, MA thesis spring 2007; "The Effects of Humor on Performance, Motivation, and Anxiety in a Calculus Course"

Candace Sanchez; B.A. Mathematics summer 2007; "Problem Solving Methods of Linear Functions among Secondary Educators"

Jenelle Manzanares, undergraduate research, Fall 2005; "Integrating Children's Literature and Mathematics: A Context for Word Problems" (This project won an award from the college of education at the undergraduate research symposium.)

Classroom Teaching:

Mathematics for Elementary Teachers I
Mathematics for Elementary Teachers II
Mathematics for Elementary Teachers III
College Algebra
A survey of Mathematics
Topic in Mathematics for Elementary Teachers
Theory and Practice of Problem Solving
Calculus for Teachers, **offered as an online course**

HELEN J. WEARING
Assistant Professor (since August 2007)
Joint appointment in the Departments of Biology and Mathematics & Statistics

EDUCATION
B.Sc 1997 (Mathematics & French) University of Manchester, U.K.
M.Sc. 1998 (Mathematics) Heriot-Watt University, U.K.
Ph.D. 2002 (Mathematical Biology) Heriot-Watt University, U.K.
Postdoc 2002-04 (Ecology) University of Cambridge, U.K.
Postdoc 2004-07 (Epidemiology) University of Georgia

RESEARCH INTERESTS
Mathematical biology: I'm broadly interested in using mathematical models to understand the biological processes that shape population and community dynamics, with a particular interest in the ecology and evolution of infectious diseases. My research uses a combination of analytical, statistical and computational tools that are drawn from the fields of dynamical systems and stochastic processes.

PUBLICATIONS 2002-2007
Rohani P, HJ Wearing, TC Cameron & SM Sait. Natural enemy specialisation and the period of population cycles. Ecology Letters 2003; 6:381-384.
Wearing HJ, SM Sait, TC Cameron & P Rohani. Stage-structured competition and the cyclic dynamics of host-parasitoid populations. Journal of Animal Ecology 2004; 7:706-722.
Wearing HJ, P Rohani, TC Cameron & SM Sait. The dynamical consequences of developmental variability and demographic stochasticity for host-parasitoid interactions. American Naturalist 2004; 164:543-558.
Cameron TC, HJ Wearing, P Rohani & SM Sait. A koinobiont parasitoid mediates competition and generates additive mortality in healthy host populations. Oikos 2005; 110:620-628.
Wearing HJ, P Rohani & MJ Keeling. Appropriate Models for the Management of Infectious Diseases. PLoS Medicine 2005; 2:e174.
Wearing HJ & P Rohani. Ecological and immunological determinants of dengue epidemics. PNAS 2006; 103:11802-11807.
Vasco DA, HJ Wearing & P Rohani. Tracking the dynamics of pathogen interactions: modeling ecological and immune-mediated processes in a two-pathogen single-host system. Journal of Theoretical Biology 2007; 245:9-25.
Cameron TC, HJ Wearing, P Rohani & SM Sait. Two species asymmetric competition: effects of age structure on intra- and inter-specific interactions. Journal of Animal Ecology 2007; 76:83-93.
Rohani P, HJ Wearing, DA Vasco & Y Huang. Understanding host-multi-pathogen systems: the interaction between ecology and immunology. In Ecology of Infectious Diseases (Eds: Osfeld, Keesing & Eviner), Princeton University Press (2007).

COURSES REGULARLY TAUGHT
Math 181 Elements of Calculus II (for the life sciences)
Math 412 Nonlinear Dynamics and Chaos

GRADUATE STUDENTS 2002-2007
Henry Moncada, MS Applied Math
Etsuko Nonaka, MS Applied Math (co-chair)

MAJOR SERVICE ACTIVITIES
At UNM
Cell Biology Search Committee (2007-08)
Math Dept Colloquium Committee
Computational Applied Math Hiring Committee (2007-08)
BA/MD program representative for Biology and Math&Stats

Outside UNM
Manuscript reviewer for American Naturalist, Bulletin of Mathematical Biology, Ecology, Ecology Letters, Journal of Animal Ecology, Journal of Mathematical Biology, Journal of the Royal Society Interface, Journal of Theoretical Biology, PLoS Biology, Proceedings of the National Academy of Sciences USA, Nature, Proceedings of the Royal Society London, Science, Theoretical Population Biology.

Adriana H. Aceves
Department of Mathematics and Statistics
University of New Mexico
(505) 277-5203
email: raceves@math.unm.edu

Education

- ABD, University of Arizona, Tucson Arizona, Applied Mathematics, 1990.
- MS, University of Arizona, Tucson Arizona, Applied Mathematics, 1988.
- BS, Universidad Nacional Autonoma de Mexico

Professional Positions

- Director of the Pre-Calculus Program, Department of Mathematics and Statistics, University of New Mexico, 8/2001 to present

  Responsibilities include:
  - Overseeing the coordination of all the core courses in the department
  - Hiring all part-time instructors
  - Working with scheduling coordinator on assigning courses to PTIs and TAs
  - Supervising the teaching of all the graduate students in the department
  - Organizing the training of TAs the week before fall semester
  - Working with many entities and organizations around campus on issues related to math classes
  - Organizing the common final exams for all the core classes and the group grading session that follows
  - Course development and periodic revision of the content in the syllabus of the different core courses that the math department offers
  - Resolve issues between students, instructors, parents and administrators
  - Coordinate with mathematics departments of the branch campuses

- Lecturer, Department of Mathematics and Statistics, University of New Mexico, 8/2000 to present
- Part-time adjunct faculty, Department of Mathematics and Statistics, University of New Mexico, 8/1990 – 2000

Teaching Experience:

- I have taught every course from math 120 (Intermediate Algebra) to math 316 (ODE's) that the math department offers
- I teach the courses in the Mathematics for Elementary Teachers sequence on a regular basis
- I have taught several classes for the LA META project. These are mathematics courses offered to in-service middle and high school teachers
- Developed and teach every fall the Teacher Training course, mandatory for all incoming teaching assistants

Synergetic Activities

- Coordinator for the project to assess the core curriculum of the math department
- Member of the Undergraduate Committee
- Member of the K-12 outreach committee
- Member of several dissertation committees
- Department liaison for the CAPS program
- Department liaison for the Title V grant
- Chair and UNM representative of the State-wide Articulation Task Force
- Member of the American Mathematical Society

Conferences

- Invited participant to the conference "Mathematicians Corner" in Holyoke, Mass; December 2006.
- Invited presentation in the conference "Success in the Classroom – Sharing Practices that Work" at the University of new Mexico; February 2008

Research

- Comparative Analysis of Mexican and American curricula of mathematics classes in grades 1 to 5

Awards

- Outstanding Teacher Award, NASA Training Project, UNM, spring 1996
- Outstanding Lecturer of the Year Award, UNM, spring 2007

Curriculum Vitae
Jurg Bolli

11012 Malaguena NE, Albuquerque, NM 87111-6824

Education

1977 to 1984: University of Zürich, Switzerland:
M.S. in Applied Mathematics. ("Diplom in Mathematik")
Thesis: "Systems of Volterra Integro-Differential Equations" under the supervision of Prof. H.R. Schwarz.

Minors in Applied Physics and Theoretical Physics.

Professional Experience

1/2000 to present: University of New Mexico, Department of Mathematics and Statistics, Albuquerque, NM: Lecturer II; Coordinator for Math 123 Trigonometry and Math 150 Pre-Calculus, this involves development of syllabi, textbook selection, class visitations etc.

1/1987 to 12/1999: University of New Mexico, Department of Mathematics and Statistics, Albuquerque, NM: Part-time mathematics instructor, coordinator for a variety of classes.

8/1994 to Present: Albuquerque Technical-Vocational Institute, now renamed CNM, Albuquerque, NM: Part-time mathematics instructor.

8/1986 to 12/1988: University of New Mexico, Valencia Campus, Los Lunas, NM: Part-time mathematics instructor.

1980 to 2/1986: High Schools in Luzern and Aarau, Switzerland: Instructor

Public & Community Contributions

Since 2006 I have been on the Executive Committee under Kris

Galicki.

1977 to 1986: Swiss Army, First Lieutenant: Developed, implemented and supervised training plans for infantry platoons of 50 men in basic training, in the reserves and in live ammunition exercises.

Awards

1993: Outstanding Part-Time Instructor, Department of Mathematics and Statistics, University of New Mexico, Albuquerque, NM.

Cathy Briand: **Vitae** **Spring 2008**

Teaching 2007-2008:

- By invitation, I conducted a two week seminar on "Teaching Mathematics with Manipulatives" at the Universidad Pedgogical in Tegucigalpa, Honduras. Based on the resounding success of the seminar and the level of sustained teacher participation, Dr. Adalid Gutierrez, Chairman of Mathematics Education, has requested I return to teach additional seminars.

- I was able to raise funds to bring $2000 worth of math manipulatives for the teachers participating in my seminar to keep for use in their classrooms.

- My student evaluations are consistently rated HIGH ranging from 5.7 – 6.0. Last semester I received two 6's and received one 5.7 for teaching Math 215 using a totally constructivist approach.

- All course work toward a Ph.D. in the Mathematics Education program in now complete. My GPA is 3.92.

- I participate in meetings with our mathematics education group to enhance our teaching strategies.

- I participate in the bi-monthly meetings as part of the Math Liaison Team which seeks to link UNM to the local school community for the improvement of mathematics education.

- I advise students who are enrolled in the elementary-mid-school as well as secondary school mathematics program.

- I have developed course packs for Math 215 and Math 339 for student use that contains activities and techniques that will be useful in their future teaching careers.

Service 2007 – 2008:

- I am the Co-Director of the UNM-PNM Statewide Mathematics Contest. This is our department's main community service outreach. The contest receives $15,000 per year from the PNM Foundation. For the past 13 years, I have raised the funds to operate the contest, which has been tremendously successful in challenging young aspiring mathematicians and scientists.

- I created a pamphlet to advertise the UNM-PNM State Mathematics Contest that includes a historical biography of the contest from it's inception to the current time.

- I arrange for and preside over the Round I grading session for the contest. This includes contacts teachers to help with grading, organizing the tests to be graded, and providing refreshments for the graders.

- I order t-shirts, plaques, make arrangements for the Awards, and book travel and accommodations for the visiting guest speaker during Round II.

- I make all arrangements for the banquet facilities, catering, create the Banquet Program and preside over the banquet.

- I have volunteered every Tuesday and Thursday morning at Escuela Luz del Mundo from 9:30 a.m. – 10:45 a.m. teaching 17 sixth graders mathematics. This is a school for children from low Socio-Economic Status homes and mainly English Language Learners.

- Member of the National Council of Teachers of Mathematics

- Member of the Albuquerque Teachers of Mathematics

- I prepare numerous references per year for students who are either applying for acceptance into the COE or applying for scholarships

- I participated in the Taos conference "What Mathematics Teachers Ought to Know" May 2007. Facilitators and teachers from around the state came together to brainstorm and draft proposals for essentials mathematics teacher's needed to teach successfully.

Teaching 2006-2007:

- Honored by being nominated this past year for inclusion in the 61st Edition of **Who's Who among America's Teachers.** (8th time to be included)

- My student evaluations are consistently rated HIGH ranging from 5.7 – 6.0.

- I will have one course left to complete my course work toward a **Ph.D. in the Mathematics Education** program at UNM. My current GPA is 3.87. Dr. Richard Kitchen is my advisor.

- I will be teaching a two week seminar titled "Enhancing Students' Understanding of Mathematical Concepts Using Manipulatives" at the University of Honduras between June 11th and June 23rd.

- I am in the process of raising funds to leave class sets of manipulatives for each of the twenty teachers who are enrolled in the seminar.

- I attended a Lesson Study presentation in January 2007, and was instrumental in having our mathematics education group carry out a lesson study with our Math 111 class at UNM.

- I am currently documenting the process we have gone through in our lesson study, and plan to publish our lesson study process.

- I attend meetings with our mathematics education group to enhance our teaching strategies.

- I advise students who are enrolled in the elementary-mid-school as well as secondary school mathematics program.

- I have been co-teaching for the La Meta program this fall under the guidance of Kristin Umland.

- I have developed course packs for Math 111 and Math 112 that provides notes, homework solutions, test reviews and answer keys as well as the final exam review and answer key. Also included are additional problems & information on topics taught within that class.

Service 2006 – 2007:

- I am the Co-Director of the UNM-PNM Statewide Mathematics Contest. This is our department's main community service outreach. The contest receives $15,000 per year from the PNM Foundation. I was responsible for raising the funds to operate the contest, and the contest has been tremendously successful for the past twelve years that I have been in charge of its development.

- I order t-shirts, plaques, make arrangements for the Awards Banquet and preside over the banquet.

- I arrange for and preside over the Round I grading session for the contest.

- I am on a book search committee with Kristin Umland & Rick Kitchen to find a suitable book to not only meet the needs of the Math 111, 112 & 215 curriculum, but to enhance our program.

- I am a grader for Extended University for Math 111, Math 112 & Math 215. In addition to grading, I have developed the assignments, tests and test reviews for these three classes.

- Member of the National Council of Teachers of Mathematics

- Member of the Albuquerque Teachers of Mathematics

- I prepare numerous references per year for students who are either applying for acceptance into the COE or applying for scholarships

Teaching 2005-2006:

- Honored by being nominated this past year for inclusion in the 11th Edition of **Who's Who among America's Teachers**. (7th time to be included)

- My student evaluations are consistently rated HIGH ranging from 5.7 – 6.0.

- I will have completed 11 courses toward a **Ph.D. in the Mathematics Education** program at UNM by the end of the Fall semester. Dr. Richard Kitchen is my advisor.

- I am planning to go to the University of Honduras in March 2007 for two weeks, hopefully as a Fulbright scholar.

- I attend meetings with our mathematics education group to enhance our teaching strategies.

- I advise students who are enrolled in the elementary-mid-school as well as secondary school mathematics program.

- I have been co-teaching for the La Meta program this fall under the guidance of Kristin Umland.

Service 2005 – 2006:

- I am the Co-Director of the UNM-PNM Statewide Mathematics Contest. This is our department's main community service outreach. The contest receives $15,000 per year from the PNM Foundation. I was responsible for raising the funds to operate the contest, and the contest has been tremendously successful for the past twelve years that I have been in charge of its development.

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- Member of the Albuquerque Teachers of Mathematics

- I prepare numerous references per year for students who are either applying for acceptance into the COE or applying for scholarships

Biographical Record for James Dudley, 2006-2008 Supplement

Name	Dudley, James
Rank or Title:	Lecturer II
Department:	Mathematics and Statistics
School/College:	Arts and Sciences
Email Address:	jdudley@math.unm.edu

Teaching *(accomplishments and recognitions in the area; curriculum development, production of teaching materials, etc.)*	Coordination of the review & adoption of texts and web support programs for Intermediate Algebra. Development of curriculum for the Combination Intermediate and College Algebra course.
Activities in learned and professional societies *(meetings attended, office held, professional papers read, etc.)*	Participant in the LANL Foundation conference "Childhood Learning and the Brain: Making the Connection" (July 31, 2006); the January 2008 Pre-K Institute on Numeracy sponsored by the NM Department of Education and the Department of Chilren, Youth and Families.
Other professional activities *(exhibits, concerts, dramatic productions, off-campus talks, etc.)*	Presenter at the Jan 7, 2008, APS In-service Conference for High School Math Teachers on "Articulation with UNM and CNM." Workshop presented January, 2007, to A Child's Garden Preschool teachers on age-appropriate use of recycled manipulatives to teach transformations, pattern recognition, data collection and display.
Non-teaching university, college, and department service *(administrative, committee work, etc)*	Participant in the Continuing Success Summits for public school teachers, CNM and UNM faculty each spring since 2004. Member of the planning committee for the APS/UNM Teacher Exchange (2006). Member of the Mathematics Education Liaison Committee (K-12). [ongoing] Strategist, with Alejandro & Adriana Aceves, Mark Ondrias, Karen Olson, and Monika Nitsche, in exploring ways to improve success rates in Math 120 & 121. [ongoing] Member of Liaison Committee to facilitate communication between the Department and CAPS
Public service	Clerk of the Albuquerque Friends Meeting (Quakers) 2003-2007.

Vitae

NAME: Philip P. Herlan

ADDRESS: 1207 El Portal NW
Los Ranchos, NM 87107

EDUCATION:

A.A.	Genesee Community College (Mathematics)	1971
B.A.	State Univ. College N.Y. at Buffalo (Mathematics)	1973
M.S.	State Univ. College N.Y. at Buffalo (Mathematics)	1975

SPECIALTY: Mathematics Education

EXPERIENCE:

Sergeant	U.S. Army	1966-1969
Instructor	University of New Mexico	1976-1982
Lecturer II	University of New Mexico	1982-present

AWARDS:

Outstanding educator; Alumni Association, May 1984.

Outstanding Undergraduate Instructor 1993, UNM Department of Mathematics and Statistics.

SERVICE :

1. Scheduling Coordinator 1984-present

2. State Director of the AMC 8 American Mathematics Contest 1989-2004

3. Wrote and presented to the department 'Getting Started with the TI-83". (fall 99)

4. I observe the new teaching assistants in a classroom setting during in service week.

Workshops attended:

Summer 1993 Calculus Reform , NSF, Don Small (West Point)

Summer 1994 Harvard Calculus , NSF and Wiley, John Hagood (NAU)

Summer 1995 Calculus Reform, NSF, Lawrence Moore and David Smith (Duke)

January 1997 Enhancing College Mathematics with the Graphing Calculator, Sally Fischbeck (RIT) and Sally Thomas (Orange Coast College)

May 1997 New Mexico Initiative for Math Reform, Regional Workshop (TVI Community college)

Victoria C. Kauffman
709 Calle del Contento NE
Albuquerque, NM 87110
505-256-0293
kauffman@math.unm.edu

Education:

University of New Mexico August 1982 to July 1984
Masters of Arts in Secondary Education/Mathematics
Mathematics and Science courses:
Probability, Numerical Analysis I and II, Survey of Advanced Math, Applied Matrix Theory, Solar Energy Use, Optics, summer workshops involving Topics in Math and AP calculus training for teachers.

LaSalle University August 1971 to May 1976
Bachelor of Arts (Cum laude) Education/Mathematics

Professional Teaching Experience: 27 years

University of New Mexico August 2002 to present
Mathematics and Statistics Department
Duties include coordinating the college algebra curriculum. This course is taken by over 1000 students each semester and requires uniformity of expectations to prepare the students for a continuation in the mathematics schedule. I have also taught business calculus, intermediate algebra, pre-calculus and teacher preparation topics classes. I collaborate with many of my fellow instructors and coordinators, striving to improve the success rates of our students. While here, I participated in a lesson study with four teachers from Albuquerque Public Schools, designing appropriate lessons for pre-calculus in 2002-2003.
I have sat on Faculty Senate 2006-present.
I act as liaison with the public schools that feed into our university, keeping them informed of our ongoing curriculum changes.

Albuquerque Public Schools
Career Enrichment Center August 1997 to May 2002
The Career Enrichment Center is a magnet school for Albuquerque Public Schools and serves all of the eleven high schools, as well as home schooled students in the district. I taught Robotics which included a credit in advanced math topics that are incorporated with the technology. This required me to develop a curriculum for this unique course. I also taught Algebra I Enriched in a Ninth Grade Academy with two other teachers who integrated English and Biology in a pilot program in 2001-2002.

- Participant in Gender Equity Expert Training Summer 1991

Other Interests:

- Advocate for students with learning disabilities, especially attention deficit disorder, ADHD and brain disorders that are directly linked to learning difficulties. Also assisted with visually impaired students.
- Member of NAIC Investment club
- Avid reader and member of all female bookclub
- Enjoy biking, tennis, skiing and most outdoor activities.
- Enjoy all forms of music and have attended the New Orleans Jazz and Heritage Festival over nine times.
- Love to travel and experience new things.

Appendix B

Department of Mathematics and Statistics
Assessment Plan – Spring 2008

Background.

Although our department has no official records or any statistical analysis of the progress that our students make each semester, we have a long history of looking back at the results of the final exams, analyzing the major deficiencies in the students preparation that semester, and modifying our program to improve on these particular results.

Some of the modifications that we have made in the past five years, as a result of the observations of student performance in the core exams include the following

- Modify the syllabus to allow more class time to the subjects that seem to be particularly difficult for the students.
- Allocate more class time to those skills that are basic for student performance in a given class. This includes allocating time at the beginning of the semester to review basic skills from previous courses.
- Carefully coordinating all the different sections of each class to guarantee that every student will be exposed to the same material regardless of the section.
- Writing an annotated syllabus for each core class to make sure that all instructors are emphasizing the same concepts.
- Posting all relevant information for all the core classes on our web-page. This includes reviews for each mid-term exam and for the core finals, sample finals from previous semesters, lecture notes, problems for extra practice, links to websites that provide relevant information about the topics covered in the class.
- In situ (DSH) tutoring tables staffed by the math department instructors for algebra and calculus courses.
- Established a TA training program that includes: In-Service week to train all new instructors; TA classroom observations of other instructors teaching the same course; classroom visits from the coordinators to most instructors but specifically any new instructor teaching the course; a Teaching seminar that runs the whole semester every fall.
- Creating the recitation courses for math 120, 121 and 180 to give help to students for which the class is specially challenging or that need help with deficiencies in their basic skills.
- Tried in several sections (although not across all of them) to use different methods of pedagogy, including on line help, and active learning methods
- Offered intersession workshops of math 120 and math 121 for those students that had performed well in the semester (and for whom repeating the whole class would not be the best option) but did not pass the core exam.

Plan for Fall 2007.

We have written student learning outcomes for all the core classes in the department (math 121 – 180, math 215, and stat 145) and have published these outcomes in the website of our department.

Plan for Spring 2008.

We will be doing embedded assessment in all the sections of math 121 and math 150. We have decided on the method of collecting the information about student performance and will try the method in one or two of the mid-term exams to make sure that everything works as planned. The actual assessment items for the semester will be embedded in the core exam at the end of the semester.

We are still in the process of deciding what learning outcomes we will assess this semester. Our guidelines will be

- Outcomes that appear in one fashion in several courses of our core sequence.
- Outcomes that are crucial for the successful completion of more advanced math classes.

We will use the data collected from these items to analyze the content and method of delivery of the material in these two courses.

Appendix C

Award Abstract #0713888

New Mexico Analysis Seminars 2007-2009

NSF Org:	DMS Division of Mathematical Sciences
Initial Amendment Date:	March 15, 2007
Latest Amendment Date:	March 15, 2007
Award Number:	0713888
Award Instrument:	Standard Grant
Program Manager:	Joseph M. Rosenblatt DMS Division of Mathematical Sciences MPS Directorate for Mathematical & Physical Sciences
Start Date:	September 1, 2007
Expires:	August 31, 2009 (Estimated)
Awarded Amount to Date:	$25000
Investigator(s):	Maria Pereyra crisp@math.unm.edu(Principal Investigator) Joseph Lakey (Co-Principal Investigator) Adam Sikora (Co-Principal Investigator) Robert Smits (Co-Principal Investigator) Tiziana Giorgi (Co-Principal Investigator)
Sponsor:	University of New Mexico SCHOLES HALL RM 102 ALBUQUERQUE, NM 87131 505/277-2256
NSF Program(s):	ANALYSIS PROGRAM
Field Application(s):	0000099 Other Applications NEC
Program Reference Code(s):	OTHR,9150,1281,0000
Program Element Code(s):	1281

ABSTRACT

This is an award of $25,000 to support the New Mexico Analysis Seminar (NMAS), an annual conference in mathematical analysis, for the next three installments in this conference series. The organizers plan to make this conference a forum for the presentation of the most recent significant results in this area of mathematics. The NMAS will provide a very exciting intellectual atmosphere for students and faculty. The funds requested support travel and subsistence for invited speakers and participants, especially student participants, without other means of support. The funds will be used to support mainly graduate students, recent graduates, women, minorities and persons with disabilities attending the conferences.

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Last Updated:April 2, 2007

Award Abstract #0621173

CMG: Collaborative Research on Multiscale Modeling of Arctic Sea Ice

NSF Org:	ARC Arctic Sciences Division
Initial Amendment Date:	August 31, 2006
Latest Amendment Date:	August 31, 2006
Award Number:	0621173
Award Instrument:	Standard Grant
Program Manager:	William J. Wiseman, Jr. ARC Arctic Sciences Division OPP Office of Polar Programs
Start Date:	September 1, 2006
Expires:	August 31, 2009 (Estimated)
Awarded Amount to Date:	$437259
Investigator(s):	Deborah Sulsky sulsky@math.unm.edu(Principal Investigator)
Sponsor:	University of New Mexico SCHOLES HALL RM 102 ALBUQUERQUE, NM 87131 505/277-2256
NSF Program(s):	INTERDISCIPLINARY MATH, MATHEMATICAL GEOSCIENCES, OPPORTUNITIES FOR RESEARCH CMG, ARCTIC NATURAL SCIENCES
Field Application(s):	0311000 Polar Programs-Related
Program Reference Code(s):	OTHR,9150,7303,7232,4444,0000
Program Element Code(s):	7283,7232,7215,5280

ABSTRACT

Sulsky 0621173
Coon 0620363

Funds are provided to support collaboration among mathematicians, engineers and geophysicists to develop a multi-scale, computational procedure to predict ice motion, deformation and thickness under observed external forcing conditions and to verify the procedure using newly available data. Specifically, a model for predicting lead (i.e., crack) initiation, orientation and extent of opening, developed with prior NSF support, will now be extended to include additional aspects of the ice pack. These extensions exploit an explicit representation of leads and allow a complete description of lead opening, ridging and freezing that is more realistic than the spatially averaged models currently in use. Thus, this project will advance the state-of-the-art in ice mechanics through model formulation, algorithm design, efficient numerical implementation and model validation.

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Last Updated:April 2, 2007

Award Abstract #0610067

Numerical Methods for Wave Propagation Problems: Efficient Resolution of Multiple Scales

NSF Org:	DMS Division of Mathematical Sciences
Initial Amendment Date:	July 24, 2006
Latest Amendment Date:	July 24, 2006
Award Number:	0610067
Award Instrument:	Standard Grant
Program Manager:	Junping Wang DMS Division of Mathematical Sciences MPS Directorate for Mathematical & Physical Sciences
Start Date:	August 1, 2006
Expires:	July 31, 2009 (Estimated)
Awarded Amount to Date:	$150000
Investigator(s):	Thomas Hagstrom hagstrom@math.unm.edu(Principal Investigator)
Sponsor:	University of New Mexico SCHOLES HALL RM 102 ALBUQUERQUE, NM 87131 505/277-2256
NSF Program(s):	COMPUTATIONAL MATHEMATICS
Field Application(s):	0000099 Other Applications NEC
Program Reference Code(s):	OTHR,9263,9150,0000
Program Element Code(s):	1271

ABSTRACT

The focus of our research will be the detailed study of questions we deem crucial to the development of reliable, efficient, and general computational tools for wave propagation problems. These, in turn, can have long-term impacts on numerous fields in science and engineering. Precisely we will:
(i) Further develop accurate methods for truncating the computational domain near regions where full approximations are required, extending the range of application of the successful methods we have previously constructed to inhomogeneous and anisotropic media as well as to multiscale computations; (ii) Construct and analyze novel high-resolution approximation schemes enabling accurate simulations with near-optimal degrees-of-freedom per wavelength, mild time-step stability restrictions, and easy coupling with grid grid generation software to efficiently treat problems in complex geometry; (iii) Apply our methods to difficult problems in aeroacoustics; (iv) Collaborate with other computational scientists who are building and
maintaining high-quality software for simulating waves.

Wave propagation phenomena are ubiquitous in nature. Although waves may be produced by physical processes ranging from electric currents to turbulent flows to massive earthquakes, their basic features allow a unified mathematical description. From the perspective of simulations on modern computers, it is
reasonable to hope that generally applicable tools can be constructed which will be useful in answering important questions throughout the basic and applied sciences. The challenge in the computational analysis of waves is that almost all problems of interest exhibit widely varying spatial scales. This is a consequence of the fundamental fact that waves propagate long distances relative to their characteristic dimension, the wavelength. We thus will work to develop methods

which allow us to avoid the direct computation of the wave field everywhere along its path, concentrating computational resources only where they are needed. In addition to our work on basic techniques with broad applications, we plan focused studies on problems related to the generation of sound by jets and its propagation into the environment. We believe that the fundamental studies we will carry out can motivate the development of better sound suppression technologies for commercial and military aircraft.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

(Showing: 1 - 4 of 4).

Dohnal, T; Hagstrom, T. "Perfectly matched layers in photonics computations: 1D and 2D nonlinear coupled mode equations," *JOURNAL OF COMPUTATIONAL PHYSICS*, v.223, 2007, p. 690 - 710. View record at Web of Science

E. Andries, S. Atlas, T. Hagstrom, and C. Willman. "Regularization strategies for hyperplane classifiers: Application to cancer classification with gene expression data," *J. Bioinformatics and Comput. Biol.*, v.5, 2007, p. 79.

Hagstrom, T; Hagstrom, G. "Grid stabilization of high-order one-sided differencing I: First-order hyperbolic systems," *JOURNAL OF COMPUTATIONAL PHYSICS*, v.223, 2007, p. 316 - 340. View record at Web of Science

Hagstrom, T; Lau, S. "Radiation boundary conditions for Maxwell's equations: A review of accurate time-domain formulations," *JOURNAL OF COMPUTATIONAL MATHEMATICS*, v.25, 2007, p. 305 - 336. View record at Web of Science

(Showing: 1 - 4 of 4).

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Last Updated:April 2, 2007

Award Abstract #0552314

Fermat quotients, correspondences, and uniformization

NSF Org:	DMS Division of Mathematical Sciences
Initial Amendment Date:	June 2, 2006
Latest Amendment Date:	June 2, 2006
Award Number:	0552314
Award Instrument:	Standard Grant
Program Manager:	Tie Luo DMS Division of Mathematical Sciences MPS Directorate for Mathematical & Physical Sciences
Start Date:	June 1, 2006
Expires:	May 31, 2009 (Estimated)
Awarded Amount to Date:	$112100
Investigator(s):	Alexandru Buium buium@math.unm.edu(Principal Investigator)
Sponsor:	University of New Mexico SCHOLES HALL RM 102 ALBUQUERQUE, NM 87131 505/277-2256
NSF Program(s):	ALGEBRA,NUMBER THEORY,AND COM
Field Application(s):	0000099 Other Applications NEC
Program Reference Code(s):	OTHR,9150,0000
Program Element Code(s):	1264

ABSTRACT

Given a geometric object and an equivalence relation on it one is often faced with the situation that there are no invariant functions except the constants. In particular the categorical quotient reduces to a point. One way to go around this difficulty is to shift focus from the study of invariant functions to the study of the ``non-effective descent data'' for the equivalence relation.
Stack theory and non-commutative geometry are both examples of this strategy. In previous work, the PI proposed a rather different approach. The idea is to enlarge the repertoire of functions of algebraic geometry by adjoining a ``Fermat quotient operator''; the new functions in the repertoire
(which should be viewed as arithmetic analogues of non-linear differential operators) turn out to be sufficiently flexible to sometimes provide interesting invariants. The new resulting geometry can be referred to as arithmetic differential geometry. This is a commutative geometry and can be viewed as an arithmetic analogue of the Ritt-Kolchin differential algebraic geometry. There is an arithmetic differential geometry for each prime number. The main conjecture proposed by the PI is that if one is given an algebraic curve over a number field and a correspondence on it satisfying a certain natural density condition then the categorical quotient of the curve by the correspondence is non-trivial in arithmetic differential geometry for almost all primes if, and only if, over the complex numbers, the correspondence admits a ``complex analytic uniformization''. One can complement the conjecture above by predicting that in most cases the corresponding quotient spaces are ``rational''. Previous work of the PI led to confirmation of the conjecture in a number of basic examples. The present research project proposes to continue the work on this conjecture, to extend this work to the higher dimensional case and to the ``partial differential case'', and to exploit the interactions of this theory with other theories.

The construction of quotient spaces is a central problem in geometry. There are natural situations when quotients, in a

given geometry, exhibit fundamental pathologies. This prompts one to seek extensions of classical geometries where the quotient pathologies can be avoided. The proposal puts forward a new extension of algebraic geometry which seems well suited to treat pathologies arising from arithmetical problems.

Award Abstract #0504367

Einstein Metrics, Sasakian Geometry and Kahler Orbifolds

NSF Org:	DMS Division of Mathematical Sciences
Initial Amendment Date:	July 14, 2005
Latest Amendment Date:	July 14, 2005
Award Number:	0504367
Award Instrument:	Standard Grant
Program Manager:	Christopher W. Stark DMS Division of Mathematical Sciences MPS Directorate for Mathematical & Physical Sciences
Start Date:	July 15, 2005
Expires:	June 30, 2008 (Estimated)
Awarded Amount to Date:	$215999
Investigator(s):	Charles Boyer cboyer@math.unm.edu(Principal Investigator) Krzysztof Galicki (Co-Principal Investigator)
Sponsor:	University of New Mexico SCHOLES HALL RM 102 ALBUQUERQUE, NM 87131 505/277-2256
NSF Program(s):	GEOMETRIC ANALYSIS
Field Application(s):	0000099 Other Applications NEC
Program Reference Code(s):	OTHR,9150,0000
Program Element Code(s):	1265

ABSTRACT

Abstract

Award: DMS-0504367
Principal Investigator: Charles P. Boyer and Krzysztof Galicki

Professors Boyer and Galicki propose to investigate several projects in geometry and topology. The objective of all the projects is to study fundamental questions in Riemannian Geometry with two main focal points: Contact Geometry of orbifold bundles over Calabi-Yau and Fano varieties and the existence of some special (i.e., Einstein, positive Ricci curvature, transversely Calabi-Yau) metrics on such spaces. The questions and problems proposed here are deeply rooted in the principal investigators' earlier work which exploited a fundamental relationship between contact geometry of Sasakian-Einstein spaces and two kinds of Kaehler geometry, namely Q-factorial Fano varieties with Kaehler-Einstein orbifold metrics with positive scalar curvature, and Calabi-Yau manifolds with their Kaehler Ricci-flat metrics. Most recently the principal investigators and J. Kollar

have solved an open problem in Riemannian geometry. We have proved the existence of Einstein metrics on exotic spheres in a paper to appear in the Annals of Mathematics. Furthermore, we have shown that odd dimensional homotopy spheres that bound parallelizable manifolds admit an enormous number of Einstein metrics. In fact, the number of deformation classes as well as the number of moduli of Sasakian-Einstein metrics grow double exponentially with dimension. The techniques used by the principal investigators borrow from several different fields; the algebraic geometry of Mori theory and intersection theory, the analysis of the Calabi Conjecture, and finally the classical differential topology of links of isolated hypersurface singularities. These methods can be extended much further and in various directions. More generally the principal investigators want to address several classification problems concerning compact Sasakian-Einstein manifolds in dimensions 5 and 7. These two dimensions are important for two separate reasons. In view of earlier work higher dimensional examples can be constructed using the join construction. At the same time these two odd dimensions appear to play special role in Superstring Theory. In the context of recent developements in String and M-Theory the principal investigators also propose to investigate some related problems concerning self-dual Einstein metrics in dimension 4.

Mathematics is the foundation upon which our modern technology is built, and much of its understanding and development must preceed technological progress. Nevertheless, our research into a particular type of geometry is closely linked to some important problems in modern Theoretical Physics and should provide an important mathematical basis for their understanding. For example, the mathematical models that we are studying are currently being used in supersymmetric string theory which is a model for the unification of gravity with the other fundamental forces of nature. This also has applications to the Physics of black holes.

Award Abstract #0505618

Nonlinear Optics in Photonic Micro and Nanostructures

NSF Org:	DMS Division of Mathematical Sciences
Initial Amendment Date:	June 24, 2005
Latest Amendment Date:	August 15, 2007
Award Number:	0505618
Award Instrument:	Standard Grant
Program Manager:	Henry A. Warchall DMS Division of Mathematical Sciences MPS Directorate for Mathematical & Physical Sciences
Start Date:	July 1, 2005
Expires:	June 30, 2008 (Estimated)
Awarded Amount to Date:	$110750
Investigator(s):	Alejandro Aceves aceves@math.unm.edu(Principal Investigator)
Sponsor:	University of New Mexico SCHOLES HALL RM 102 ALBUQUERQUE, NM 87131 505/277-2256
NSF Program(s):	EXP PROG TO STIM COMP RES, APPLIED MATHEMATICS
Field Application(s):	0000099 Other Applications NEC
Program Reference Code(s):	OTHR,9150,7237,0000
Program Element Code(s):	9150,1266

ABSTRACT

This project deals with the mathematical and computational modeling of light as it propagates in photonic micro and nanostructures. In one example, a new and improved model will be proposed and used to describe novel optical pulse propagation in photonic crystal fibers such as the recently observed phenomena of supercontinuum generation which cannot be well understood with the existing slowly varying envelope approximation. A second component of this project studies light localization and steering in optical fiber arrays and in particular the role imperfections in the manufacturing of such devices have in enhancing or suppressing light localization. The model considered here is a set of coupled stochastic differential equations. Finally, we will begin to address the question of which optical phenomena that has been observed in micro-devices can also happen in the nano-devices. In all instances, the mathematical and computational outcomes will be presented to and compared with leading experimentalist efforts.

This research effort is of interdisciplinary nature and the use of mathematical modeling will help improve performance of optical devices used in medical applications such as coherent tomography and in advanced fiber lasers aimed at producing powers in the multi-kilowatt regime.

State of the art lasers based on the model studied here, will likely prove to be relevant for homeland security. This project will support the advancement of two women (a PhD student and a junior faculty) in their careers as Applied Mathematics professionals.

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Last Updated: April 2, 2007

Award Abstract #0415251

Collaborative Research: CMG: Stochastic Representation of Parameter Uncertainty within Model Predictions of Future Climate

NSF Org:	OCE Division of Ocean Sciences
Initial Amendment Date:	August 18, 2004
Latest Amendment Date:	August 4, 2006
Award Number:	0415251
Award Instrument:	Continuing grant
Program Manager:	Eric C. Itsweire OCE Division of Ocean Sciences GEO Directorate for Geosciences
Start Date:	September 1, 2004
Expires:	August 31, 2008 (Estimated)
Awarded Amount to Date:	$210661
Investigator(s):	Gabriel Huerta ghuerta@stat.unm.edu(Principal Investigator)
Sponsor:	University of New Mexico SCHOLES HALL RM 102 ALBUQUERQUE, NM 87131 505/277-2256
NSF Program(s):	MATHEMATICAL GEOSCIENCES, OPPORTUNITIES FOR RESEARCH CMG
Field Application(s):	0000099 Other Applications NEC
Program Reference Code(s):	OTHR,7303,7232,0000
Program Element Code(s):	7232,7215

ABSTRACT

Abstract: 0415738 & 0415251
CMG COLLABORATIVE RESEARCH: Stochastic Representation of Parameter Uncertainty Within Model Predictions of Future Climate

Intellectual Merit: This study will develop new efficient methods to estimate climate model prediction uncertainties stemming from the combined influence of multiple, non-linearly related parameters and explain the large disparity that exists among climate models in their response to projected increases in atmospheric CO2 concentration. Initial attempts to quantify parameter uncertainties will use Bayesian Stochastic Inversion based on Multiple Very Fast Simulated Annealing (Multiple VFSA), a stochastic importance sampling technique developed and successfully applied to the interpretation of geophysical data. In parallel, stochastic sampling strategies will be reviewed from a Monte-Carlo Markov Chain (MCMC) perspective to advance this theory's applicability to problems that are currently limited by the number of samples that may be feasible to consider either because of computational cost (e.g. climate models) or the size of data sets (e.g. interpretations of geophysical data). Specific objectives include 1) estimating a multidimensional probability distribution for a set of parameters related to clouds, convection, and radiation within the latest version of CAM2 (the climate model developed at NCAR) that are significant sources of climate model prediction uncertainty, 2) evaluate sampling biases within Multiple VFSA and prototype new efficient and robust methods of statistical inference from a MCMC perspective, 3) the calculation of an ensemble of doubled CO2 experiments with a coupled atmosphere-mixed layer ocean model that is representative of the combined uncertainty in these parameters, and 4) evaluate the climate processes that

explain differences in model response to changes in CO2 forcing.

Broader Impacts: Quantifying the main sources of climate model uncertainty is the first step toward reducing differences between different models forced by the same inputs. There is potentially useful data from both the instrumental record as well as paleoclimate archives that have not been fully exploited. The proposed research provides a methodological foundation for using these data sources to address these objectives. The results from the proposed research will demonstrate for the first time the feasibility of exploring atmospheric GCM parameter space in a comprehensive and systematic manner. With current inexpensive but powerful distributed computing architectures and the ability to automatically navigate parameter space, parameter choices can be more easily optimized for model performance. The proposed research activity will also contribute to the training and support of two graduate students.

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Last Updated:April 2, 2007

Award Abstract #0308061

On The Limiting Behaviour of Regularizations of the Euler Equations With Vortex Sheet Initial Data

NSF Org:	DMS Division of Mathematical Sciences
Initial Amendment Date:	July 30, 2003
Latest Amendment Date:	July 23, 2007
Award Number:	0308061
Award Instrument:	Standard Grant
Program Manager:	Henry A. Warchall DMS Division of Mathematical Sciences MPS Directorate for Mathematical & Physical Sciences
Start Date:	August 1, 2003
Expires:	July 31, 2008 (Estimated)
Awarded Amount to Date:	$163329
Investigator(s):	Monika Nitsche nitsche@math.unm.edu(Principal Investigator)
Sponsor:	University of New Mexico SCHOLES HALL RM 102 ALBUQUERQUE, NM 87131 505/277-2256
NSF Program(s):	EXP PROG TO STIM COMP RES, APPLIED MATHEMATICS
Field Application(s):	0000099 Other Applications NEC
Program Reference Code(s):	OTHR,9251,9150,0000
Program Element Code(s):	9150,1266

ABSTRACT

Vortex sheets model shear layers in fluid flow. In order to avoid finite-time singularities in the Euler equations that govern the dynamics of a vortex sheet, it is necessary to regularize the equations. This project compares three different regularization methods of current importance: vortex blob methods, Euler-alpha models, and physical viscosity. At present it is unknown whether different regularizations have different limits as the regularization parameter approaches zero, and this project aims to answer this question through a combination of numerical studies and analytical methods. An answer to this question is of intrinsic mathematical interest and of practical importance for numerical simulations.

Possible outcomes to this investigation include: 1) Different regularizations of the Euler equations give different limits at a fixed time. This would be of interest for both intrinsically mathematical reasons and for applications. 2) The limits are the same, and the chaotic features observed in recent work on the vortex blob method are present in all cases, including the viscous case. This would give significant insight into the physics of real fluid motion. 3) The limits are the same, and do not include the chaotic features. This would indicate that regularization can introduce artificial irregularities, and would suggest work for improved regularization methods. This work aims to present conclusive evidence towards one of these possible scenarios. It will result in increased understanding of regularizations of the Euler equations and of fluid dynamics with small viscosity.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

(Showing: 1 - 3 of 3).

Holm, D., Nitsche, M. \& Putkaradze, V.. "The alpha-model and the vortex blob model for vortex sheet motion," *J.~Fluid Mech*, v.555, 2006,

Nitsche, M., Taylor, M.\ A.~\& Krasny, R.. "Comparison of regularizations of vortex sheet motion," *Computational Fluid and Solid Mechanics 2003, ed J K Bathe*, 2003,

Nitsche, M.\ \& Steen, P.\ H.. "Numerical simulations of inviscid capillary pinchoff,," *J.~Comp. Phys.*, v.200, 2004,

(Showing: 1 - 3 of 3).

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Last Updated:April 2, 2007

Appendix D

Agenda for Excellence in Undergraduate Education

Department of Mathematics and Statistics

Prepared by the Undergraduate Committee
Michael Buchner, Evangelos Coutsias (chair), Kris Galicki, Vladimir Kolchinski,
Monika Nitsche, Laura Salter, Deborah Sulsky and Kristin Umland
with assistance from Sterling Coke, Donna George and Jenison Klinger

1 Introduction

To paraphrase an ancient saying, *living* is owed to one's parents, but *living well* to one's teachers. Recruiting New Mexico's youth and providing them with the education and growth that will give them a good life is our primary mission. As president Caldera has pointed out, improving undergraduate education is the single most important thing we can do to increase public support for UNM.

Mathematics and Statistics forms the foundation of all science and engineering curricula. The department teaches more student credit hours each year than every college on campus except Arts and Sciences itself. Since we are one of the "3R's" we constantly strive to mesh our courses with the evolving engineering and science courses. Besides conducting several introductory courses with many sections and large, cross-campus enrollments, we must also ensure that the level of our remaining courses is accessible to students from other departments and colleges and that the course content is appropriate. This means that every step we take to improve our program must be compatible with the diverse sets of goals and requirements of the campus community. But it also implies that our success in teaching and outreach will ripple across a large part of the campus.

2 Our ideal of Excellence

The Mathematics and Statistics curriculum has an intricate structure that gradually rises from a strong base. Our students require rigorous and complete training in the basics if they are to succeed in grasping the more complex concepts that follow. Any gap in the structure and it cannot continue to grow. Therefore our main courses should always be staffed by experienced faculty and their content needs to be well coordinated and up to date. Moreover, we must ensure that our students are carefully monitored through personal assessment by our staff advisor and their individually assigned faculty advisor.

We see our majors as budding professionals. Their career choices are as diverse as the individuals and illustrate the enormous opportunities open to our graduates. Examples include computer pro-

gramming and animation, forecasting and modeling, cryptography, data analysis quality assurance, and careers in the military, government or in the private sector. Some are headed for graduate research in abstract or applied fields, in a university, research center or government laboratory or in the industry, in this country or abroad. Many will seek a Masters' degree and work as actuaries, as secondary educators, or as resident statisticians in hospitals.

However the majority of our students at all levels are not majors in the department: they are engineers, physicists, education or business majors, to mention but a few, coming to us both for required courses and electives. They seek skills that will afford them a deeper grasp of their engineering or science courses or will allow them to better prepare for graduate school or a successful career.

We consider ourselves successful if our students succeed, indeed thrive, in their pursuits, whether in postgraduate education, in finding desirable employment or in the careers they choose. And we define as our students not only the select few dozen that earn a degree from us, but all the students that we serve.

3 Our Strengths

The undergraduate program in Mathematics and Statistics is stronger than ever. Our recruiting efforts, advising, and curriculum design and enrichment over the past decade have helped us recruit and guide students to a successful graduation in larger numbers than ever before, see Fig.(1a). Often a strong mentor relationship is formed between the faculty advisors and their advisees, and the benefits of having this support can be felt throughout our program. A mathematics honors society, *KME*, has been one of the venues for creating and cultivating a spirit of camaraderie among the students. We have many concentration areas for majors: Pure Mathematics, Applied Mathematics, Computational Mathematics, Statistics, Mathematics Education, and the recently added Distributed Mathematics major. These options provide the flexibility to meet the diverse interests and needs of our students.

Our students now also enjoy opportunities to participate in undergraduate research: 15 did so in the last 5 years, two through our newly formed honors program and the number of faculty involving undergraduates in their research is growing. A pending collaborative grant by Professor Salter with the Biology Department is requesting funding for 3-4 math/stat undergrad research projects over a five-year period.

In response to demand in emerging research areas, several new courses were added to the curriculum. These include Nonlinear Dynamics and Chaos, Fluid Mechanics (Professor Nitsche), Fourier Analysis and Wavelets (Professor Pereyra), Nanotechnology (Professor Putkaradze), Scientific Computing (Professor Warburton), SAS programming (Professor Justin Kubatko), Bayesian Statistics (Professors Hanson & Huerta), Biomathematics Seminar (Professor Steinberg). Also possibilities exist for internships at Sandia and Los Alamos Labs, or in the Health Sciences Center. Several of our students have participated in NSF REUs (Research Experiences for Undergraduates) and internships at a variety of Universities and Institutes (The Ohio State University, National Center

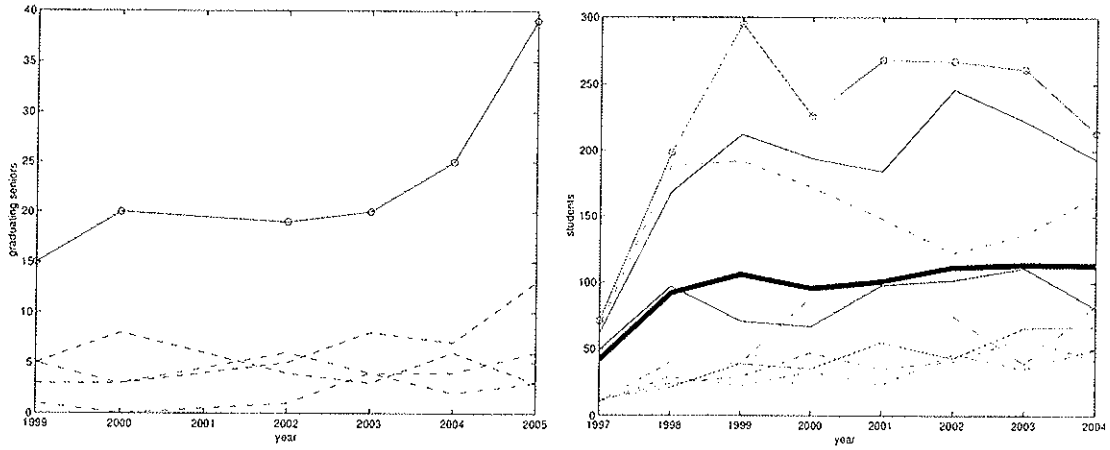

Figure 1: (a) Mathematics and Statistics graduates for the past five years. Numbers of graduates per category (broken lines) fluctuate, showing trends in cohort preferences but total shows a solid growth. (b)Students completing select 300+ courses over the past 8 years. Only the ten courses with highest enrollment are shown. The circled entries correspond to Math 316, the course with highest enrollment. The bold line gives the average enrollment for these 10 courses.

for Genome Resources, Institute for Social Research, Los Alamos, NASA, NSA among others).

Enrollments in our mainstream courses have also grown. Fig.(1b) shows the enrollment figures for our 10 courses at the 300+ level with the highest enrollments for the last 8 years for which we have **SIS** data. These courses are either required by one of our subdisciplines or by other departments or are popular electives. The average enrollment in these representative courses is also shown. To make the comparisons meaningful, we only show numbers of students that successfully completed these courses with a grade of C or better.

The increase in students attending and successfully completing our 300+ courses parallels the growth of graduates in our own program, as shown in Figs(1a,b). We believe that the time lag between the major upswing in Math 316 (ODEs), Math 314 (Linear ALgebra) and Stat 345 (Introductory Statistics), the three courses with the highest enrollments since 1997, and the upswing in present-time Math-Stat graduates is indicative of the importance of these courses as a gateway of attracting students to our own programs.

The quality of our courses is an issue of great importance to us. But so also is their relevance in the wider university arena. We maintain regular channels of communication with colleagues in other departments. Several of us have flourishing collaborations or hold joint appointments in other departments, and are actively involved in the research projects and/or advisement of graduate students outside Mathematics and Statistics. These contacts and experiences with other fields feed directly into the design of our courses.

Besides these informal communications pathways, our undergraduate committee has pursued regular contacts with its counterparts in other departments, especially Physics, C/NE, ME, the College of Education and others, to discuss and synchronize the curriculum in key required courses in Math-

ematics (316, 311, 312, 314, 321, 375, 401) and Statistics (345, 427, 428, 445) and the mathematics for secondary teachers sequence (Math 305, 306, 308) so that these sequences better serve students' needs. Through advising, we continuously monitor our students' progress, especially those with minors or double majors, so that we can achieve optimal synergy with the curricula for our intended clientele across campus.

4 Developing the Curriculum

The number of majors has been increasing, as has the number of students in our key service courses. However, our research faculty numbers have declined through attrition and loss of young faculty to competing institutions. At present we estimate that we are short by at least 8-10 faculty, as is evident if we compare the sizes of our department and our student credit hours to those of peer institutions. It is customary and essential that students in 300+ courses be taught by research faculty, with the knowledge and experience required by students at this level. Of these, our introductory Ordinary Differential Equations course, Math 316, is of special concern to us, as it is the highest level course required by several engineering departments. Many of the students in these programs may have had their lower level mathematics training outside UNM; thus, Math 316 is our one chance at introducing them to effective problem solving and modeling skills as taught by a specialist in the field, and taught in a way as to set expectations for skills across the disciplines at UNM. We believe Math 316 to be an excellent focus for adapting our curriculum to the needs of the community we serve. Other such courses are our new Calculus sequence for the Life Sciences designed by Professor Sulsky and the new Statistics for Biology course, an adaptation of Stat 345, proposed by Professor Salter. In the area of Mathematics Education several courses are planned by Professor Umland working with faculty from the College of Education. We are always interested in finding new ways to adapt our advanced undergraduate courses (such as Partial Differential Equations, Methods of Applied Math, Probability, Scientific Computing, Nonlinear Dynamics, Wavelets) to mesh with new programs, such as the proposed Nanotechnology Degree.

One of the strategies that we have used to deal with our critical faculty shortage in a way that would mitigate its short term impact on our 300+ courses has been through employing "Teaching Postdoctoral Fellows." So far we have employed 2 TPF's and they have been a positive addition to our program, as compared with part-time instructors. In other areas our shortage in faculty has forced us to cancel activities, such as our participation in the prestigious Putnam mathematical competition, in which in the past we had a strong presence. Professor Hillman began the tradition here in the '60s, founding at the same time the New Mexico Math Contest for High School students. Training a team for the Putnam requires a dedicated faculty coach, which we have not been able to afford in recent years. We also do not have the staff to expand pilot courses into full offerings. Therefore, more permanent solutions are required if our strong growth in quality and numbers is to be maintained.

At the present moment, we are involved with several changes as we adapt to the ever expanding information revolution. It has become apparent that the traditional approach of introducing students to the computer (a required programming course introducing a high level language which over the

years has changed from Fortran to C to C++) is ineffective for general instructional purposes. We have recently been exploring, in discussions with colleagues from other departments, a new course introducing freshmen to Matlab, a full, high-level mathematics programming environment, which will be offered experimentally as CE/ME 439 this Fall. While the transition is planned, we would like to introduce a 1 credit introductory Matlab course. We could offer this course utilizing 1 or 2 TA's, with close faculty supervision at first. In the long run, our courses currently using the computer (Math 314, 316, 375, Stat 345) would greatly benefit from setting an entry standard for the students' computer skills, and other creative uses of the computer could be contemplated in courses such as Partial Differential Equations, Nonlinear Dynamics, Wavelets and Differential Geometry. Most of our upper level Applied Statistics courses also use computing. Several courses use computing intensively, such as Stat 425/525 (SAS programming) and Stat 590 (Statistical Computing) or to a significant degree (Stat 440/540, 445/545, 427/527, 428/528, 474/574).

In the past, Stat 145 and Stat 345 have used computing, but at present the use of computing is limited, primarily due to the difficulty in teaching these students programming techniques when they aren't sitting in front of a computer. The same limitation hinders our use of computers in Math 316 and 314 and prevents its introduction in additional courses, such as Math 312, 412 and 437. A better classroom for teaching with computers is needed. Hopefully in collaboration with other units in the College, we can acquire a computer instruction room similar to the new Computer Lab in Mechanical Engineering, designed for effective integration of instruction with computing resources.

We see our involvement with the teachers of New Mexico as a critical part of our mission. In addition to our traditionally strong role in providing mathematical content to K-12 teachers, we have recently increased our articulation efforts with high schools from around the state. We have created extensive materials that are available on the department's website for high school teachers and prospective students. We have had significant participation by department faculty in the UNM summit for math and English teachers. We have been working to develop a teacher sabbatical program where secondary teachers can come teach at UNM and take courses for a year.

Even with the limited resources that are available, we continue to work closely in collaboration with the College of Education. With new federal directives to retrain the majority of the state's middle school mathematics teachers, we need to revamp our program for teacher training. Building on the current grant-funded work with in-service mathematics teachers, new courses need to be designed to truly help the incoming pre-service teachers deepen their understanding of mathematical concepts and improve the skills that they will bring back with them to the classroom. We will need to continue our modest but steady investment in better facilities for our teacher training program. A grant application is planned by Professor Umland for setting up a diverse collaborative team to pursue the design of a comprehensive training program for mathematics teachers. We believe that well trained teachers graduating from our program can be our most effective means of reaching the state's youth and attracting them to our department and our University.

New efforts are under way for a BA/MD program, as well as for a Biomathematics/Biostatistics program and we are making contributions through designing special courses and seminars, as mentioned above. Here again, teams need to be formed and grants planned to pursue these ambitious new directions successfully. We can have a similar approach to the new Nanotechnology effort, and we plan to remain in close contact with its designers and offer our help where it is needed.

5 Ideas for improvement

Our plans are always tempered by limited resources. In that regard, we have identified a few areas that could benefit tremendously from special funding from the College.

- Seed funding for designing various interdisciplinary courses, such as a course sequence for middle school teachers and Statistics for the life sciences. Seed funding would help to form teams possibly in collaboration with other Universities in the State, to pursue outside funding. We request $1,000 for each, mainly to support travel for grant planning meetings.
- Funding for refurbishing our Education Instruction Room. We need to make a permanent installation for grant-acquired equipment (cost $3,000) and to refurbish the closet so it can be securely locked ($5,000).
- A classroom for integrated computing instruction (possible area of pooling resources with other departments in college). The figure we have for this was what a similar adaptation cost the School of Engineering ($60,000).
- A new programming course to prepare students for using the computer in upper level courses in Mathematics (316, 314, 312, 375, 412, 434, 472) and Statistics (145, 345, 425, 427, 428, 440, 445, 474). Funding is requested for 2 TA's and initial design costs (2 TA's per year, and a one-time course release for faculty).
- An experimental mathematics laboratory: we have held discussions with Sandia Labs colleagues on designing an undergraduate laboratory for experimental demonstrations of advanced mathematical concepts. This would work best as a synergistic effort with others (physics, engineering). Several of our courses (ODEs, PDEs) would benefit from the ability to hold demonstrations of key physical phenomena, such as vibrations, waves, symmetry and bifurcation as concrete examples of abstract mathematical concepts ($20,000 for equipment).
- Creation of KME club room where students can meet and study.
- Funding to organize an Honors Seminar, to expose students to research at an accessible level and encourage more participation in the honors program (approx. $3,000 for two distinguished speakers per year, refreshments to be served at each seminar).
- Personnel so we can better prepare students for state-wide and national contests and field a Putnam team again.
- A program to encourage mathematics graduates to consider teaching at the secondary level, either as a career path or as a temporary, 2-3 year commitment on the way to graduate school.
- Funding for materials to advertise our program ($2,000). Possibly creation of a road show we can take to high schools around the state ($50,000).
- Pursue a focused hiring effort over the next 5 years to hire 8-10 research faculty so that we can staff all of our key undergraduate courses and have enough people on board to effectively pursue the above improvements as well as new ideas that may arise (**priceless!**).

March 1, 2005

Document on Distinction:

This document on distinction, presented by the Department of Mathematics and Statistics is in response to Dean Reed Dasenbrock's effort of doing a more systematic planning across the College.

Background:

The disciplines of Mathematics and Statistics are central to the University mission and goals that relate to research and education. College-wide and University-wide areas identified as areas or clusters of distinction invariably include these disciplines as critical components; examples include Nanoscience and the interdisciplinary efforts between the College of A&S and the School of Medicine. As you will see from the metrics or indicators we used, across all sub-disciplines the Department has clear elements of distinction both at the regional as well as the National and International level. It is because of this, that inasmuch as we identify specific areas of distinction, where we hope targeted hires can be implemented, it is essential to recognize that equally important is **sustainability** of distinction. Last year this Department lost Junior Faculty, Tim Warburton (now at Applied and Computational Mathematics, Rice University) and just recently Tim Hanson accepted an offer from the Biostatistics Department, University of Minnesota. Both outstanding young scientists would have been key contributors to the areas of Nanoscience and Biostatistics. Without a serious Institutional effort to support identifiable areas of distinction, the risk of losing our best Faculty will remain. We believe we are presenting convincing arguments that this Department is a case in point, and any action coming out of this document will send the right message to those colleagues from which this University can elevate its status in the National landscape.

1. Indicators of distinction:

As it is well known, UNM and its Office of Graduate Studies failed to submit the information necessary for the last round of NRC rankings. The main national organizations in our disciplines are: American Mathematical Society (AMS), American Statistical Association (ASA), Institute for Mathematical Statistics (IMS) and Society for Industrial and Applied Mathematics (SIAM) and none of them do ranking of Mathematics, Statistics, or Math&Stats Departments. Instead we present data that reflects what our ranking would be.

a. Visibility of Faculty:

- All senior Faculty in the Statistics group are either fellows of ASA or the Institute of Mathematical Statistics (Ron Christensen is a fellow in both organizations). While we

do not have data on other Departments, we believe the Statistics group is in an elite group in this category.

- Faculty in all 3 sub-disciplines have published seminal papers in prestigious journals. Examples include in Pure Mathematics: Annals of Mathematics, Inventiones Mathematicae. In Applied Mathematics: SIAM Journals, Journal of Fluid Mechanics, Physica D. In Statistics: Journal of the American Statistical Association, Biometrica, Annals of Statistics. Koltchinskii and Christensen have been in the Editorial Board of the Annals and JASA respectively).
- Last year Prof. Vakhtang Putkaradze had an article on braiding patterns in fluids published in Nature. This research was highlighted by the American Physical Society (APS) as one of the prominent results of 2004 (the APS News magazine had a story on most relevant work in 2004 and Vakhtang's was between two stories referring to Nobel winning research).
- Besides the loss of Warburton and Hanson to Rice and Minnesota, other Faculty had been offered positions at Institutions of equal or higher caliber (for example Boyer at Minnesota, Buium at Ilinois Urbana-Champaign, Kucharz at U. of Hawaii)
- Faculty are regularly asked to participate in review panels for National funding agencies. Most recent cases include: NSF (Kapitula, Lorenz, Sulsky, Aceves), NIH (Bedrick).
- Participation in professional organizations include the presidency of the Western North American Region (WNAR) of the International Biometric Society (Bedrick).
- Faculty have delivered plenary talks at meetings of the American Mathematical Society (Boyer, Buium), SIAM (Sulsky will deliver a plenary talk at this year's National Meeting) , distinguished special lectures (Boyer gave the Goldberg memorial Colloquium at the U. of Illinois, Koltchinskii gave an Institute of Mathematical Statistics Medallion Lecture) and courses such as that given by Prof. Pereyra in Harmonic Analysis for the Program for Women in Mathematics at the Institute for Advanced Studies, Princeton University.
- Faculty sabbaticals or leaves are spent at top research institutions (most recently Galicki spent a semester at the Max Planck Institute and Hagstrom is spending his sabbatical at Brown University and Haifa (fall 04) and at Lawrence Livermore Laboratory (spring 05)).
- Collaborations in the form of joint publications, collaborative grants, short and long term visits with scientists: Universities (Caltech, Courant Institute, MIT, UC San Francisco, UC Davis, UT Austin), research centers (Max-Plank Institute, Royal Institute of Technology in Stockholm, Stanford Linear Accelerator) and National Laboratories (Sandia National Laboratory, Los Alamos National Laboratory, Lawrence Livermore Laboratory, National Institute of Standards and Technology, NASA).
- Last year the Department hosted two important regional conferences: The 1000 American Mathematical Society Western Sectional Meeting (which turned out to be sectional meeting with the largest attendance ever) and the 2004 WNAR/IMS Meeting in Statistics. This year we are hosting 2 regional conferences in Mathematics.
- Visibility within the University is also an area of strength in the Department and this is a distinct advantage for growth in interdisciplinary research. Faculty in the

Department have ongoing collaborations with research groups at the School of Engineering, Health Sciences Center and in A&S, the Departments of Biology, Anthropology and Physics and Astronomy. They are also active participants in research at CHTM, professional or interdisciplinary graduate programs at HPCC and the Optical Science and Engineering PhD program. Prof. Stone is an affiliated faculty member of the recently created Institute for Infrastructure Surety. Faculty are continuously asked to be part of steering committees (CAS, Consortium of the Americas for Interdisciplinary Science) and on committees of studies for MS and PhD degrees across all disciplines. Finally, our faculty are PIs or Co-PIs in grants that span on research from fracture patterns in ice formation to genomics with participation of researches from other Departments or Schools.

b. Funding

Currently 70% of the tenured/tenure track faculty have some funding for research and/or education. All Junior professors have at least one grant. Some Faculty (Hagstrom, Sulsky, Kapitula, Salter, Putkaradze) have multiple grants from different agencies. Faculty are PIs or Co-PIs in grants funded by the National Science Foundation, the National Institute of Health, the Department of Defense, the Department of Energy and the State of New Mexico. In many instances the nature of the funded research is strongly interdisciplinary. By way of examples, Deborah Sulsky has an NSF interdisciplinary grant in the area of geosciences to do research on Multi-scale predictions of artic ice motion; Gabriel Huerta has a collaborative NSF grant with Atmospheric scientists at UT Austin to study weather prediction. Professors Steinberg and Bedrick have NIH funding resulting from their collaborations with the Health Science Center (HSC) (Bedrick has a joint appointment with HSC) and Koltchinskii is part of a NIH grant to study brain imaging at the Mind Institute. Prof. Loring's DARPA funded research deals with imaging and visualization. Boyer, Galicki and Buium have been very successful in receiving continuing funding from NSF in the areas of Geometry and Number Theory. In particular, the research of Boyer and Galicki has applications in the physics of elementary particles, string theory and cosmology.

Active grants by fiscal year (starting in 01): (# of active grants), Budget total

- **7/01/01-6/30/02: (24), 2.6M**
- **7/01/02-6/30/03: (20), 2.5M**
- **7/01/03-6/30/04: (32), 4.4M**
- **7/01/04-6/30/05: (25), 4M**

It is clear the Department has a strong record in this category. Even more so, there is a culture, based I believe on a combination of quality and confidence, of faculty understanding well the need to seek funding. It is not surprising to see that most faculty apply themselves to this difficult task as one can see from the table above in addition to our list of recently submitted grants (examples include Prof. Ellison's recently awarded DOE grant and Prof. Coutsias recent submission as Co-Pi of an NIH proposal to study molecular dynamics), or announcements that are currently under consideration. If anything, it is important to highlight that for the Statistics group in particular, the number

of projects and potential dissertation topics related to funded research is at such a high number, that faculty and more important junior faculty find it difficult to find the time to mentor student attracted to their topics. Some junior faculty have 2 or more PhD students even before tenure is granted. Lack of growth in Statistics puts a very good ongoing program in serious jeopardy. To a lesser degree, the same can be said about Applied Mathematics. While the funding shown above has given PIs the opportunity to hire postdoctoral fellows (at least 6 in recent years) and RAs (hard to give an exact figure, but likely to be at least 10 per year), for years, the Department has considered competing for Departmental grants such as the NSF-VIGRE program to increase this number. We always end up recognizing that the task exceeds any reasonable amount of time required to run and administer it; this of course is due to the size of our faculty and what was stated at the beginning, that effectively all interested faculty have grants to take care off.

c. Graduate programs

There has been a good number of PhD students going to promising positions at the start of their professional careers. In recent times PhD students in Statistics have been hired at the Harvard School of Public Health, U. of Louisville, U. of Pittsburgh, Tulane, James Madison, Wake Forest, Michigan State, U. of Chicago and Los Alamos National Laboratory. Recent PhD students in Pure Mathematics have gone to the Courant Institute, the University of Arizona and New Mexico State University. Students with PhD in Applied Mathematics have started their careers at Sandia and Los Alamos National Laboratory, Michigan State University, ETH in Zurich, Universidade Federal de Pernambuco, Old Dominion University, Humboldt State University and the US Air Force Academy. A recent PhD who worked under the direction of Prof. Koltchinskii, Dmitry Panchenko is an Assistant Professor at the Department of Mathematics, MIT doing research in probability and statistics. The number of PhD students, in Statistics is comparable with that of larger programs; Applied Mathematics is perhaps in a similar situation. PhD students have participated in conferences and workshops, visited research institutions and done summer internships at places like LANL.

Many of our graduate courses in Mathematics and Statistics attract the attention of students outside our programs. Such is the case of Math 471 which is a core course for the UNM Computational Science and Engineering Certificate Program, whose college coordinator is Dept. Faculty Monika Nitsche and the wavelets course taught by Cristina Pereyra.

2. Areas of distinct advantage for growth

While there are several directions where we believe growth can lead to an immediate impact in our research and education missions, we will concentrate on three distinct areas where we believe should resources be put in place, will make the Department and the University stand out regionally and even nationally.

- Spatial-temporal modeling in Biology and Computational Biology: We are thinking of research with applications to bioterrorism (for example the identification of anthrax) and to brain imaging such as that conducted at the Mind Institute. Work on these topics brings research that includes: high dimensional statistical models and large data sets, statistical computation via cluster computers and algorithm development, complex hierarchical modeling and graphical models.
- Nano-science and bio-mathematics: Where we are thinking of research aimed at modeling and computation of systems in the nanoscale regime including molecular dynamics, as well as the modeling and computation in biological systems. Applications to manufacturing, photonics, imaging, modeling of diseases are examples of where this research can find its use.
- Geometry: Here we envision building on our strength in this discipline, which finds as one of its applications helping understand the fundamental forces in physics. Geometry also provides the mathematical foundations in imaging. A geometry group with international reputation will help attract good students. UNM as the leading research University of the State should have a leading role in the call for preparing US citizens in the discipline of Mathematics. Growth in this area is a step in the right direction.

In all instances, but more so in the first two areas, growth will also attract students given how marketable they are. They will also generate new courses which will not only benefit the Department's graduate programs, but other programs across the University. In particular, if we get resources in the form of **targeted hires** in these areas, we would promise as a condition for growth to develop in each case a course either for the BA/MD program or the PhD in Nanoscience program. A number of active faculty and more important, most junior faculty will be part of these initiatives.

3. Opportunities for Interdisciplinary research

The areas of distinction cover foundations of mathematics, biostatistics, biocomputing, modeling and high performance computing. All are natural research areas to foster interdisciplinary research. In fact, as stated before, the interdisciplinary research format is well imbedded in a large number of our faculty. It is a matter of **sustaining** it by growth, which will assure a continuation of interdisciplinary research with the Health Science Center, the Center for High Technology Materials, the School of Engineering, the Sandia and Los Alamos National Laboratories and the A&S Departments of Biology and Physics and Astronomy. It should be noted that to a large degree the Department of Mathematics and Statistics has been hiring talented young faculty that have been immersed from the start in Interdisciplinary research. Salter, Hanson, Huzurbazar, Poutkaradze, Nitsche, Warburton have concrete lines of research with scientists outside the Department. The same is true with Nakamaye and Umland, who have made part of their work be connected to the mathematics culture of undergraduates across all disciplines including mathematics education. Per capita, we are likely to be the Department with most faculty presence in Interdisciplinary grants and PhD committees outside the discipline. This is a

very good ongoing dynamics and the University needs to put resources to sustain it and help us bring it to national levels of recognition.
With respect to the areas of Biostatistics and biomathematics, faculty from this Department are taking part in a project to form a Southwest Consortium of Mathematics in the Life Sciences. The leading Institutions are: the University of Arizona, Arizona State University, Texas Tech University, Colorado State University, Los Alamos National Laboratory and UNM. ASU, Texas Tech and CSU have already committed resources for this initiative. Adding faculty in any of these directions will give us a prominent role in this regional consortium.

4. Specific requests

a. Understanding that this is NOT a hiring document, where teaching needs across the University and Department curricula take precedent, we are requesting **targeted hiring in areas of distinction.** Concretely we request:

- 1 position in the areas of Biostatistics
- 1 position in the area of Biomathematics or Nanoscience
- 1 position in the area of Geometry

In all cases the budgeted position would be for a Junior faculty with a starting salary of 65-70K and a startup of 20K for a total of 255-270K

b. The teaching postdoctoral positions have been a success despite the teaching load of 3-3, which is higher than similar positions in most Universities. To date we have had three such hires: Last year, Mike Stubna (PhD Cornell), who is currently a postdoctoral fellow at the Mathematics-Biology Institute at Ohio State University. This year Scott Beaver (PhD UC Davis) has recently accepted a position at Western Oregon University and Yeojin Chung (PhD UC Irvine) who has a standing offer for a tenure track position at Southern Methodist University. This proves we can attract young people to Institutional postdocs, on top of other postdoctoral fellows hired from research grants. These postdocs will have an opportunity to do research if the teaching load is reduced to 2-2. Our specific request is to have 2 to 3 teaching postdocs at the current salary of 40K each, but with a teaching load of 2-2.

c. While at this time we have no requests for additional TA lines as we believe the possible hires on distinction will allow us to expand on our RA lines and as a consequence expand our graduate programs, a College fellowship to recognize outstanding PhD students should be put in place.

d. Junior faculty with a load of 2 or more PhD students should be awarded a course release. We therefore request a one 2-1 teaching load be given on a yearly basis for an Assistant or Associate Prof. who at the time has 2 or more PhD students with at least one to graduate in the given academic year.

5. Conclusions

This document reflects realities: all indicators point towards areas of distinction in the Department and we are at a prime time to grow on them. We are at the same time at a critical juncture in that continuing loss of talented faculty such as Warburton and Hanson will have a negative impact in any effort to create clusters of distinction across the University, or build new interdisciplinary programs and initiative with strong presence from the College of Arts and Sciences. We are sure similar requests and arguments will be presented by other units. Our hope is that they are all taken seriously, and that for those who have the most convincing argument, resources are put in place. We obviously believe we have presented a very compelling case into three specific areas of distinction (Biosatistics/Biomathematics, Nanoscience, and Geometry). A proportion of our funded research implicitly or explicitly deals with these topics. Targeting resources here will attract talented students who can go to prestigious positions similar to those where some of our best students went after graduation. Finally, faculty working in these or related areas have acquired national and international visibility. While at this time we would not be surprised if not all of our requests are immediately address, it will be discouraging if none of the are considered for immediate action. A response with a long (3 year) plan to move in this direction will be a welcome signal from the college.

On behalf of the Faculty in the Department, I thank you in advance for the review and consideration of this proposal. Please feel free to contact me should you have any questions or comments. I look forward to hearing from you.

Sincerely,

Alejandro Aceves
Chair
Mathematics and Statistics

Document on Success:

This document, presented by the Department of Mathematics and Statistics is in response to Dean Reed Dasenbrock's effort of doing a more systematic planning across the College.

It should not be surprising to anyone, that a large number of UNM students need to take Math 120 which serves as prerequisite for all of the mathematics courses that satisfy the core requirement. Since the failure rates in this class and the next one in the sequence (Math 121) are some of the highest for students taking math classes, it forces many of these students to spend several semesters trying to move towards the Calculus sequence which is the springboard for careers in the STEM and Business disciplines. What follows is a set of initiatives that we believe will make a real difference in the retention and graduation rates. The common principle behind these efforts is early intervention. Unless and until everyone involved in the K-12 education of New Mexico kids recognizes the importance of working on math skills throughout their education, **including 4 years of mathematics curriculum in HS,** no matter how much we continue looking at curriculum, instructional approaches, outside the classroom help, etc., the impact will minimal.

Initiatives:

1. Off-site Math Classes 120-121 (Credit/ no-credit): Offering a section of math 120 and eventually math 121, possibly at West Mesa HS or other APS campus, assuming they are willing to let UNM use the facility to teach in the late afternoon. A full time lecturer would be needed to teach this course and to get mileage for their travel. As coordinator, Vicky Kauffman would initiate this program, making certain it was attended to properly. The class would follow the syllabus for all math 120/121 sections given here on the main campus. The instructor would teach at this off-site location on a Tuesday-Thursday schedule, similar to what is offered at UNM.
The target audience would be seniors who were NOT considering taking a math class in their final semester of high school. This would enhance their chances of moving through the required classes once they arrived as freshmen at UNM. Another example might not be a college bound student, but a student who may later on see college as an opportunity and who needs an environment that reflects college expectations. In addition to these two types of students, the class could be made available to community members in order that they may take a course off-campus, to prepare for returning to college life.

We propose to have a pilot section in place for Spring 06 and for that semester, we would ask for funds in the amount of 2K as an extra-compensation for V. Kauffman, so she goes to a designated HS to teach the course and interact with students and HS math teachers. We expect this to be a successful project and we need to follow up on this immediately. To do so, we will request a search for a Lecturer to be hired in Fall 06, with a 3-3 teaching load, one such course per semester being taught at a High School as an

afternoon class. The principal service component for this Lecturer will be to act as liaison between the High Schools and the UNM Mathematics and Statistics Department. **If there is no Institutional desire, both from APS and UNM to follow-up on this plan, we will not put a request for a Lecturer position.**

2. Joint Math 120-121 Section: The Mathematics and Statistics Department will run a combination class Math120/Math121 as a pilot during the Spring 05 semester. This class is viewed as an attempt to address two issues:

- Students can complete the prerequisites for higher level math in one semester. This also positively affects the eligibility of many students to be accepted to other departments like Biology or the School of Business.
- Students will have at once the basic manipulation part offered in Math 120 along with the more advanced concepts covered in Math 121. This, along with having a math class every day, will help students achieve a deeper understanding of Algebra.

The curriculum for this new class will cover all the topics in both Math 120 and Math 121. This class will carry 6 credit hours.

3. Visiting program for HS Math teachers: This Fall, with the help of Megan Hill and Doug Earick from A&S, we submitted a pre-proposal for eventual submission to the Arthur Vining Davis Foundation. The main objective was to create a Visiting Program for HS Math teachers. The details of this proposal are in the **Appendix**. While this pre-proposal was viewed favorably in Scholes Hall and chosen to be the one that could be sent for competition, we found ourselves in a position where we could not guarantee APS Principals would allow teachers to participate. The immediate plan now is to have a Forum in the Spring 05 where we will invite Math teachers across the State as a follow up of what was done last year for English and Math teachers. At that time, we would like to bring a concrete proposal supported by the UNM Administration, where we can advertise such a program and begin implementation.

The current request to A&S is then to help us address the current concerns so we can submit this proposal either to the Arthur Vining Davis Foundation or a better venue.

4. Technology in the classroom: Vicky Kauffman, as the math 121 coordinator, along with Adriana Aceves, are exploring the use of immediate response mechanisms, both technologically and non-technologically oriented, to allow students more variety in our methods of instruction. This requires funding for keypad responses and also paper products which help give immediate feedback to the students, similar to the Physics program. The department has some funds for the paper products we seek, but we will need more scantrons and item analysis forms, in order to have a ready supply available. While we expect to submit a Teaching proposal, immediate resources from the College will give us a head-start.

Under the leadership of the University of New Mexico's College of Arts & Sciences and in collaboration with Albuquerque Public Schools (APS) and the College of Education, we have devised a two-year pilot project to improve both the success rates of the *killer classes* and the teaching of mathematics throughout secondary schools in Albuquerque. It is designed to increase the exchange of content information, enhance successful teaching techniques and foster vertical interaction between secondary math instructors and UNM math faculty. The collaborative program will directly support professional development, enhance teaching skills and contribute to a growing body of pedagogical research focused on improving mathematics education in America's secondary schools.

Teachers selected for this fellowship will be mid-career, having taught 5-7 years and be recognized leaders in their respective schools. Each will be selected from a competitive nomination process in which they write a commitment essay indicating their strong desire to return to their school of origin and affect change to improve mathematics teaching within the district.

The first year of the fellowship will offer four APS teachers working sabbaticals in which they are integrated into the College of Arts & Sciences Mathematics department. They will have the opportunity to engage cutting-edge mathematics research and technology that they can integrate into their own curriculum. Each participant will be assigned a mentor from the Math department faculty who will work with them to improve relevant content and technological knowledge. They will be given tuition waivers to attend 2 classes per semester to improve their subject knowledge and to engage new and applicable technological advances. These classes can also be applied towards an advanced degree.

In turn, the teachers will be asked to share their expertise with the Math department regarding teaching techniques specific to the material taught in the *killer classes*- Math 120 and Math 121. As such, they will be asked to teach two sections of either Math 120 or Math 121 each semester. Data regarding student success rates affiliated with these classes will be gathered, examined and measured against results from previous years. It is our supposition that more students will pass these classes and Math faculty will gain insight to new methods to teach this very important and fundamental mathematics information.

In the second year, these teachers will return to their high schools. They will share what they have learned with their colleagues in a series of three workshops. As a result, new content information, pertinent computer programs and innovative technology will percolate throughout the math programs and district.

We chose to conduct this pilot project with Albuquerque Public Schools because each year, half of UNM's freshman class is composed of students who graduate from one of the eleven APS schools. By offering working sabbaticals to four secondary teachers per year, we will have strengthened the ties between APS and UNM and affected a positive impact in the teaching of mathematics in each of the APS schools within 3 years.

Additionally, this fellowship will directly support APS's strong emphasis on vertical teaching and leaning. That is, teachers from all grade levels working together to promote and foster successful learning and teaching. While this had proven effective in grades K-12, there is a gap at the university level. We expect this program to augment this strategy and create a seamless and integrated approach to teaching mathematics. A sense of community will grow in which APS teachers and math faculty will be genuine colleagues, share ideas, curriculum and teaching strategies. It will contribute to a permanent conduit of exchange between high school mathematics teachers and UNM mathematics faculty.

This hands-on integration between APS teachers and UNM's math faculty will be indirectly supported and enhanced by the network and partnership that the Albuquerque Teacher's Institute (ATI) has built since 1999. As you know, ATI was funded by the Foundation in 2000 to provide content-area seminars specifically designed for K-12 teachers. We feel this project will derive positive and productive benefits from ATI's extensive infrastructure and success.

Attached, you will find a budget that outlines the costs associated with each year of this project. **As such, we respectfully request funding from the Arthur Vining Davis Foundation in the amount of $150,000.**

Thank you in advance for review and consideration of this proposal. Please feel free to contact me should you have any questions or comments. I look forward to hearing from you.

Sincerely,

Mathematics and Statistics

University of New Mexico
College of Arts & Sciences
Program to Improve Mathematics Teaching in Albuquerque's Secondary Schools

BUDGET

Year 1

$140,000
Sabbatical pay for participants @ $35,000/each of four APS teachers
$1,000
Costs associated with classes (books, materials, etc.)

Year 2

$9,000
Stipend to participants @ $2,250/each to organize, plan and execute three workshops to network and share lessons learned to their colleagues

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Total Request from **$150,000**

Appendix E

GENERAL DATA			
CATEGORY	if applicable TIME PERIOD	if applicable NUMBER	EXPLANATORY TEXT
# (FTE) of Professors	FY07	18	2 Profs. on leave without pay.
# (FTE) of Associate Professors	FY07	7	
# (FTE) of Assistant Professors	FY07	2	
# (FTE) of Lecturers	FY07	7	
# (FTE) of PTI	FY07	32.15	
# (FTE) of Research Faculty	FY07	0	
# (FTE) of Post-docs	FY07	3	
# Masters Programs	FY07	3	Statistics, Pure Mathematics, Applied Mathematics
# PhD Programs	FY07	3	Statistics, Pure Mathematics, Applied Mathematics
# masters degrees awarded	FY07	16	
# doctorates awarded	FY07	1	
# of interdisciplinary programs/collaborations	FY07	5	1. One Faculty is a member of the Optical Sciences and Enginering Program 2. Faculty in Statistics collaborate with UNM-HSC 3. At least one Faculty collaborates with the School of Engineeing 4. Two faculty are affiliates of the Los Alamos National Laboratory 5. Several faculty collaborate with Sandia National Laboratory

EXCELLENCE			
CATEGORY	if applicable TIME PERIOD	if applicable NUMBER	EXPLANATORY TEXT
Faculty			
# of peer-reviewed articles	FY06 & FY07	50	Close estimate based on the 2006-07 Department report.
# of books authored or co-authored	FY06 & FY07	0	
# of books edited or co-edited	FY06 & FY07	0	

# of edited chapters	FY06 & FY07	0	
# of journals published in house	FY06 & FY07	0	
# of other types of publications	FY06 & FY07	0	
Current faculty with UNM recognition - such as Distinguished Professor, Presidential Teaching Award, Teacher of the Year award (# and types)		3	One current Presidential Teaching Fellow. One curent UNM Lecturer of the Year Award One current Regent's Lecturer (plus 2 previous Regents Lecturers)
Current faculty recognition outside UNM, such as Fellows in Professional Organizations, National Awards, etc. (# and types)		3	Prof Bedrick is Fellow of the American Statistical Association (ASA) Prof. Christensen is Fellow of both ASA and Institute of Mathematical Statistics (IMS. (Comment: Professional Organizations in Mathematics do not award Fellow status)
Hosted conferences (# and type)	FY06 & FY07	3	1. International Conference on Riemannian Topology and Geometric Structures on Manifolds (NSF funding). Oct 06. 2. Sectional Meeting of the American Mathematical Society. Oct. 07. 3. 9th New Mexico Analysis Seminar (NSF funding)
# faculty with active research funding (extramural)	FY07	12	Based on active grants between 7/1/06 and 6/30/07.
# active contracts/grants (extramural)	FY07	20	Total $$: 6,255,425. Based on active grants between 7/1/06 and 6/30/07.
Graduate Students			
Grad students - recognition outside UNM (# and types)	FY06 & FY07	0	
# of externally funded grad student fellowships	FY06 & FY07	15	Thirteen graduate students supported from RA's and external funding. One student supported by a Fulbright fellowship (2007-08). One supported by the Dean's dissertation award.
# articles submitted and published by grad students	FY06 & FY07	11	All co-authored at least with faculty mentor.
Undergraduate Students			
# honors theses	FY06 & FY07	9	Two in 2006. Seven in 2007.
# of undergrads involved in research	FY06 & FY07	11	Of these students, 9 did honors theses. Two were funded by an NSF-REU. One student's research lead to a poster presentation at a professional meeting
Additional			

Anecdotal evidence of student excellence, such as jobs attained after graduation or acceptance to prestigious grad schools	Time Period if applicable	0	
Anecdotal evidence of student or faculty of interest	Time Period if applicable	0	
Additional	Time Period Beg6/30/08 if applicable	1	The Department was recently granted a 750,000 3-year award from the National Science Foundation for a program to increase the success of students (mainly in the Southwest) as they transition from Undergraduate to Graduate education in Mathematics.
Additional	Time Period if applicable	0	

FACULTY DEVELOPMENT

CATEGORY	if applicable TIME PERIOD	if applicable NUMBER	EXPLANATORY TEXT
Minorities hired	FY06 & FY07	4	One hispanic male. Two women (which are a minority in STEM disciplines). One hispanic female (teaching posdoc)
Research Semesters funded by the University or College	FY06 & FY07	3	* 2 research semesters and 1 summer research semester award.
Research Semesters funded by the department	FY06 & FY07	0	
Formal mentorship program for new faculty	FY06 & FY07	0	
Use of travel funding	FY06 & FY07	only numbers 225000 no $,	
Start up funds expended ($)	FY06 & FY07	only numbers 15000 no $,	
Seed money expended ($)	FY06 & FY07	only numbers 0 no $,	
Funds provided for membership in professional societies ($)	FY06 & FY07	only numbers 15640 no $,	
Grad students funded to support for faculty scholarship	FY06 & FY07	only numbers 0 no $,	
Additional	Time Period if applicable	only numbers 0 no $,	
Additional	Time Period	only numbers 0 no $,	

	if applicable		
OUTREACH			
CATEGORY	if applicable **TIME PERIOD**	if applicable **NUMBER**	**EXPLANATORY TEXT**
Involvement in K-12	FY06 & FY07	only numbers 2 no $,	1. Prof. Kristin Umland is running a state funded program called "La Meta". This program works with Mathematics teachers across the State. 2. The Department runs the UNM-PNM Math contest. This is a State-wide competition for students from 7th to 12th grade.
Faculty on community boards	FY06 & FY07	0	
Community member participation on advisory boards	FY06 & FY07	0	
Museum programs	FY06 & FY07	0	
Centers and institutes - special events	FY06 & FY07	0	
Service Learning	FY06 & FY07	0	
EU and KAFB courses (#)	FY06 & FY07	12	
Lecture series open to the public or presented in the community	FY06 & FY07	2	As part of the Statewide UNM-PNM Math contest there is a public lecture in Mathematics. Recent speakers include mathematicians from Stanford, Berkeley and Princeton.
Student Internships (# and types)	FY06 & FY07	0	
Anecdotal evidence of accessibility and source of outreach	FY06 & FY07	only numbers 0 no $,	
Additional	Time Period 10/07 if applicable	1	We hosted the event "Who wants to be a Mathematician", organized by the American Mathematical Society. this is a game style competition for HS students.
Additional	Time Period if applicable	0	