

Department of Mathematical Sciences
Annual Report for 2002

November 22, 2002

1. Overview

This has been an excellent year for research, outreach, teaching improvement, and graduate recruitment in the Department of Mathematical Sciences. The faculty who submitted annual reports had 37 refereed publications and several books appear in 2002. Seventeen faculty members had external support for research and educational activities. New grants were awarded to support research by individual faculty members, international collaborations, and curricular reform. Our graduate program has 43 students which, because of graduations and other departures, is down from last year's record 48, but still is extremely healthy. In fact we are supporting more students than we have GA positions. Grant opportunities, a diversity GA from the Graduate School, and a special commission from the Provost will enable us to admit and offer support to at least three new students in Spring, 2003. We were again successful in recruiting graduate students from the minority community and one received a partial CHE Fellowship.

Three outstanding young research mathematicians joined the tenure track faculty: Tiziana Giorgi who specializes in partial differential equations and applications to physics, Bruce Olberding who is an algebraist, and Robert Smits, a probabilist. A fourth will join us in 2003. The ADVANCE grant enabled us to make an attractive offer to Dr. Giorgi. Dr. Amal Mostafa, Dr. Linda Zimmerman, and Ms Susan Schibel assumed budgeted College track positions in the mathematics Learning Center. Several other College faculty were hired in regular positions and we had three visiting research faculty who contributed to our teaching and research missions.

The department conducts many outreach programs, most of which have attracted external funding. Department faculty and graduate students participated in the Proyecto Access Las Cruces PREP program. Sandy Geiger and Chris Weaver continued to direct the Mathematics Accessible to the Visually Impaired Student (MAVIS) program, this year with support from the New Mexico Commission on Higher Education. Professors Patricia Baggett and Patrick Morandi, with other faculty input and the assistance of John Pierce, Computer Operations Group director, designed mobile wireless computer laboratory/classroom

for the mathematical education of future teachers. It became fully operational in Spring 2002. The department has a strong presence in the AGEP program, a multi-institutional effort with NMSU as lead institution, which has National Science Foundation support to increase the presence of members of minority groups in the professoriate in science, mathematics, and engineering fields. Professor Lolina Alvarez serves as the primary departmental representative in that effort. Several graduate students receive support from that program and it has assisted us in recruiting new students. A team of mathematics and engineering faculty led by Professors David Finston and Caroline Sweezy directed an NSF sponsored project which provides academic and nonacademic support for economically disadvantaged students. Professor Baggett continues to develop partnership courses for Las Cruces Public School teachers and NMSU undergraduates and graduate students. A multifaceted effort is underway in the department to create a third mathematics course in the sequence required for elementary education majors. Research faculty with interests in pure and applied mathematics engaged in a vigorous effort to positively influence the perception of mathematics among high school students. The efforts involved classroom discussions and other workshops about topics in contemporary mathematics, and the development of an online high school mathematics contest.

The department played an important role in service to the mathematics community, the state of New Mexico, and the university. Faculty members served on professional society committees, journal editorial boards, and organizing committees for national and international conferences. Professor Hung Nguyen was named Distinguished Fellow in the ASEE/NAVY Summer Faculty Research Program. Professor Kitty Berver co-chairs the New Mexico Higher Education Mathematics Articulation Task Force. Many faculty interacted with the Las Cruces Public Schools. Faculty members participated on sensitive university and college committees and in the faculty senate.

The most serious problems faced by the department continue to be a shortage of tenure track faculty and staffing of our Computer Operations Group (MathCOG). Our tenure track ranks are down by three, but we anticipate no retirements in the near future 2002. Thus we see 2002-03 as a prime opportunity to restore our tenure track ranks to full strength. However, the job market in mathematics has opened up and our offers to several promising individuals have been turned down recently in favor of more attractive offers elsewhere. Even the enhanced start up packages to female candidates that the ADVANCE grant have made possible have been insufficient in comparison to other universities. I point out again

that Robert Wisner and Joaquin Loustaunau, who retired in 1999 and 1998, did not have active research programs in the years immediately preceding their retirements. They were therefore assigned to three courses per semester. Since the increased use of new mathematics in many fields of study compels us to consider for tenure track positions only faculty active in research, these retirements resulted in a net loss to the department of a full tenure track teaching position.

MathCOG has only one permanent staff member, John Pierce. The other personnel are students. The department maintains three laboratories, one of which serves the entire university community through our service courses. A new facility devoted to developmental mathematics courses is planned.. Faculty and graduate students rely increasingly on technology in all of their academic activities. Moreover, the department has not been immune to the computer viruses plaguing the society as a whole and our computers, like most in academia, are invaded by hackers on a daily basis. The workload is excessive beyond reason for a single staff member.

2. Personnel Changes

Dr. Martin Krupa was promoted to Associate Professor and awarded tenure. Professor Richard Bagby retired after more than 30 years of distinguished service to NMSU. We have are experienced the large turnover that was predicted in 1999. The department developed a long term hiring plan at that time. Its implementation has broughtus new faculty with specialties in partial diferential equations, applied mathematics, topology, and algebra. Our current search still includes areas that were identified by that plan as priority areas, notably mathematics education and mathematical biology. We have some very exciting prospects in both areas.

The department was fortunate to have Drs. Peter van Rossum, Christopher Stuart, and De Jun Feng as visiting faculty. Each taught two courses each semester, enlivened our graduate program, and are actively engaged in collaborative research with NMSU faculty members. A Fulbright grant also brought Professor Busiso Chisala to the department for collaborative research and teaching. With our shortage of staffing in tenure track positions, it is only with the services of such visitors that we are able to meet our teaching obligations.

3. Curricular Activities

3.1. Course Development and Improvement

Professor Baggett continues to develop courses for present and future elementary and middle school teachers in the partnership format. She and another group of faculty have become convinced that a third course ought to be required for the elementary education major. New courses are under development along with a plan to introduce one without exceeding a reasonable number of credit hours for the degree. A collaborative effort between the department and the Computer Science department has resulted in a new course on discrete structures that can serve as an alternative mathematics requirement for the CS degree. Another collaborative effort between these departments resulted in a successful grant proposal to the National Science Foundation to support the development of curricular materials for our discrete mathematics program. The Supplementary Major in Applied Mathematics is now drawing significant interest, particularly from students majoring in Engineering disciplines. The MAVIS group in the department continues its leadership role in addressing the needs of visually impaired students.

The Undergraduate Curriculum Committee is developing a proposal to alter our scientific calculus program from three 3 credit courses to three 4 credit courses. The aim is to improve student retention and the strategy is two fold. The extra hour will enable us to offer more in-class support. Additionally, we will facilitate the transfer of knowledge among courses in the sequence, and to those for which they are prerequisites, by developing "just in time" learning modules introducing applications of conceptual mathematics as they naturally arise in the curriculum.

One of the department's major curricular efforts involved development of course materials using mathematical software and the internet to improve courses taken by mathematics, science, engineering, and education majors. With NASA support, Professor Staffeldt developed materials that incorporate advanced software in our course in third semester calculus. The software enables students to investigate fine details of surfaces in three dimensional space and also to apply calculus to more realistic problems. These innovations have made their way now into nearly all sections of that course and into our undergraduate course in ordinary differential equations. Professor Morandi had NASA support to redesign our introductory course in modern algebra, required of math and secondary math education majors. The redesign introduces abstract concepts through familiar applications and uses software to effect calculations structures that generalize our familiar number systems. A text written with support of this grant was piloted in

Fall 2002. I point out that this course and its partner course in modern analysis are drawing larger than normal enrolments.

Faculty are using technology for teaching purposes in many ways. In addition to using the internet for posting class materials and communicating with students, computer demonstrations have become integral to teaching at all levels. The old portable PC/overhead projector combination has proved to be unwieldy for effective classroom demonstrations. We have equipped some of our classrooms with permanently installed overhead projectors and have acquired sufficiently many laptop computers to enable many more faculty members to integrate computer use in their teaching. Future planning calls for the purchase of portable projectors because of concerns for the security of the ceiling mounted projectors. Funding for this process is provided by Instructional Equipment funds and grants from NASA and the Department of Education.

Central Administration concerns about the success of students in our developmental mathematics program (Math 115, 180, and 185 taught through the Mathematics Learning Center) prompted the department to propose a comparative study of developmental mathematics courses here and at our peer institutions. Funding for a GA to conduct this study in Spring 2003 was secured from the Provost. In order to better our success with Math 115 in particular, the department added two UNIV courses to be taken in conjunction with Math 115. UNIV 101 supports lecture sections and UNIV 103 combines study skills with support for mastery sections. In Spring 2003, we will pilot a new software in 4 special "laboratory sections" of the course in Spring 2003. Funding for a GA to supervise the lab sections has been requested from the Central Administration. If, as expected, the results are positive, we will commit the majority our 2002 and 2003 share of the Title V grant (\$45,000) to the development of a computer laboratory/classroom for developmental mathematics in Walden Hall. The department continues its cooperative agreement with DABCC in which Math 115 can be taken over two semesters.

Professors Lodder and Pengelley are writing a textbook that emphasizes the use of historical sources in the teaching of mathematics. This is a hallmark of their teaching styles. Professors Hung Nguyen and Tony Wang have written a two volume text suitable for NMSU courses in statistics at the senior/first year graduate level. Professor Swanson is nearly done with a manuscript suitable for doctoral students on advanced topics in commutative algebra. Professor Hung Nguyen, Carol and Elbert Walker (Professors Emeriti in the department) and Professor Prasad of Electrical Engineering have written a textbook on fuzzy

control. As always, faculty offered special topics undergraduate and graduate level courses on recent developments in pure mathematics, and on the use of advanced technology in the elementary and middle school classroom.

The department participates actively in the Honors and General Education programs. Faculty members routinely teach the Honors courses “Spirit and Evolution of Mathematics” and “Great Theorems: The Art of Mathematics.” Honors courses on mathematics appreciation and number theory have been developed. Professor Lampert developed an Honors course on Jewish literature. In addition to the Honors courses, the department offers an array of courses approved for General Education, including courses on mathematics for elementary education, business calculus, and mathematics appreciation. An alternate means of meeting the General Education requirement in mathematics is to take six credits of mathematics that require Math 115.

The National Science Foundation Grant “Math/Engineering Scholarships” offered academic and financial support to over 40 undergraduates and graduate students. Grant activities included a mathematics course introducing students to research opportunities.

3.2. Student Advising

Student advising is handled by special departmental committees. Undergraduate mathematics majors are advised by members of the Undergraduate Majors/Minors Committee. This committee nominates mathematics majors for scholarships and awards and informs them about study and career opportunities. The Undergraduate Curriculum Committee coordinates the update of our course offerings, syllabi, and information provided to instructors. That committee assisted the College of Education with the NCATE accreditation visit in Fall, 2002. Advising of graduate students is coordinated by the Graduate Studies Committee, which also makes recommendations for graduate assistant appointments, coordinates comprehensive exam preparation and grading, and updates our graduate course offerings. The Graduate Studies Committee recommended, and the department approved, a significant overhaul of our requirements for the doctorate. These included, for the first time, course requirements in addition to successful completion of the comprehensive exam. One of the goals of our program that was found in need of improvement by our outcomes assessment process is that Ph.D. students should acquire significant breadth in mathematics beyond the area of the thesis. The course requirement will enable us to better meet that goal.

Members of the department advise for the Advising Center and the Honors program and many advise secondary mathematics education majors. Professor Sweezy handles most of the advising for Supplementary Majors in Applied Mathematics.

Sandy Geiger is assigned as Special Students Program Coordinator to monitor students who are handicapped, have learning disabilities, or are experiencing great difficulties in their classes. She monitors students repeating a Mathematics Learning Center class more than one time and Native American students, and she acts as liaison with the American Indian Program Office and Student Support Services. She is also the departmental Americans with Disabilities Act (ADA) contact.

3.3. Graduate Studies

Graduate enrollment in the department remained high in 2002 with 43 mathematics graduate students enrolled in Masters and doctoral programs in Fall 2002 (below the record of 48 in 2001, but above the previous record set in 2000). Three Mathematical Sciences graduate students were awarded Master's degrees and three were awarded doctorates during the year. The department continues to attract relatively large numbers of students from groups traditionally under-represented in mathematics (40% are women and 23% are US citizen members of ethnic minority groups). Two of our graduate students are citizens of Mexico. Our recruiting efforts in the minority community and in area colleges and universities continue. The Sloan Foundation awarded the department funds to increase the presence of minority graduate students and the National Science Foundation awarded NMSU the AGEP grant for similar purposes in a broader spectrum of scientific disciplines. Again in 2002 a new mathematics graduate student was recruited with the AGEP grant and two continuing students had support from that program.

The department offers a seminar designed specifically to introduce faculty and graduate students to new topics in contemporary mathematics, many of which are suitable for thesis topics. New requirements ensure that our doctoral students will have the breadth necessary for successful careers. Along with this change, the department approved a plan to broaden the areas on which doctoral students can be examined for the written portion of the comprehensive exam. The motivation for this is to enable them to progress more rapidly to thesis work in a broader array of mathematical areas (e.g. statistics, applied mathematics,

logic, and mathematics education). Along with this change, new two semester doctoral level course sequences were developed in logic/universal algebra and ordinary/partial differential equations. Doctoral course sequences in mathematics education remain in development.

3.4. Teaching Improvement

The Teaching Committee oversees the coordination of multi-section courses and classroom observations of faculty members and graduate student teaching assistants. The committee drafted plans for a longitudinal study of student performance, to assess the efficacy of current mathematics preparation for courses with mathematics prerequisites. We have been unsuccessful so far in obtaining funds for release time for Professor Lampert to collect and analyze the appropriate data. Professor Staffeldt was among the first NMSU faculty members to participate in the GRASP program. He reported on the positive affect it has had on his ability to reach students with varying learning styles. Dr. Gasparim participated in the second wave of the program.

Faculty members are using advanced technology, including mathematical software and the internet, in significant ways in their teaching. With NASA, NSF, and Department of Education support, Professor Baggett is offering a new course on the use of technology in elementary science classes. Professor Staffeldt has developed programs used by several faculty to aid students in visualization of various structures of geometric significance in calculus and differential equations courses. He published a paper about this work and spoke about it at national conferences on engineering education. Professor Morandi has developed programs for use in graduate modern algebra courses and uses internet sites in courses for prospective teachers. The same NASA funding provided him with a course release to revamp the introductory course in modern algebra required of mathematical sciences and secondary mathematics education majors.

A major strength of the department's educational program is the participation of graduate students and talented undergraduates as tutors and graders in the Mathematics Learning Center. This provides a history of experience with the peer-tutoring aspect of learning, which is inherent in the cooperative learning projects now taking place in many other classes. It creates a valuable training program for new graduate assistants, introducing them to educational issues while they are under close supervision by experienced educators.

Several faculty members developed interests in the mathematical education of

future teachers. Many of them regularly teach the mathematics content courses which we offer from the beginning undergraduate (Math 111) to the doctoral level (Math 561). Many faculty members worked on updating the mathematics competencies for the teacher preparation program and assisted the College of Education with their NCATE review. Faculty members attended the New Mexico Roundtable discussions on the preparation of future teachers. Professor Alvarez attended monthly meetings at the Teacher's Center in connection with her activities on the CETP grant. Professor Finston serves on the Education Council.

Other work with undergraduate students includes coaching and other preparation of students for the prestigious Putnam and COMAP competitions. Professors Caroline Sweezy and Robert Smits along with Emeritus Professor Dick Bagby conducted these activities.

The department and the administration are concerned that with low success rates in our developmental mathematics courses. The department secured central administration funding to conduct a comparative study of similar courses at our peer institutions. Recommendations to improve these courses will be made in April 2003.

3.5. Outreach

The department engages in outreach activities both within and external to the university. The Liaison Committee was established in 1997 to contact faculty members from client departments and contact mathematics departments at branch campuses for their feedback concerning the content of mathematics courses. We have been working with the Computer Science department to update the course requirements that we have in common. A grant awarded by the National Science Foundation to faculty in the two departments will result in new course materials based on classic mathematics papers that laid the foundations for computer science. The Undergraduate Curriculum Committee is developing a proposal to alter our scientific calculus sequence. Since the College of Engineering provides the majority of students in these courses, modifications will be done in consultation with their faculty. In fact Professors Morandi and Finston outlined our plans to Engineering Department Heads in Fall.

Mathematics Learning Center faculty members work closely with faculty at the Doña Ana Branch Community College, indeed the new two semester version of Math 115 has faculty from both institutions as instructors. Department mem-

bers participated in discussions with Branch faculty and administrators on the mathematical requirements for their new Educational Assistant degree.

Educational outreach activities included visits to area public, elementary, middle, and high schools to speak to students and the development of an online high school mathematics contest. The contest was held in Spring 2002 with 5 teams from Las Cruces area high schools participating. An awards ceremony was held, with prizes supplied by Mackickan Software and the department. An expansion of the contest to the wider southern New Mexico region is under development with a Spring 2003 date for administration.

Department members were again active in the PREP program. The program encourages disadvantaged middle school and high school students to study mathematics and science through an intensive summer program of enrichment activities. The recently funded HCOP grant also provides academic and nonacademic support to middle and high school students from a wide area of southern New Mexico. The Department provides HCOP with online mentoring and tutoring and instruction in the summer enrichment program to be held at NMSU in summers 2003-2005..

A considerable amount of effort has been devoted to the Mathematics Placement Exam (MPE). The MPE was administered at off campus early registrations in Spring 2002. Recognizing the crucial nature of appropriate placement for a large number of majors, our intention is to administer a version of the exam to high school students in the junior and senior year. For seniors, it will provide incentive to prepare well and for juniors we expect that it will provide incentive to take a fourth year of mathematics in high school. Professor Berver has developed an online version of the MPE that we will administer in Spring 2003. The department held workshops for public school faculty and administrators. We expect to continue this activity.

Professor Baggett teaches a series of partnership courses in which NMSU students are matched with active Las Cruces area high school teachers. Professor Morandi requires education majors in his Math 111 and Math 112G courses to visit elementary school classrooms. Professor Baggett again conducted a Mathematics Education Institute in Spring, 2002. With the support of an Eisenhower Foundation grant, the department held a series of conferences in 2001-02 for mathematics teachers and teachers of the visually impaired to facilitate their use of the mathematics materials developed at NMSU.

The department participated in many recruiting activities for the university. A faculty member is designated as the coordinator of Visitor's day activities.

We have set up a booth at Experience NMSU for the past three years and were the only NMSU department to have a booth at three Aggie Experiences. In order to publicize our programs and the online high school mathematics contest, the department had a booth at the Annual High School Principals/Counselors Conference.

4. Research Activities

The productivity of our research program continued a growth trend begun in 1992, as did the number of faculty members supported by outside funds. Faculty members spoke at numerous conferences and universities. Interdisciplinary research remained an important part of our research effort. The Mathematical Sciences Summer Research Awards, funded by an anonymous donation to the NMSU Foundation enabled Professors Gasparim, Harding, Lodder, and Sikora to make substantial progress on their research programs and to network with international colleagues. Professor Hung Nguyen spent part of his sabbatical year at various universities in Europe and the Far East and held a distinguished visiting professorship in the statistics department of Bowling Green State University in Spring 2002. In summer 2002 he was appointed Distinguished Fellow in the ASEE/NAVY Summer Faculty Research Program. Professor Tony Wang obtained grant funds from Taiwan to deliver a series of lectures there and conduct collaborative research.

Professors Swanson and Salamanca-Riba were awarded new research grants from the National Science Foundation. Professors Bezhanishvili, Gehrke, Harding, and Morandi were awarded funding from U.S. Civilian Research & Development Foundation and the Georgian Research & Development Foundation for a program of research collaborations and conferences. Professor Lakey was awarded a new grant from the Army Research Office for basic research.

Members of the department were productive researchers. Eighteen of the tenure-track faculty members had forty three papers appear in print in 2002. One had a book appear, and faculty members delivered dozens of talks on their research at conferences and at other universities.

Faculty members had continuing external funding to support their research and educational activities. Nine faculty members conducted mathematics research with funding from the National Science Foundation, the National Security Agency, the Army Research Office, and the Astrophysics Research Lab. Professors Barany and Krupa conducted defense related research at the ICASA Institute at

New Mexico Tech. Eight faculty members conducted funded educational research work during the past year; some of these projects involved joint work with public schools in the Las Cruces area and with the New Mexico School for the Blind in Alamogordo. Support came from the National Science Foundation, the Department of Education, The Department of Health and Human Services, the National Aeronautics and Space Administration, the Department of Education, the New Mexico Commission on Higher Education, and the New Mexico Eisenhower Foundation. A new NSF grant was awarded to Professors Lodder and Pengelley and two Computer Science faculty members for curricular reform.

Members of the department conduct joint research with mathematicians at other institutions. Some highlights of this type of activity include: Professor Swanson is spending part of her sabbatical at the mathematical Sciences research Institute, along with a doctoral student from the department. In collaboration with Professor Craig Huneke, she will complete a monograph on advanced topics in commutative algebra. Professor Gasparim participated in workshops at the Isaac Newton Institute in England and conducted joint research with notable European algebraic geometers. Professors Alvarez and Stanford conduct joint research projects with faculty at institutions in Mexico. Professor Bezhanishvili spent part of the summer in Milan, Italy where he developed a research collaboration with an Italian mathematician. Professor Gehrke is writing a research text with a distinguished mathematician at Oxford University. Professors Sikora and Lakey conduct joint research with colleagues in Australia, and Professor Krupa has an ongoing program with faculty in Vienna. Professor Hung Nguyen has numerous research collaborations, many with mathematicians in the far east. He brokered an agreement between NMSU and Assumption University, Thailand for research collaborations and exchanges of graduate students and faculty.

The department sponsors a weekly colloquium and several weekly seminars. The colloquium series included 34 lectures during the year, most of them presented by visitors to NMSU. Speakers from other institutions visit the department to collaborate with our faculty on their research. A few of the talks were presented by members of other departments on campus, explaining how they use mathematics in their research. The seminars specialize in algebra, analysis, cryptography, lattice theory, statistics, topology, and fuzzy mathematics. The “Basic Notions” is a more informal, general interest seminar. This year we began the practice of devoting one Basic Notions seminar each month to a topic of interest to undergraduates. This seminar is followed by a reception for undergraduate members of the newly reorganized club for mathematics majors. The New Mexico Analysis seminar is a

joint venture between the mathematics faculty of NMSU and UNM. The Spring, 2002 session was held at NMSU and featured talks by NMSU graduate students as well as talks by distinguished established mathematicians. Together with their counterparts at UNM, Professors Alvarez and Lakey secured NSF funding for the seminars for the next two years.

Faculty members participate in interdisciplinary research. Professors Barany and Krupa are conducting joint research with faculty members in the College of Engineering and at New Mexico Tech on externally funded projects. Professor Lakey collaborates with staff at PSL and Statisticians Hung Nguyen, Nhu Nguyen, and Tony Wang consult with researchers around campus. Professor Giorgi has a history of collaboration with physicists. We expect that she will establish such collaborations at NMSU.

5. Professional Service Contributions

The department provided service for the mathematical community and the university. We are an institutional member of several professional organizations, and a sponsor of one journal. Department members worked on committees and conferences for these organizations. They served as journal editors and referees of research articles and grant proposals. For the university, faculty members were members of sensitive university and college committees, and were outside representatives on tenure and promotions committees for nine departments. The department is represented in the faculty senate by Professor Stanford and on the Education Council by Professor Finston.

Members of the department play an important service role in the mathematical community. The department is an institutional member of the American Mathematical Society, the Mathematical Association of America, the Society for Industrial and Applied Mathematics, the American Mathematical Association of Two-year Colleges and the Association for Women in Mathematics. It is an institutional sponsor of the *Pacific Journal of Mathematics* and a member of the Rocky Mountain Mathematics Consortium. Twenty members of the department served as referees for journals and books, reviewers for the two major mathematical abstract journals, and referees for grant proposals to the National Science Foundation and the National Security Agency. Faculty members took part on conference organizing committees and organized special sessions at national and international conferences sponsored by professional societies. Professors Lolina Alvarez, Richard Bagby, Pat Baggett, Kitty Berver, Hung Nguyen, Nhu Nguyen,

John Harding, David Pengelley, Irena Swanson, and Joe Zund serve on editorial boards of professional journals (Hung Nguyen was recently named co-Editor in Chief of one). Professor Jerry Lodder is the department's representative to the Rocky Mountain Mathematics Consortium and Professor Sweezy is on the board of directors of the Pacific Journal of Mathematics. Professor Smits serves as the department's representative to the Mathematical Association of America (MAA). David Pengelley is a member of two MAA committees. Lolina Alvarez, David Finston, and Douglas Kurtz are members of committees of the American Mathematical Society and Professor Kurtz also serves on a committee of the Mathematical Association of America. Emeritus Professor Joe Zund was a member of one Special Commission and two Special Committees of the International Association of Geodesy, and the chair of one Special Subcommission. He served on one committee of the American Geophysical Union.

Professor Alvarez gave an invited lecture in the Distinguished Women in Engineering and Science Lecture Series at Kansas State University. She lectured on her research, conducted workshops with undergraduate and graduate women, and gave a lecture on her life in and out of academics for the entire Kanasa State University community.

The department plays a major role in the university's service mission. Members of the department served on the Disability Resource Advisory Board, the Educational Diagnostician Advisory Council, the Faculty Senate, an ad hoc Committee on Admissions, two General Education Committees, two Outcomes Assessment Committees, and the Westhafer Award Committee. One faculty member served on the Publications Board for the ASNMSU. Professors Alvarez and Giorgi served on the research awards selection committee for the ADVANCE grant. The department provided advice and assistance to the College of Arts and Sciences with representatives on the Curriculum and Educational Policies, Faculty Affairs, and Research Affairs Committees, and on the College Council. Mathematical Sciences faculty served as outside members on tenure and promotions committees for the Departments of Astronomy, Computer Science, Government, History, Physics, Philosophy, Psychology, and Sociology and Anthropology. Faculty members also served as advisors in the College of Arts and Sciences Advising Center, advisors to several student organizations, and Dean's representative on many graduate student exam committees external to the department. . All department faculty members participated in committee work within the department.

6. Community Relations

Working with groups and agencies outside the university is important to the department. Several faculty members worked with Las Cruces Public School students and teachers.

The department has been involved in the New Mexico Commission on Higher Education Mathematics Articulation Task Force, which coordinates the transfer of credits for mathematics courses among the institutions of higher learning in the state. Currently, Professor Kitty Berver is cochair of the task force. She is responsible for maintaining the internet-accessible database that articulates transfer credits. She was also external evaluator of the lower division mathematics program at Eastern New Mexico University.

The department has increased and improved its interactions with local public schools. Patricia Baggett reorganized her Math 111 (Fundamentals of Elementary Mathematics I) and Math 112 G (Fundamentals of Elementary Mathematics II) classes to run concurrently with special topics Math 301 and Math 501 courses for pre and in-service teachers. She has created new courses on teaching mathematics and science with technology. Elementary education majors in these courses are paired with practicing teachers enrolled in the concurrent graduate course, who act as mentors to the pre-service teachers, allowing them to observe, co-teach, and finally teach alone, in their classrooms. Several other Math 111 and Math 112G instructors had their students observe public school classes. The in-service teachers received free tuition with funds provided by a grant from the New Mexico Commission on Higher Education and from NASA. The administration of the Las Cruces Public Schools and, in particular, the Teachers' Center have been highly supportive of this initiative, which has led to several joint interactions involving the department, the public schools, and the College of Education.

Professor Baggett continues her practice of teaching a class a week in elementary and middle schools, presenting workshops, and addressing the LCPS School Cabinet. Several other faculty members are frequent visitors to area schools. In Spring 2002 the department elevated its practice of making visits to high school classes a recognized service activity. Professor Swanson coordinated these activities in Spring and approximately a dozen visits were made to area high schools in which faculty spoke to students about issues in contemporary mathematics. The department maintains contact with the area public schools through the Education Council and a good working relationship with the Associate Deans in the College of Education. It was through these contacts that our Math Placement Exam

workshops were arranged.

The department maintains several display cases in public areas in Science Hall, in the classroom wing and near the department office. These help to introduce visitors to the members of the department and to give timely information about mathematical topics of current interest.

Three faculty members serve on a joint committee with members of the Doña Ana Branch Community College mathematics faculty. Their activities include working to develop a smooth transition from branch college to main campus mathematics courses and arranging mini-conferences involving members of both faculties at the beginning of each semester. Faculty from both institutions designed a new course that spans both campuses. Others have met to discuss the mathematics course that best meets the goals of the new Educational Assistant degree mandated by the "No Child Left Behind" law.

The department supports university and state activities by providing space for organizations on campus. It has housed the university's Women's Studies Program for ten years, as the university refuses to provide space for this recognized program. It converted a seminar room into the office of the southern coordinator for the New Mexico MESA (Mathematics Science Engineering Achievement) program.

7. Outcomes Assessment Activities

7.1. Undergraduate Outcomes Assessment Activities

The department's undergraduate program evaluation includes a survey to be completed by all Mathematical Sciences faculty teaching courses in which at least one mathematical sciences major is enrolled. The survey was devised by Richard Bagby in collaboration with the Undergraduate Majors/Minors Committee. The questions to be answered for each mathematical sciences major are:

1. Does the student display the ability to understand definitions and use them in appropriate situations? Often /Seldom
2. Does the student display the ability to complete explicit calculations and derivations? Often /Seldom
3. Can the student clearly express a written mathematical argument? Often/Seldom

4. Does the student display the ability to apply theoretical knowledge to solve problems? Often /Seldom
5. Does the student demonstrate a degree of mathematical maturity? (Indications of this are the ability to think of a problem in several ways, to anticipate developments in course material, to relate the subject material to other courses in meaningful ways.) Often /Seldom

Faculty are also asked to justify their responses, indicating the methods by which they arrived at the assessment.

Complementing the survey, all students with senior status are invited for a discussion with the department head every semester until graduation. The discussion enables the department head to assess the satisfaction students have with their program of study, assess their preparation for their future mathematical life (graduate school or career), and supplement the standard advising that students receive. Four such interviews were conducted in 2001. The department intends to institute a senior seminar course as a requirement for the major. The department's outcomes assessment program was accorded level 3 status in Spring, 2001.

Results of Assessment Activities Our previous assessment activities included exit interviews and post graduation surveys. Neither elicited much response from students. However, instructors of the two "theoretical" courses required of all mathematical sciences majors agreed that these courses need serious revision. A new text was written as a step in this direction. David Finston and Patrick Morandi have revised the content of the algebra course and are collaborating on a text with the revised content. The majority of the faculty use problem-solving and writing assignments in their classes. We continue to encourage our majors to participate in national competitions, such as the Putnam Examination and the COMAP Modelling Contest. Emeritus Professor Bagby is teaching a course on competitive mathematics to prepare students for these activities.

7.2. Graduate Outcomes Assessment Activities

The assessment of our graduate program includes a survey of graduates with advanced degrees and evaluation of the performance of our graduate students on master's and doctoral examinations. In 1999 we instituted a questionnaire

administered to the chairs of graduate examining committees for the oral comprehensive exams and final orals for the master's and doctorate. The intent is to assess whether the examinee demonstrates mathematical breadth and content specific knowledge appropriate to his or her level. Six students passed final oral examinations in 2002 and the questionnaires were administered at these exams. Our graduate outcomes assessment program was also accorded level 3 status.

Results of Assessment Activities The information we have received from our established assessment activities, along with the new breadth of research interests in the department, led to a proposal to expand the subject areas on which students can be examined for the doctoral comprehensive and to impose course requirements for our doctoral students. It was voted on and passed in Fall, 2001. The revision enables students to progress more rapidly into research leading to a doctoral dissertation. It necessitated course revisions since the written portion of the comprehensive exam is based on year long course sequences at the 500 level. Therefore an area can be considered as an examination area only if there is a year long sequence of 500 level courses upon which to base the examination. New areas that were included in 2002 are statistics, applied mathematics, and logic/universal algebra. A mathematics education sequence is in development. The revision includes course requirements to ensure that our Ph.D.s have appropriate breadth in several mathematical areas.

7.3. Research Outcomes Assessment Activities

The proposal to assess the research program incorporated the university's mission with proposals from the American Mathematical Society. It involved the research production of faculty members and participation of graduate and undergraduate students in research and creative activities. The research production of the faculty is assessed by the percentage of the tenure-track faculty members who publish research results during each three-year period. This percentage should be at or above the average for Carnegie I Research Universities, which was 84% for the fall of 1994.

Results of our Assessment Activities More than 80% of the tenure-track faculty members currently on our staff published research results during the past three years. During 2002, faculty members offered advanced courses in pure and applied mathematics and mathematics education to undergraduate and graduate

students, introducing them to ideas at the forefront of these fields. The department offered special topics courses in the spring, summer, and fall, including advanced courses in mathematical physics, and mathematics applied to coding theory. Graduate and undergraduate students are involved in mathematical research in faculty research projects funded by the NSF, Los Alamos National Lab, externally funded programs in mathematics education, and on research projects funded by the Physical Sciences Laboratory.

8. Department Self-Study

Part of the university's review process is university-wide self-studies which began in spring, 1995. The department volunteered to be one of the first in the College of Arts and Sciences to perform a self-study. As the follow-up to the self-study, we proposed the following three activities:

1. Develop a research program in mathematics education.
2. Receive permission to hire visiting faculty members beginning in March for the following academic year.
3. Increase the number of minority students in our graduate program.

Over the past seven years our success on items 1 and 3 are significant. The program in mathematics education is extremely active. We are presently conducting a search for additional faculty members with primary research interest in mathematics education, and have revised our doctoral comprehensive exam structure to encourage students to pursue theses with this specialty. Our graduate recruiting efforts resulted in many students of minority heritage, and we have developed strategies to draw talented minority mathematics majors nationwide to our graduate program. Funding to sustain this effort has been awarded to the department from the Sloan Foundation and to the university from the National Science Foundation through the AGEP grant. The department works with the Graduate School on recruiting efforts through SACNAS, the Western Name Exchange, and the McNair Program. Item 2 remains a problem. Faculty will continue to request leave without pay, and the temporary vacancies these leaves create give us an opportunity to get talented mathematicians as visitors. Early approval for visiting faculty will enable us to get the best fit for the department in terms of teaching needs and research compatibility.

9. Computing Facilities

The department made several significant advances in its computing facilities this year. John Pierce is to be commended for his work in protecting our network from possible damage due to hackers and viruses. The department currently has 17 *Unix* computers, including two *Sun* servers, 139 *IBM* compatible PC's, three of which run *Linux/NT*, and 20 printers. In addition, the mobile wireless mathematics education laboratory has 27 laptops. Thus, when the lab is in use, the department can have as many as 183 machines on the network at one time. Additionally, there are two PC/overhead projector combinations, a fixed projector in two classrooms, and 6 laptops that can be checked out by teaching staff for instructional purposes. These machines are used by faculty members and graduate students for research and for the preparation of teaching materials. The department purchased the fixed overheads and laptops through funds provided by external grants. In 2002 we obtained funds to upgrade the undergraduate and graduate student computing laboratories.

The department maintains three computer labs incorporating state-of-the-art equipment and software. The undergraduate lab houses twenty two networked personal computers, equipped with the mathematics word processing and computing software, *Scientific WorkPlace*, and the symbolic computing software, *Maple*. This lab has been used for students in calculus, linear algebra and several graduate-level courses. The graduate students' lab is equipped with 9 UNIX machines and three personal computers. The mathematics education laboratory/classroom became fully operational in Spring 2002 as a mobile wireless classroom. Funding for this lab came largely from grants awarded by NASA and the Department of Education Title V program. The department has an ongoing need for computing equipment and advanced software for educational uses. We have committed funds from the Title V grant toward the construction of a new computer laboratory to support our developmental mathematics program.

The Computer Operations Group has one full time staff member. The other staff consists of student workers. This is inadequate staffing for an operation as large as ours. In comparison, Computer Science has a smaller operation with three full time staff members. Dean Casillas had agreed to fund one half of a second staff member provided the department can come up with the remaining funds. There are very few grant opportunities that would enable us to hire computer staff on soft money. We had to withdraw the request from a very good prospect because the agency required an institutional commitment to maintain

the position after the funding period. I could not get Dean Casillas's agreement to that. Grant funds and salary savings have enabled us to fund a GA's work in MathCOG, but these are only ad hoc arrangements and therefore unsatisfactory.

10. Advanced Degrees Awarded in 2002

Name	Degree
Abdul Jarrah Advisor: Reinhard Laubenbacher	Ph.D.
Hideo Nagahashi Advisor: Mai Gehrke	Ph.D.
Sofian Obeidat Advisor: Joseph Lakey	Ph.D.
Katherine Kanim Advisor: David Pengelley	Master's
Ivette Chuca Advisor: Lolina Alvarez	Master's
Ricardo Rodriguez Advisor: Martin Krupa	Master's

11. Departmental Colloquia for the year 2002:

- Robert Smits, Towson University, *Exit Times and Heat Kernels for Unbounded Euclidean Domains*. January 14.
- Tiziana Giorgi, Towson University, *Analysis and Approximation of Phenomenological Ginzburg-Landau Models of Superconductivity*. January 17.
- Rudolf Willie, Darmstadt University, *Dyadic Mathematics—Abstraction of Logical Thinking*. January 24.
- Jens Funke, Indiana University, *Class Number Relations: Gauss and Kronecker Revisited*. January 25.
- K. N. Raghavan, Institute of Mathematical Sciences, Chennai India, *Hilbert Functions of Points on Schubert Varieties in the Grassmannian*. January 30.
- Linghai Zhang, University of Minnesota, *Asymptotic Stability of Traveling Pulse Solutions Arising From Neuronal Networks*. January 31.
- Claudia Miller, University of Toronto, *Intersection Multiplicities and Characteristic p Techniques*. February 7.
- Sophia Jang, Texas Tech University, *Extinction, Persistence and Coexistence of Variable-Yield Nutrient-Phytoplankton-Zooplankton Models With Nutrient Recycling*. February 12.
- Alex Wilce, Juniata College, *Stone-Cech Compactifications of G -Bundles*. February 14.
- Peter Casazza, University of Missouri, *Mathematical Insanity*. February 21.
- John Benedetto, University of Maryland, *Wavelet Theory and a Fundamental Application*. February 21.
- Raphael Lyman, New Mexico State University, *Fading-Envelope Prediction: An Orthogonal Odyssey*. February 28.
- Jim Milgram, Stanford University, *Interactions Between Engineering, Biology and Topology*. March 11.

- Mara Neusel, University of Notre Dame, *Depth in the Invariant Theory of Finite Groups*. March 21.
- Bruce Olberding, The University of Louisiana, *Stability of Ideals and its Applications*. April 1.
- David Pengelley, New Mexico State University, *Sophie Germain's Grand Plan for Proving Fermat's Last Theorem*. April 18.
- Wojciech Gajda, Poznan University, Poland, *On K -Theory of the Integers and Arithmetic*. April 25.
- Hideo Nagahashi, New Mexico State University, *Fundamental Theorem of Calculus*. May 2.
- Annegret Paul, Western Michigan University, *Lie Groups, Representations, and Dual Pairs*. August 30.
- Robert Smits, New Mexico State University, *A Random Walk Down the Yellow Brick Road*. September 5.
- Adam Sikora, New Mexico State University, *Multiplier Theorems for Laguerre and Hermite Expansions*. September 12.
- Hung T. Nguyen, New Mexico State University, *Random Sets: A Bridge Between Statistics and Intelligent Systems*. September 19.
- Johann Boos, Fernuniversitat Hagen, *Sequences of 0's and 1's in Sequence Spaces*. September 26.
- Anatolii Puhalskii, Colorado University at Denver, Colorado, *Idempotent Ito Equations*. October 3.
- Ted Stanford, New Mexico State University, *Brunnian Links Are Determined By Their Complements*. October 10.
- Jerry Lodder, New Mexico State University, *New Manifold Invariants*. October 17.
- Al Sethuraman, California State University, Northridge, *Determinantal Varieties Over Truncated Polynomial Rings*. October 24.

- Ralph Cohen, Stanford University, *String Topology*. October 31.
- David Vogan, Massachusetts Institute of Technology, *Linear Algebra and Unitary Representations*, November 1.
- Don Johnson, Somerset, New Jersey, *Spaces of Prime Initial Sets*, November 7.
- Tian Hu, University of Wisconsin - Green Bay, *Bernoulli Convolutions and Their Spectral Properties*, November 14.
- Bruce Olberding, New Mexico State University
- De-Jun Feng, Title TBA. December 5.

12. International Activities 2002

12.1. Colloquia

- K. N. Raghavan, Institute of Mathematical Sciences, Chennai India, *Hilbert Functions of Points on Schubert Varieties in the Grassmannian*. January 30.
- Wojciech Gajda, Poznan University, Poland, *On K-Theory of the Integers and Arithmetic*. April 25.
- Johann Boos, Fernuniversitat Hagen, *Sequences of 0's and 1's in Sequence Spaces*. September 26.
- De-Jun Feng, China, Title TBA. December 5.

12.2. Department Visitors

- Busiso Chisala, Spring 2002.
- Peter van Rossum, University of Nijmegen, Spring 2002.
- De Jun Feng, China, Spring 2002.

12.3. Collaborative Research

- Ross Staffeldt conducts joint research with colleagues in Germany.
- Irena Swanson conducts joint research projects with faculty in Italy and Germany, among others.
- John Harding conducts research with colleagues in the Czech Republic and Canada.
- Pat Morandi does collaborative research with Susanne Pumpluen, University of Regensburg.
- Joe Lakey does collaborative work with colleagues in Australia.
- Adam Sikora does collaborative work with colleagues in Australia.
- Elizabeth Gasparim does collaborative work with colleagues in England and Italy.
- David Finston conducts joints research with colleagues in the Netherlands.
- Martin Krupa collaborates with colleagues in Vienna.
- Mai Gehrke does collaborative work with colleagues in Denmark, Portugal, and England.
- Lolina Alvarez does collaborative work with colleagues in Argentina and Mexico.
- Hung Nguyen does collaborative work with colleagues in Thailand.
- Nhu Nguyen does collaborative work with colleagues in Australia.
- Tony Wang does collaborative work with colleagues in Taiwan and China.

12.4. International Service

- Joe Zund was a member of one Special Commission and two Special Committees of the International Association of Geodesy, and the chair of one Special Subcommission.
- Lolina Alvarez is US Liaison of the Argentine Mathematical Union

- John Harding is an officer of the International Quantum Structures Society.
- Douglas Kurtz served on an international visiting committee to the Mathematics Department of the University of the United Arab Emirates.

12.5. International Lectures

- John Harding lectured at a conference in Vienna.
- Guram Bezhanishvili lectured at the universities of in Milan and Salerno.
- Marcus Cohen was an invited speaker at a conference in Canada.
- Elizabeth Gasparim lectured at conferences in England and Romania and at Cambridge University.
- Tony Wang presented talks at several universities in China and Taiwan.
- Hung Nguyen spoke at international conferences in Thailand and Taiwan.
- David Pengelley spoke at a conference in Scotland.
- Nhu Nguyen spoke at universities in Hong Kong and Thailand.
- Jerry Lodder lectured at a conference in Germany.
- Bruce Olberding lectured at conferences in Venice and Pisa.
- Adam Sikora lectured at the Australian National University.
- Ted Stanford gave an invited talk at a conference in Mexico.
- Irena Swanson gave a month long workshop in Tehran, lectured at the University of Shiraz, and spoke at a conference in Italy.

13. Refereed Publications and Books Appearing in 2002

Josefina Alvarez

- (with M. Guzmán-Partida, University of Sonora, Mexico) "The S' -convolution with singular kernels in the Euclidean case and the product domain case," *Journal of Mathematical Analysis and Applications* **270** (2002), 405-434. This work was part of the research collaboration I proposed for the Manasse Chair Award competition.
- (with Martha Guzmán-Partida, University of Sonora, Mexico), "The development of the integral from Cauchy to Lebesgue" (in Spanish), *Arenario* (refereed journal of mathematics education published by the University of Sonora, Mexico), **1(2)** September (2001), 127-139. I use an English version of this paper as one of the supplemental readings in the course Math 593 (Measure and integration).

Patricia Baggett

- Baggett, P. & Ehrenfeucht, A. *Breaking Away from the Algebra and Geometry Book: Original and Traditional Lessons for Grades K-8* (2001). Lanham, MD: Scarecrow Press. I will provide a copy of this book when I come to Las Cruces in late October.
- Baggett, P. & Ehrenfeucht, A., "Partnership Mathematics Content Courses for Prospective and Practicing Elementary and Middle School Teachers," *Journal of Mathematical Teacher Development. Special issue on Relating Content to Context: Factors Influencing in Preservice Mathematics Teacher Education: An International Perspective*, **3**, (2001) 74-85 (invited). The journal editor gave permission, and this article is now on our website, <http://math.nmsu.edu/breakingaway>.
- Baggett, P. & Ehrenfeucht, A., "Marcy's Dots: A Problem on a National Test Revisited," *Humanistic Mathematics Network Journal* **26** (June(2002)), 32-34. I will provide a copy of this when I come to Las Cruces in late October.

Guram Bezhanishvili

- Guram Bezhanishvili and John Harding, "Functional monadic Heyting algebras", *Algebra Universalis* **48** (2002).

- Guram Bezhanishvili, Ray Mines, Patrick J. Morandi, “The Priestley separation axiom for scattered spaces”, *Order* **19**, 1-10, (2002).

David Finston

- Deveney, J.K., Finston, D.R. “Regular G_a invariants”, *Osaka Journal of Mathematics* **39** (2002) 275-282.
- Deveney, J.K., Finston, D.R. “ G_a invariants and slices”, *Communications in Algebra* **30** (2002) 1437-1447.

Elizabeth Gasparim

- (with E. Ballico) "Numerical Invariants for Bundles on Blow-ups, *Proceedings of the American Mathematical Society*, **130(1)**, 23-32 (2002).
- "Two applications of Instanton Numbers," *Issac Newton Institute for Mathematical Sciences*, Preprint number NI02022-HDG, Cambridge, England.

Mai Gehrke

- (with H. A. Priestley), "Non-canonicity of MV-algebras", *Houston Journal of Mathematics*, **28(3)**, 2002, pp. 449-455.
- (with Y. Venema), "Algebraic Tools for Modal Logic," *13th European Summer School in Logic, Language, and Information, Course Notes*, CD-Rom published by University of Helsinki, see <http://www.helsinki.fi/essli/>.
- "Logik som Anvendt Matematik," *Matilde* nr. **13** (2002), 14 -15.
- (with H. Nagahashi, Y. Venema) "A Sahlqvist Theorem for Distributive Modal Logic," *ILLC Research Report PP-2002-9*, see http://preprint.beta.uva.nl/server/bp_search/
- (with G. Bezhanishvili) "A new proof of completeness of S4 with respect to the real line," *ILLC Research Report PP-2002-07*, see [http://www.illc.uva.nl/Publications/ ResearchReports/](http://www.illc.uva.nl/Publications/ResearchReports/)
- (with van Benthem, J.; Bezhanishvili, G.) "Euclidean hierarchy in modal logic," *ILLC Research Report PP-2002-08*, see [http://www.illc.uva.nl/Publications/ ResearchReports/](http://www.illc.uva.nl/Publications/ResearchReports/)

Tiziana Giorgi

- (with D. Phillips) "The Breakdown of Superconductivity due to Strong Fields for the Ginzburg-Landau Model," *SIAM Review*, **44(2)** (2002), 237-256.

John Harding

- Harding, J. & Pták, P., "Central Ideals and Set Representations of Orthomodular Posets", *Coll. Math.*, **89** (2002), 233-240.

Martin Krupa

- M. Krupa and Melbourne, "Stability of robust heteroclinic cycles,"
- S.A. van Gils, M. Krupa and P. Szmolyan, "Asymptotic expansions using blow-up," Re-submitted to *ZAMP* after revisions. (2002).
- M. Krupa, W. F. Langford and J. P. Voroney, "Canard explosion in the Belousov-Zhabotinsky Reaction, " Submitted to *J. of Nonl. Sci.*
- E. Barany, M. Krupa, "Emergence of critical rates in CSMA/CD type network control schemes," Submitted to *proceedings of the ICCS conference* (2002).

Jerry Lodder

- "Curvature in the Calculus Curriculum," performed at the Joint Meetings of the American Mathematical Society and the Mathematical Association of America, in the special session *Classroom Demonstrations and Course Projects that Make a Difference*, Jan. 8, 2002, San Diego, CA. Schedule attached.

Patrick Morandi

- Bezhanishvili, G., Mines, R., Morandi, P., "The Priestley separation axiom for scattered spaces," *Order* **19** (2002), 1-10.

Hung Nguyen:

- (with I.R. Goodman) "Fuzziness and Randomness," In *Statistical Modeling, Analysis and Management of Fuzzy Data* (C.Bertoluzza, M.A. Gil and D. Ralescu, Eds.) Physica-Verlag (2002), 3-21.
- (with D. Bamber and I.R. Goodman) "New relations between Adams-Calabrese and product space conditional event algebras with applications to second-order Bayesian inference," In *Proceedings of the Workshop on Conditionals, Information and Inference* (G.Kern-Isberner and W. Rodder, Eds.), Hagen, Germany, May 13-15, (2002), 149-168.
- (with M. Mukaidono and V. Kreinovich) "Probability of Implication, logical version of Bayes theorem and fuzzy logic operations," In *Proceedings IEEE-FUZZ'02*, Honolulu, Hawaii, May 12-17, **1**, (2002), 530-535.
- (with V. Kreinovich, S. Ferson and L. Ginsburg) "From computation with guaranteed intervals to computation with confident intervals," In *Proceedings NAFIP'02*, New Orleans, Louisiana, June 27-29, (2002), 418-422.
- (with S. Ferson, L. Ginsburg, V. Kreinovich and S.A. Stark) "Uncertainty in risk analysis: Towards a general second-order approach combining interval, probabilistic and fuzzy techniques," In *Proceedings IEEE-FUZZ'02*, Honolulu, Hawaii, May 12-17, **2** (2002), 1342-1347.
- (with O. Kosheleva and V. Kreinovich) "On the optimal choice of quality metric in image compression," In *Proceedings IEEE Southwest Symposium on Image Analysis and Interpretation*, Santa Fe, New Mexico, April 7-9, (2002), 116-120.

Nhu Nguyen

- "Iterated functions of finite type and the weak separation property," *Proc. Amer. Math. Soc.*, **130** (2002), 483-487.

Bruce Olberding

- Olberding, B. & Saydam, S., "Ultraproducts of Commutative Rings," *Commutative Ring Theory and Applications*, Marcel Dekker, **231** (2002), 369 - 387.

- Olberding, B. "On the Structure of Stable Domains," *Communications in Algebra* **30** (2002), 877 - 895.

Adam Sikora

- ter Elst, A. F. M., Robinson, Derek W., Sikora, Adam, "On second-order periodic elliptic operators in divergence form," *Math. Z.* **238 (3)** (2001), 569–637.
- Cowling, Michael, Sikora, Adam, "A spectral multiplier theorem for a sublaplacian on $SU(2)$," *Math. Z.* **238(1)** (2001), 1–36.
- Sikora, Adam, Zienkiewicz, Jacek, "A note on the heat kernel on the Heisenberg group," *Bull. Austral. Math. Soc.* **65(1)** (2002), 115–120.
- Sikora, Adam, "Spectral multipliers for a distinguished Laplacian on certain groups of exponential growth (a remark on the paper of M. Cowling et al.)," *Studia Math.* **152 (2)** (2002), 125–130.

Ross Staffeldt

- Schwanzl, R. and Staffeldt, R., The Seifert-van Kampen theorem and generalized free products of S-algebra, *Proc. Amer. Math. Soc.* **130 (11)** (2002), 3193-3208.

Tony Wang

- (with Q. Liu, Z. Q. Zhang, et al.) "Active microwave imaging I: 2-D forward and inverse scattering methods," *IEEE Trans. Microwave Theory Tech.* **50 (1)** (2002), 123-133.
- (with Hung, T. Nguyen and Berlin Wu) "On probabilistic methods in fuzzy theory." To appear in *International Journal of Uncertainty, Fuzziness, and Knowledge-Based Systems*, (May, 2002).

14. Summary of Grants and Grant Proposals in 2002.

JOSEFINA ALVAREZ

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
NSF proposal number 0086986: New Mexico Analysis Seminar I am co-principal investigator			\$20,941	3 years,	awarded request in 2000
Subcontract from the NSF funded program NM Collaborative for Excellence in Teaching Preparation			\$25,062.		

PATRICIA BAGGETT

Title/Co-PI's	Date Submitted	Agency	Amount	Duration
Math & science Educators for the future(with Finston et al.)	1999	NASA	\$590,788	3 years
NMSU Title V Developing Hispanic-Serving Institutions Program (with Nassersharif, Morandi, Finston, et al.)	2000	US Dept of Education	\$1,019,702	5 years
Spreading the “partnership” model of Mathematics education for prospective and practicing teachers (with Morandi)	2002	IERI/NSF	\$6,000,000	5 years
Expanding a program of partnership mathematics courses through web development and grant preparation	2002	ADVANCE/ NSF	~\$20,000	2002
NMCETP (5th annual Math Ed Institute) (with R. Scott et al)	2000	NSF	~\$5000	Through May 2002
Creating a new mathematics course for teachers	Not yet submitted; 2002	ADVANCE/ NSF	~15,000	Through 2003

ERNEST BARANY

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	St
Complex Systems Modeling, Analysis and Simulation with R. Colbaugh, K. Glass		New Mexico Tech	\$5,000,000	3/1/02-8/28/02	Fu

GURAM BEZHANISHVILI

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Applications of Topology and Universal Algebra to Modal Logic	May 2002	GRDF/CRDF	\$35,000	2 Years	Funded
Co-PIs: M. Gehrke P. Morandi J. Harding					
Teaching Discrete Mathematics via Original Historical Sources	June 2002	NSF	\$74,432	2 Years	Pending
Co-PIs G. Lodder D. Pengelley H. Leung D. Ranjan					

MARCUS COHEN

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Singularities and Jets in Nonlinear, Multispinor Fields.					Proposal in preparation.

DAVID FINSTON

Title/Co-PIs	Date Submitted	Agency	Amount	Status
Engineering/Mathematics Scholarships	August, 1999	NSF	\$220,000	Ended 8/31/02
Math and Science Educators for the Future	December, 1999	NASA	\$600,000	Active
MAVIS	March, 2000	Eisenhower Foundation	\$20,000	Ended 9/30/02
Sloan Fellowships	August, 2000	Sloan Foundation	\$30,000	Active
Strengthening Hispanic Serving Institutions	Spring, 2000	Dept. of Education	\$2 million	Active
Visiting Scholar	November, 2000	Fulbright	\$25,000	Ended 4/30/02
HCOP	December 2002	Dept. of H. H. S.	?	Active

ELIZABETH GASPARIM

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
International Centre for Theoretical Physics		ICTP, Italy			Funded
Computational Algebraic Geometry		NMSU minigrant			Pending

MAI GEHRKE

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Complex Decisions Systems	1998	PSL	1/4 salary		Ended May 2002
Canonical Extensions of Lattice ordered algebras	Spring 2002	NSF ADVANCE	summer salary		Active
Canonical Extensions of Lattice ordered algebras	Spring 2002	NMSU Minigrant	\$1000		Ended July 2002
US/ Georgian	Fall 2001	NSF	\$35,000		Funded
Canonicity and Duality for Lattice Expansions	Fall 2002	NSF	\$237,538		Pending
Travel to AWM Workshop	Fall 2002	NSF Advance	\$1,200		Pending

TIZIANA GIORGI

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Sta
New Mexico State Advance Grant start-up funds in the form of Computer Equipment and travel funds.		Advance Recruitment Program			func

JOHN HARDING

Title/Co-PIs	Date Submitted	Agency	Amount	Duration	Status
Applications of Topology and Universal Algebra to Modal Logic	May 2002	GRDF/CRDF	\$35,000	2 years	Funded

CO-PIs:
G. Bezhanishvili
M. Gehrke
P. Morandi

MARTIN KRUPA

Title/Co-PIs	Date Submitted	Agency	Amount	Duration	Status
ISRP Research Grant		ICASA at NMT	\$66,000	August 2001 - Sept. 2002	Funded
Canard explosion and canard chaos	November 2002	NSF	\$250,000	3 years	Submitted

JOSEPH LAKEY

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
New Mexico Analysis Seminars	April 2000	NSF	\$20,941	3 years	Current Co-PI
Collaborative: Sampling and uncertainty	October 2001	NSF	\$50,841	3 years	Not funded Co-PI
On models for coordination activity	April 2002	ARO	\$225,704	3 years	Current

JERRY LODDER

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
“Leibniz Homology, Characteristic Classes and K-theory”	Nov., 2001	NSF	\$ 81,384.00	3 yrs.	attenuated
“Teaching Discrete Mathematics via Original Historical Sources” Bezhnashvili, Leung Pengelley, Ranjan	June, 2002	NSF	\$ 74,432.00	2 yrs.	pending
“Leibniz Homology, Characteristic Classes and K-theory”	April, 2002	NMSU Summer Research Award	\$ 1,000.00	Summer 2002	funded

PATRICK MORANDI

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	St.
Applications of Topology and Universal Algebra to Modal Logic Gehrke, Bezhnashvili, Harding	May 2002	GRDF/CRDF	\$35,000	2 years	fun
Title V - Developing Hispanic Serving Institutions Program	March 1999	Dept. of Ed .	\$2,500,000	5 years	fun
Mathematics & Science Educators for the Future Baggett, Finston	December 1999	NASA	\$598,000	3 years	fun
Interagency Educational Research Initiative Baggett	May 2002	NSF	\$6,000,000	5 years	pe

HUNG NGUYEN

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Perception-Based Decision Making for Intelligent Systems Principal Investigator.	October 31, 2002	ONR	\$ 595,493	40 months	pending

BRUCE OLBERDING

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Prüfer Rings in function fields	Fall 2002	NSF	\$140,000		Pending
Prüfer Rings in function fields	Fall 2002	NSA	\$49,500		Pending
Projective presentations	Fall 2002	NMSU minigrant	\$600		Pending

DAVID PENGELLEY

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Teaching Discrete Mathematics via Original Historical Sources PIs: G. Lodder G. Bezhanishvili D. Pengelley H. Leung D. Ranjan	June 6, 2002	NSF	\$74,432	06/01/03–05/31/05	Pending

SUSANA SALAMANCA-RIBA

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Unitary dual of real groups	10/03/01	National Science Foundation	\$ 87,002.00	06/01/02 to 05/31/05	Granted on 05/22/02
ADVANCE Institutional Transf. Award	03/11/02	National Science Foundation	\$ 23,214.00	06/01/02 to 12/31/02	Granted on 04/01/02
Sloan Minority Ph. D. program in Mathematical Sciences	08/25/00	Alfred P. Sloan Foundation	per Sloan formula	Indefinite	Granted on 12/11/00

ADAM SIKORA

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Spectral properties of elliptic and sub-elliptic differential operators	4th of Oct 2002	NSF	\$ 204 000		Pending
Summer Research Award	31 May 2002	NMSU	\$ 5000		Current
Minigrants NMSU	31st April 2002	NMSU	\$ 1000		Completed

ROSS STAFFELDT

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Algebraic K-theory of S-algebras	December 2001	NSF	\$105,000		Declined
Algebraic K-theory of S-algebras	December 2002	NSF	\$105,000		Pending
MASEF grant with Baggett, Finston and Morandi	Awarded Spring 2000	NASA	\$199,000	2 years	Active

TED STANFORD

Title/Co-PI's Date Submitted Agency Amount Duration Status

IRENA SWANSON

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Powers of Ideals	October 1998	NSF	\$90,000	ends May 2002	Ac
Decomposition of ideals	October 2001	NSF	\$97,263	ends May 2005	Ac
REU site: Computational Algebra Summer Inst. at Colorado College PI: Michael Siddoway Co-PI: Irena Swansson	September 2001	DMS Infrastructure program	\$227,280		Not f
Travel Grant for ICM 2002, Beijing, China	October 2001		\$2250		Sp

CAROLINE SWEEZY

Title/Co-PI's	Date Submitted	Agency	Amount	Duration	Status
Math/Engineering Scholarships	August, 1999	NSF/CSEMS	\$220,000	Fall 2000 to Spring 2002	over
Sloan Minority Ph D Fellowships in Mathematics	August 2000	Sloan foundation	2 or more students at \$25,400 per student		funded for 2001-

TONY WANG

Title/Co-PI's	Date	Agency	Amount	Duration	Status
<i>Random sets for statistics</i> Dr. Dejun Feng and Dr. Zhiying Wen of Tsinghua University, Beijing, China	Submitted June 2002	Major State Fund of China	RMB10,000	May 26 - July 5, 2002.	Funded