Department of Mathematical Sciences
Annual Report for 2006

19 December 2006

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1. Overview

The dominant theme of this year in the Department of Mathematical Sciences has been change. There has been a large amount of turnover in the department; Greg Allison, Suzanne Hill, and Irena Swanson resigned, and Sandy Geiger and Barb Sallach retired. We hired James Slack, Christ Stuart, and Erica Voges over the summer, and very recently hired Larry Hughes. The office staff saw Paula Stevens and Melinda Caskey resign and John Pierce retired from his position of Computer Manager. We lost each of these three staff positions. Min Li resigned at the end of January. In addition, James Slack resigned at the start of the Spring 2007 semester, and we lost his position. Finally, Pat Morandi became department head in August, succeeding Ross Staffeldt.

Changes to the department also came in terms of curriculum. The most significant was our changing the precalculus courses Math 115/180/185 into the sequence Math 120/121/190. Work on revising these courses began several years ago, and in Fall 2006, we taught Math 120, 121, and 190 each for the first time. Naturally, with such a substantial change, we had some problems with these new courses, but by the end of the fall the courses were running fairly well, and we expect each of them to be even better in Spring 2007. Another curriculum change is coming in calculus. This fall the department received a grant from the U.S. Department of Education, and the immediate impact of this is that we will be running one hour recitation sections for Math 192 in the spring. These will not be standard recitation sections in the model of universities which teach large lecture hall calculus classes. Rather, they will focus on discipline-specific problems designed to deepen students' understanding and appreciation of calculus, and its relevance to their major. We will then run recitation sections for both Math 191 and Math 192 in Fall 2007.

The department continues to be productive in research. The faculty had over 130 papers appearing in print, accepted for publication, or submitted for publication in 2006. The department received over $1,000,000 in new grant funding this year, from agencies including the Department of Education, the National Science Foundation, and the Los Alamos National Laboratories (LANL). Currently four faculty, Jens Funke, Tiziana Giorgi, Martin Krupa, and Susana Salamanca-Riba have support from the NSF to conduct research. Faculty members are also in the process of applying for several large grants which will total several million dollars. A number of faculty received travel support to visit colleagues to conduct joint research at other universities.

In 2006 the college inaugurated the Arts and Sciences Faculty Outstanding Achievement awards. Several faculty members were nominated for the awards, and two, Dave Finston and Greg Allison, received the awards. In addition, Mary Ballyk was nominated for the Patricia Christmore Teaching Award, and was one of its finalists.

The department continues to play an important role in providing service to the university, the state, and the mathematical community. Faculty members serve on several college and university committees, including the Faculty Affairs Committee and the Faculty Senate. Several members serve as editors for mathematical research journals and conference organizing committees. One served on The New Mexico Mathematics and Science Advisory Council and the Mathematics Planning Committee of the New Mexico Public Education Department.

Not all changes to the department were positive. The department lost two office positions and the position of Computer Manager. This has put a strain on both the office staff and on the Computer Operations Group. Making the situation even more difficult, the Department of Psychology lost its one computer staff position, a Computer Manager, and as a result our COG group is currently serving the computer needs of Psychology. The faculty is also stretched more thinly than in the past. Currently the department has 28 tenure-track faculty, while four years ago it had 31 such faculty.

The department received over $60,000 from the Dean's Office and BRR funding to remodel the tutoring center in Walden Hall. Alyne Fulte is working with the contractors and the university on the design. The remodel will be completed in February 2007. It is intended to give both students, tutors, and faculty a more conducive work environment.

2. Personnel Developments

Several faculty members were promoted or tenured this past year. Ernie Barany and Joe Lakey were promoted to Professor. Tiziana Giorgi, Maria Christina Mariani, and Robert Smits were tenured and promoted to Associate Professor. Guram Bezhanishvili was promoted to Associate Professor. Linda Zimmerman was promoted to College Associate professor. The department recommended Guram Bezhanishvili for tenure, Amal Mostafa for promotion to College Associate Professor, and Caroline Sweezy and Tony Wang for promotion to Professor. Over the summer we hired James Slack as a College Instructor, and Erica Voges and Chris Stuart as College Assistant Professors. At the end of the year we hired

Larry Hughes as a College Assistant Professor. Irena Swanson resigned from the department in November. She had been on leave for the past year and a half, having taken a position at Reed College. John Pierce retired from his position as Computer Manager at the end of June. Min Li was left to run the Computer Operations Group while still classified as a Computer Specialist.

In the fall, Dave Finston, Ross Staffeldt, and Ted Stanford were on sabbatical leave. Ross Staffeldt spent the semester at the Mathematical Sciences Research Institute in Berkeley. Dave Finston and Ted Stanford were in residence and continued their professional activities. Mai Gehrke, David Pengelley, and Sue Schibel were on professional leave in the fall. Mai Gehrke spent the semester working with Hilary Priestley of Oxford University. David Pengelley focused his activities on his research, although spent time on service tasks. Sue Schibel spent the semester working on her Ph.D. in Engineering and teaching an ECE course. Adam Sikora was on professional leave in spring, as a visiting Research Fellow of the Australian National University.

Early in the fall semester the Provost approved money for the College of Education to partially fund shared positions in Mathematics Education and Science Education. He allocated money for the half of each position in Education, and the College of Arts and Sciences was to fund the other half of each position from existing faculty lines. The department sent in a faculty position justification document, and is waiting to hear if we have permission to advertise for the shared position.

3. Curricular Activities

The department put a huge amount of effort into revamping the precalculus courses Math 115, 180, 185, converting them into the sequence Math 120, 121, 190, intermediate algebra, college algebra, and pre-calculus. Work on revising these courses began several years ago, and in Fall 2006, we taught Math 120, 121, and 190 each for the first time. Naturally, with such a substantial change, we had some problems with these new courses, but by the end of the fall the courses were running fairly well, and we expect each of them to be even better in Spring 2007. Linda Zimmerman is the Math 120 coordinator, and did the bulk of the course development. James Slack coordinates Math 121 and developed much of the course materials. To help the students succeed in the first two courses, we run supplementary instruction sections. These one credit courses meet three hours per week, are run by graduate assistants or undergraduates, and are supervised

by an instructor of the corresponding course.

The department, through the hard work of Maria Christina Mariani, aided by Lolina Alvarez, is developing a professional Master's degree program in financial mathematics. Courses in this program will be taught by our faculty and faculty from the Department of Finance in the College of Business. This program is a collaboration between us and the Department of Finance. It is aimed at attracting a new group of students to our department. The students in this program will need a background in calculus, linear algebra, statistics, and probability. They will take 10 courses, 3 finance courses, and 7 mathematics and statistics courses. Of these, 5 are long existing courses in our department, and 2 are courses in Financial Mathematics, Math 521 and Math 522, created by Maria Christina Mariani, which have been taught already with good sized audiences. The department is nearing the completion of the program's proposal, and hopefully the program will be implemented in the near future.

Late in 2006, the department received $600,000 in funding for Project: MESH (Mathematics, Engineering, Science Hybrids). David Finston is the project manager, and Mary Ballyk, Ernie Barany, Tiziana Giorgi, and Caroline Sweezy are some of the key personnel on the project. This project will improve recruitment and retention of minority students by developing four introductory web-based courses which combine mathematics and science aimed at students who have completed mathematics through high school Algebra II. It will also increase retention and success in engineering calculus courses through the development of a required 1 credit recitation section for Math 191 and Math 192 which will reinforce the connections between mathematics and science and engineering applications. In Spring 2007 we will start implementing recitation sections in Math 192, and in Fall 2007 we will have such sections in both Math 191 and 192. Work will begin in the spring to develop "umbrella" problems from other disciplines whose solutions involves calculus. In the long term, the recitation sections will focus on these umbrella problems. Since these have not yet been developed, the recitation sections in Spring 2007 will likely focus on more traditional homework exercises.

Guram Bezhanishvili, Jerry Lodder, and David Pengelley are collaborating with faculty from Computer Science on a National Science Foundation funded grant to implement student projects for active learning from primary historical sources in several undergraduate courses for majors in Mathematics, Computer Science, and Secondary Mathematics Education. We are a national leader in the use of historical sources in teaching mathematics. These projects provide increased motivation and enhance the ability of students with diverse learning

styles to succeed. The group is finalizing a Phase 2 proposal to the NSF to continue their work, and will submit the proposal in early 2007. This new proposal was supported by an NMSU ISSS Research Cluster fund grant

As we have done for many years, the department makes significant use of technology in many of its classes. Handheld calculators are used extensively in the precalculus courses Math 120, Math 121G, and Math 190. They are also used significantly in our calculus courses and in Math 230. Furthermore, several instructors, especially Pat Baggett, make use of calculators in courses for elementary education majors. Computers are used in a wide range of classes. Instructors use portable computers and projectors for classroom demonstrations. Instructors will hold their classes in one of our two undergraduate computer labs from time to time for more serious use of computer work. In addition, the labs are used by students outside of class to work on homework or other class projects. For example, the Walden 27 lab is used for Math 191 and Math 192 students working on the online homework system ThomsonNow (formerly, iLrn). The department has requested Instructional and General money to improve our computer resources to aid in our teaching.

Student advising is handled by three departmental committees. Undergraduate mathematics majors, minors, and supplementary majors are advised by members of the Majors and Minors Committee. This committee also nominates mathematics majors for scholarships and awards, and informs them about study and career opportunities. Graduate students in the department are advised by members of the Graduate Committee. This committee also makes recommendations for admittance and for graduate assistant appointments. Finally, members of the department advise unclassified students through the Arts and Sciences Advising Center.

The department has had an ongoing participation in the Honors program. It regularly teaches two honors courses, *Spirit and Evolution of Mathematics* and *Great Theorems: The Art of Mathematics*. In addition, Gabriel Lampert taught Hon 364G, Jewish Literature and Culture. In addition, the department has taught an honors version of Mathematics Appreciation. Furthermore, this spring Elizabeth Gasparim taught a special section, Math 291H, Calculus and Analytic Geometry III.

The department also actively participates in the General Education program. The GE course with the highest enrollment is Math 210G, Mathematics Appreciation. This year we offered 24 sections, 10 in the spring, 5 in the two summer sessions, and 9 in fall. We offer other ways for students to satisfy the GE require-

ment in mathematics: elementary education majors take Math 112G, business, economics, and some other majors take Math 142G, and science students typically satisfy the GE requirement through the 9 hour rule, which means students satisfy the requirement by taking 9 units of mathematics. The new college algebra course Math 121G was designated a GE course, and many students will satisfy the requirement by this course. In fact, in time we should see a decrease in the demand for Math 210G due to students enrolling in GE courses via Math 121G. We also participate in the GE program by offering two honors courses, Math/Hon 275G and Math/Hon 411G.

Several of our emeriti faculty continue to help the university's teaching mission. Dick Bagby taught a course in the fall to prepare students to take the Putnam Exam, and one student took the exam in December. Joe Zund taught two courses on relativity for the Physics department. John and Annie Selden teach a course each semester, one on research methods in mathematics education, and the other intended to help incoming graduate students work with abstract concepts.

3.1. Teaching Improvement

The department participates in several internal and external activities designed to improve its teaching. It has held several departmental colloquia on educational topics. It oversees the teaching of multi-section courses through having faculty members serve as course coordinators to supervise graduate student teachers and other instructors and to coordinate exams and homework assignments. It also oversees classroom observations of faculty and graduate assistants by faculty members, who then write reports on their observations. Special note goes to Kathryn Engebos, who has coordinated Math 142G for several years. Many sections of this course are taught by graduate assistants, and so there is considerable supervision needed for it.

Members of the department continue to participate in the GRASP program and Teaching Academy events. Fifteen faculty participated in various events in the 2005-2006 academic year. Amal Mostafa was the leading participant in terms of time spent, having attended over 100 hours of faculty training sessions. Surprisingly, she was not the university faculty member with the most hours!

Graduate assistants gain teaching experience through working initially as tutors in the Mathematics Success Center, which gives them time to learn our system and the needs of NMSU students. This is important, especially for foreign students who come from much different educational systems. After one or more

semesters as a tutor, they teach their own courses, albeit with supervision by a course coordinator.

During the summer of 2006 Jerry Lodder completed an impact study of the NSF grant "Teaching Discrete Mathematics via Original Historical Sources," tracking the performance of all undergraduates who completed a discrete mathematics course with historical projects. In the subsequent 167 math courses taken by these students, their performance was equal or better than the course mean GPA is 111 cases, i.e., about 66% often, with 64% scoring above the mean GPA. For undergraduates who completed a computer science course with projects, tracking their performance in all 185 subsequent computer science courses reveals that the project cohort scored equal or better than the mean GPA in 118 cases, i.e., 64% often, with 62% scoring above the mean GPA.

3.2. Working with Teachers

The department has several educational projects which involve working with public school teachers. Doug Kurtz, Pat Morandi, Bruce Olberding, Ted Stanford, Tony Wang, and Linda Zimmerman, along with ten members of the College of Education, through the large, collaborative state-funded grant, Mathematically Connected Communities, lead a nationally recognized, statewide effort to improve middle school mathematics education in New Mexico. Mathematics faculty work with educators to design and conduct intensive summer academies for middle school teachers, and we continue to work with these teachers closely throughout the year. This grant has been funded by the New Mexico Public Education Department, receiving over $2,000,000 for the past three years. The group is in process of applying for further funding from the Public Education Department.

Susana Salamanca-Riba is the PI for a $200,000 Mathematical Sciences Partnership award from the Institute for Advanced Study/Park City Mathematics Institute to help Las Cruces and Gadsden middle and high school teachers improve their mathematical knowledge and study the effect of their teaching practices on student learning. The program also provides funds for teachers to attend a three-week summer workshop in Park City.

Ted Stanford is working with members of the College of Education, University Communications, and the Digital Media Lab on a grant, funded by the Ohio Board of Regents, to use emergent technologies, particularly handheld devices such as iPods, as supplemental instructional aids for mathematics at the middle school level.

Our department, along with the College of Education, has contracted with Gadsden Independent School to offer a Masters of Arts in Teaching for a cohort of elementary, middle and high school teachers. Each semester, the teachers take one mathematics course and one education course. The mathematics course is co-taught by Maribeth Olberding and another faculty member. So far, Pat Morandi, Bruce Olberding, and Linda Zimmerman have co-taught a course, and Tony Wang will co-teach a course in Spring 2007. The program will be finished at the end of the Summer 2007 session.

Over the last several years, our department has designed and offered courses for an online Master's of Arts in Teaching Mathematics degree, in collaboration with the College of Education, designed for middle school teachers. Dave Finston, Doug Kurtz, Tony Wang, and Linda Zimmerman have each taught a course in this program. The department is working with members of the College of Education to improve this program, and to consider helping to create a statewide MAT program.

3.3. Undergraduate and Graduate Programs

In Fall 2006 the department had 64 mathematics majors and 27 supplementary majors. Our major is overseen by the department's Majors and Minors Committee, headed by Caroline Sweezy. The committee conducts student advising and supervises our course offerings. In addition, it recommends students for departmental scholarships. The department contacts students performing well in classes to encourage them to become mathematics majors. They receive letters encouraging them to discuss the major with Pat Morandi. Furthermore, to further encourage students to consider a mathematics major, we give complimentary copies of general audience mathematics books to encourage their interest in mathematics and to show our interest in their education. The department supports a chapter of the national mathematics honor society, Pi Mu Espilon. It organizes meetings of the group for interested students to encourage students to consider our major. For the last two years, we have obtained private funding from Harris Corporation to sponsor a Mathematics Modeling team to compete in the two COMAP competitions. Tiziana Giorgi and Mary Ballyk organize the teams.

Enrollment in our graduate program reached 48 students, thanks to a large group of 20 entering graduate students this fall. Because of efforts by David Finston, we are one of only two universities in the nation to obtain a commitment from the Sloan Foundation to fund fellowships for minority mathematics graduate

students. Currently we have 3 graduate students who have received this highly prestigious $30,000 Sloan Foundation award, and another will arrive in Spring 2007. In addition, we have one student supported through the Bridge to the Doctorate Fellowship. The graduate program is overseen by the department's Graduate Committee, headed by John Harding. The duties of the committee include making recommendations on admissions and the granting of graduate assistantships, organizing the comprehensive examinations, and advising. John has worked enormous hours on this committee, and has instituted several good changes, some of which have resulted in the department doing better advising, and predicting which graduate courses will have sufficient enrollment. In 2006 the department awarded 4 Ph.D. and 6 M.S. degrees.

3.4. Outreach

The department's primary teaching responsibility is for courses taken by majors of other departments in the college and the university. Therefore, it is important for the department to maintain good relations with the rest of the university and to cooperate with other departments to meet the needs of their students. The department maintains two committees, the Liaison Committee and the Dona Aña Liaison Committee, to maintain our ties to the university and to the Dona Aña Community College. Members of the department have been working closely with faculty at the Dona Aña Community College on the revision of our precalculus courses. In addition, Shakir Manshad, one of their faculty, taught Math 120 in the fall at both the community college and for our department, and will teach for us again in Spring 2007.

In the fall, through requests from faculty in the Colleges of Business and Agriculture, members of the department have been working to create an upper division course in applied mathematics for students in these colleges. Lolina Alvarez, Christina Mariani, and Amal Mostafa have been meeting with members of the two client colleges in order to design the course in order to satisfy the needs of their students.

4. Research and Other Scholarly Activities

Members of the department were very productive researchers. The tenure track faculty had a total of 45 papers published, 50 papers accepted, and 41 papers submitted. In addition, three textbooks authored by faculty members were published

and 3 were accepted for publication. Faculty members gave a total of 65 talks at conferences or other universities. In addition, both Roger Beck and Chris Stuart had papers published or accepted this year.

Faculty members continued to receive external funding to support their research. Jens Funke, Tiziana Giorgi, Martin Krupa, and Susana Salamanca-Riba were supported with funding from the NSF. Robert Smits was supported by the National Security Agency. Joe Lakey and Hung Nguyen were supported by the Los Alamos National Labs. Mary Ballyk, Elizabeth Gasparim, Tiziana Giorgi, and Christina Mariani were supported by NSF-ADVANCE grants. Mai Gehrke received funding from Oxford University and the Technical University of Denmark to support her leave in the fall. Martin Krupa received funding from the Dutch Science Foundation to support his leave in Spring 2007.

The department also received funding to conduct educational projects. The Mathematically Connected Communities, consisting of Doug Kurtz, Pat Morandi, Bruce Olberding, Tony Wang, and Linda Zimmerman, in collaboration with members of the College of Education, has received approximately $2,200,000 in funding. Susana Salamanca-Riba has been receiving support from the Park City Mathematics Institute, and received a $100,000 award this year. Ted Stanford and members of the College of Education received funding to provide supplemental mathematics content to middle school children using emerging technologies.

Many faculty received travel money to support their research. Adam Sikora was funded to work with Derek Robinson of the Australian National University and Tom ter Elst of the University of Auckland. Jens Funke was supported by the Forschungsinstitut für Mathematik for two one-week visits to the Swiss Federal Institute of Technology in Zurich and also received funding to visit the University of Maryland and the University of Cologne. Pat Morandi was supported for a month's stay at the University of Artois in Lens, France. Guram Bezhanishvili received support from the University of Amsterdam, and the Georgian Academy of Sciences to conduct research in modal logic. Elizabeth Gasparim received support for summer visits to Stanford University and the University of Münster. Lolina Alvarez was supported by the Sociedad Matematica Mexicana to give an invited talk to the annual meeting of the Sociedad Matematica Mexicana.

Several faculty members are involved in organizing research conferences. Mai Gehrke is co-organizing a conference in Oxford, UK, in Summer 2007 and is on the program committee for a conference to be held at Vanderbilt University in Summer 2007. David Pengelley is a co-organizer of the international conference on complex cobordism in homotopy theory, to be held in March 2007 at the

Johns Hopkins University. Guram Bezhanishvili is chair of the program committee of the Oxford conference. Hung Nguyen is on the program committee for six international conferences, to be held in Canada, France, the United Kingdom, Taiwan, and China.

The department sponsors a weekly colloquium and several weekly seminars. The colloquium series included 25 lectures, presented by 19 visitors (plus panel) and 6 speakers from NMSU. Most of the speakers from other institutions visit the department to collaborate with our faculty on their research. One speaker, Igor Vasiliev, comes from the Physics Department of NMSU. The department runs seminars in algebra, analysis, applied mathematics, lattice theory, statistics, and topology. Two students have organized a seminar given by and for graduate students. Most faculty and many graduate students attend at least one of the seminars.

There are several faculty who do research on interdisciplinary projects. Ernie Barany and Mary Ballyk are working with a group in the Biology department to develop undergraduate research opportunities and a program of study at the interface of the mathematical and life sciences. Marcus Cohen's research on unified field theories has been published in Physics-oriented journals. Mai Gehrke collaborates with others at the intersection of mathematics and computer science and, along with Hung Nguyen, is working with Jack Wright of the Geography Department on a LANL-funded project. Martin Krupa works with bioengineers at the University of Twente and a neuroscience research lab in the Netherlands. Joe Lakey is working with faculty in the Electrical and Computer Engineering Department on his DARPA grant through LANL. Christina Mariani collaborates with faculty in Computer Science, Finance, Industrial Engineering, and Physics, on a variety of problems. Finally, a large group of faculty are working with the College of Education on several projects involving both teacher training and education of elementary school students.

5. Professional Service Contributions

The department provides service to the university, the state, and the mathematical community in several ways. Lolina Alvarez serves on the Steering Committee of NM-AGEP, the Recruitment Committee for the NSF-ADVANCE program, the Faculty Affairs Committee, and the committee to oversee and coordinate the first year experience at NMSU. Christina Mariani is a member of the Faculty Senate. John Harding serves on the Graduate Council and the College Curriculum and Ed-

ucation Policies Committee. Doug Kurtz was on the College Planning and Budget Committee, the Ralph B. Crouch Memorial Board Committee, and the Foundations of Excellence Philosophy Team. Joe Lakey is on the Faculty Salary Appeals Board and was recently appointed to the University Appeals Board. Bruce Olberding sat on the Selection Committee for the College's Faculty Achievement Awards. Robert Smits was a member of the Foundations of Excellence Diversity Committee. Caroline Sweezy served on the College Improvement of Instruction and Student Relations Committee. Pat Baggett, Dave Finston, Doug Kurtz, and Hung Nguyen each serve as an outside member of the Tenure and Promotion Committee for a Arts and Sciences department. Several faculty, including Lolina Alvarez, Doug Kurtz, and Pat Morandi, are mentors for the NSF-Advance mentoring program, and several departmental members participate as mentees.

Faculty members contribute to the profession and to the community in many ways. Ted Stanford serves on The New Mexico Mathematics and Science Advisory Council and the Mathematics Planning Committee of the New Mexico Public Education Department. Lolina Alvarez, Guram Bezhanishvili, John Harding, Christina Mariani, and Ross Staffeldt are all editors of research journals. Robert Smits is the department's liaison to the Mathematical Association of America and is the representative to the Rocky Mountain Mathematics Consortium. Lolina Alvarez, Pat Morandi, and Tony Wang were judges for the NMSU Graduate Research Symposium in the spring.

6. Community Service and Relations

Pat Baggett teaches mathematics courses for education majors as partnership courses. Local K-12 teachers sign up for a graduate level version of the courses, and the teachers partner with and mentor the undergraduates, who observe, co-teach, and teach alone in the teachers' classrooms. Other instructors of Math 111 and Math 112G, including Elaine Cohen, Maribeth Olberding, James Slack, and Laura White-Hosford, have their students help out in public schools.

Members of PSL have created an open source program, the "EduApp Developer's Kit". Its purpose is to enable NMSU undergraduates to respond to requests from K-12 teachers for custom technology which can complement their instruction. Undergraduates would then partner with a local teacher to take a teacher's needs and turn it into a web-based computer application for the teacher's students to use. Pat Morandi met with the program's leader Charles Cosse to discuss getting mathematics majors involved in the program.

Pat Baggett is working with members of the Science Education Alliance to initiate a program of student outreach in schools for mathematics, similar to one for science. The program will have undergraduates volunteer to help in mathematics classes in the Las Cruces public schools. This will give teachers additional help in their classrooms and give students experience in working with children on mathematics.

Several faculty members work with students in local schools. Dave Finston organizes and runs a weekly mathematics club for 6th, 7th, and 8th graders at the Las Cruces Catholic School. Robert Smits gave a presentation of his research and of the mathematics major to a group of more than 100 high school students from El Paso. In addition, he teaches a weekly mathematics class at Hillrise Elementary School. In spring, Ted Stanford taught a weekly math lesson for the 3rd and the 5th grade class at Hillrise Elementary, and in fall, he is teaching a weekly math lesson for the 4th grade at Hillrise.

Several faculty served as judges for various contests. Lolina Alvarez was head judge in the Southwestern NM regional science and engineering fair. Christina Mariani, Pat Morandi, and Tony Wang each judged for the Graduate Research and Arts Symposium. Christina also judged at the New Mexico Mesa Competition.

Pat Baggett and her students taught math to a group of 7th graders from Gadsden Middle School and a group of 8th graders from Santa Teresa Middle School, while the students were visiting NMSU on a field trip. In addition, three times in spring she taught mathematics to a group of students who took field trips to NMSU.

Elizabeth Gasparim coordinated presentations about the department by faculty and students to high school students on visitor's day.

Susana Salamanca-Riba works with a group of teachers from Gadsden, Oñate, and LC High School on the program "Lesson Study". Teachers get together to design a lesson which will help them reflect on their classroom practices, focussing on student thinking and understanding of the mathematics. They observe one of the teachers teach the lesson, then get tog ether to revise the lesson. They then observe another teacher teach it, and then revise it and write it up as a resource for other teachers.

Ted Stanford participated in the New Mexico mathematics textbook adoption meetings in June, to help schools with the selection of classroom materials. He also works regularly with middle school teachers, and conducts enrichment workshops, as part of his work on the Mathematically Connected Communities project. He is also serving on the New Mexico Mathematics and Science Advisory

Council to work with the New Mexico Public Education Department to implement recommendations which came out of a town hall meeting in November 2005.

With the support of a minigrant from the Information Science and Security Systems Research Cluster, Dave Finston taught a summer institute for high school students on cryptography and coding theory. A middle school mathematics teacher served as his teaching assistant and earned credit toward the Master of Arts in Teaching Mathematics degree.

Jens Funke gave a lecture on cryptography for Mathematics Awareness Month in April. This talk was well attended, nearly filling Science Hall 102, and introduced the audience to some nice applications of number theory. At the end of his talk, he gave a nice advertisement to the department's programs. Many students were in the audience, and several signed up for the department's Supplementary Major in Applied Mathematics as a result of their interest in the talk.

The department has an active charter of the national mathematics honor society Pi Mu Espilon. The department organizes meetings, which typically consists of a combination of a mathematical activity, such as a talk, together with a social gathering. Students have an opportunity to meet and to talk to other mathematics students and departmental faculty.

The department organizes students to form Mathematics Modeling Teams. The Consortium for Mathematics and its Applications (COMAP) runs two annual contests of interest to undergraduate students. The Mathematics Contest in Modeling is designed to stimulate and improve problem-solving and writing skills. The Interdisciplinary Contest in Modeling is designed to develop and advance interdisciplinary problem-solving skills as well as competence in written communication. Tiziana Giorgi and Mary Ballyk prepared two teams to compete in these two exams. They were successful in obtaining sponsorship from the Harris Corporation for the team.

7. Outcomes Assessment Activities

7.1. Undergraduate Outcomes Assessment Activities

1. Does the student display the ability to understand definitions and use them in appropriate situations?

2. Does the student display the ability to complete explicit calculations and derivations?

3. Can the student clearly express a written mathematical argument?

4. Does the student display the ability to apply theoretical knowledge to solve problems?

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.)

Results of Assessment Activities The department received the Outcomes Assessment Committee Report for 2004-2005 in January, 2007. The report listed our undergraduate program at stage 3, meaning we are using the results of student learning outcomes assessment to change/improve the academic program, and are rated "Yes" under assessing learning. The report gives the following description of our assessment program.

Was an Outcomes Assessment Plan Included: *Yes*

Does the department's Outcomes Assessment Progress Report indicate that direct measure of student learning were examined: *Yes*

Brief Description of the direct and indirect student learning outcomes measured: *Assessment of student learning accomplished through assessment questionnaire completed by faculty for declared majors. Also, exit interviews are used.*

Comments about Outcomes Assessment Measures examined in the department: *The survey questionnaire is well designed and is comprehensive in assessing the breadth and depth of the curriculum.*

Outcomes Assessment Stage Description: *Using the results of student learning outcomes assessment to change/improve the academic program.*

Comments about the Outcomes Assessment Stage Assigned: *Implementation stage is the same as previous year.*

General Comments and Suggestions for Continued Improvement in Outcomes Assessment: *The department is using a very comprehensive approach to OA. The student exit interview could be improved by adding a Likert scale to questions 6-8 as well as querying which courses most impacted in developing the specific skill.*

Based on these responses, we will consider revising our exit interview in order to get better information about our undergraduate program.

7.2. Graduate Outcomes Assessment Activities

The department asks all faculty teaching graduate students to answer the following questions about each graduate student in their course:

1. What is this student's learning ability (average, above average, below average, barely keeping up with the course, going beyond the course)?
2. Can this student express a mathematical argument?
3. Motivation of this student: for the course: for mathematical sciences:
4. In your opinion, can this student complete a Ph.D. thesis?

Results of Assessment Activities The Outcomes Assessment report listed our graduate program at stage 3, meaning we are using the results of student learning outcomes assessment to change/improve the academic program, and are rated "Yes" under assessing learning. The report gives the following description of our assessment program.

Was an Outcomes Assessment Plan Included: *Yes*

Does the department's Outcomes Assessment Progress Report indicate that direct measure of student learning were examined: *Yes*

Brief Description of the direct and indirect student learning outcomes measured: *1. Master oral exam assessment. 2. Ph.D. comprehensive exam assessment. 3. Ph.D. final oral exam assessment. 4. Fall/Spring semester graduate student performance evaluation in course work.*

Comments about Outcomes Assessment Measures examined in the department: *Assessment instruments too general, specific learning objectives need to be identified.*

Outcomes Assessment Stage Description: *Using the results of student learning outcomes assessment to change/improve the academic program.*

Comments about the Outcomes Assessment Stage Assigned: *Implementation stage is the same as previous year.*

General Comments and Suggestions for Continued Improvement in Outcomes Assessment: *Next years report should include specific details of the coursework performance evaluations, such as questions and quantitative and qualitative data.*

Based on this information, we will consider making more specific assessment instruments and identifying student learning objectives. We will also look into evaluating our coursework in more detail.

8. Computing Facilities

The department has a serious computer network infrastructure. We operate two undergraduate student labs, in Science Hall 118 and in Walden Hall, which have 34 and 27 personal computers, respectively. We also operate a graduate student lab with 10 machines. Furthermore, we have a portable cart containing 30 laptops which can be used in classrooms. For instructor use we have 3 carts each with a laptop and projector. Finally, the department has approximately 100 computers in faculty and graduate student offices, and the department office. All told, we have over 200 computers in the department connected to the department's networks. These networks allow students in our classes access to the computer labs and give instructors and students convenient ways to share files. The student labs are used for students in a wide range of courses, including calculus, linear algebra, and elementary mathematics for teachers.

In spite of the department losing the Computer Manager position, its systems have been maintained well by Min Li, who effectively took over the Computer Manager position without being reclassified into the position. He has also been taking care of the computer needs of the Department of Psychology through an agreement between the two departments to pool resources, after both departments lost Computer Manager positions. This agreement allowed the department to upgrade Megan Townsend's position, and she is working as an assistant to Min, along with creating and maintaining the web pages of both departments. The Computer Operations Group is also staffed by several student employees, who aid Min in the daunting task of keeping the computers and the network running.

9. Advanced Degrees Awarded in 2006

Name	Degree
Moh'd Yasein	Ph.D.
Lloyd Moyo	Ph.D.
Baokun Li	Ph.D.
Hamed Obiedat	Ph.D.
Matej Danter	M.S.
T. J. Machado	M.S.
Santi Tasena	M.S.
Sarah Holden	M.S.
Uyen Pham	M.S.
Jea Pil Cho	M.S.

10. Publications Appearing in 2006 or late 2005

Josefina Alvarez

- Personal recollections in honor of the mathematician Mischa Cotlar, appeared in the Notices of the Argentinean Mathematical Union, Vol. 39, July 2006.

- Column *?'Qué pasaría si...?* (What if ...?), a regular feature of the electronic journal *Matematicalia* (http://www.matematicalia.net), published five times a year by the Spanish Royal Mathematical Society with the support of the Spanish Department of Science and Technology.

Ernest Barany

- Golinski, M., E. Barany and M. Ballyk, "Ecological conditions that favor the evolution of intermediate virulence in an environmentally transmitted parasite", *Journal of mathematical biology,* **51**(4), pp. 389-402, October, 2005.

- Ball, Steven, Kevin Wedeward, Ernest Barany and Steve Schaffer, "A reduced generator model with excitation limits", Proc. LASTED Conference on Power and Energy Systems, Marina del Rey, CA, pp. 100-105, October 2005.

- Ball, Steven, Ernest Barany, Steve Schaffer and Kevin Wedeward, "Control of singularly perturbed power flow network model using feedback linearization", Proc. LASTED Conference on Circuits, Signals and Systems, Marina del Rey, CA, pp. 20-25, October 2005.

- Barany, E. and m. Krupa, "Stability of multiple access network control schemes with carrier sensing and exponential backoff", **Physica A 363**(2), pp. 573-590, May 1, 2006.

Guram Bezhanishvili

- G. Bezhanishvili and Revaz Crigolia, *"Locally finite varieties of Heyting algebras", Algebra Universalis,* **54** (2005), pp. 465-473.

- G. Bezhanishvili, I., Esakia, D. Gaelaia, *"Some results on modal axiomatization and definability for topological spaces",* Studia Logica, **81** (2005), pp. 325-355.

- *"The algebra of topology: new directions",* Abstracts of the XIII Latin American Symposium on Mathematical Logic, Oaxaca, Mexico, 2006, p. 36.

Jens Funke

- *Traces of CM values of modular functions*, joint with J. Bruinier (University of Cologne, Germany), Journal für die Reine und Angewandte Mathematik (Crelle's Journal) **594**, 1-33 (2006).

- *Cycles with local coefficients for orthogonal groups and vector-valued Siegel modular forms*, joint with J. Millson (University of Maryland), American Journal of Mathematics **128**, 899-948 (2006).

Mai Gehrke

- Generalised Kripke semantics, special issue '40 years of possible world semantics', part II. *Studia Logica* **84**, 245-279 (2006).

- Canonical extensions and relational completeness of some substructural logics, with Michael Dunn and Alessandra Palmigiano, *J. Symb. Logic* **70** no. 3, 713-740, 2005.

- MacNeille completions and canonical extensions, with John Harding and Yde Venema, *Trans. of Amer. Math. Soc.* **358** no. 2, 573-590, 2005.

Tiziana Giorgi

- with R. G. Smits, Eigenvalue Estimates and Critical Temperature in Zero Fields for Enhanced Surface Superconductivity, Z. angew. Math. Phys., Vol. 57, pp. 1-22, 2006.

- with R. G. Smits, Monotonicity results for the principal eigenvalue of the generalized Robin problem, Illinois J. Math., Vol. 49, No. 4, pp. 1133-1143, Winter 2005.

John Harding

- "Orthomodularity of Decompositioins in a Categorical Setting", *The International J. of Theoretical Physics,* Volume 45, Number 6, June, 2006, 1117-1128.

Maciej Krupa

- E. Barany and M. Krupa, Stability of multiple access network control schemes with carrier sensing and exponential backoff, *Physica A* Volume 363, Issue 2, 573-590 (2006).

- M. Brøns, M. Krupa and M. Wechselberger. Mixed mode oscillations due to the generalized canard phenomenon. *Fields Inst. Comm.* **49**, 39-64 (2006).

- M. Krupa, W. Poth, A. Steindl, W. Steiner, H. Troger and G. Wiedermann, Modelling, dynamics and control of tethered satellite systems. *Nonlinear Dynamics* **43**: 73-96 (2006).

Joseph D. Lakey

- J.A. Hogan and J.D. Lakey, Periodic Nonuniform Sampling in Shift Invariant Spaces, in "Harmonic Analysis and its Applications: In Honor of John J. Benedetto," C, Heil, ed., Birkhauser, Boston, 2006, 253-288.

- J.A. Hogan and J.D. Lakey, On uncertainty bounds and growth estimates for fractional Fourier transforms, Applicable Analysis 85 (2006), 891-899.

- J.A. Hogan and J.D. Lakey, Hardy's theorem and rotations, Proc. Amer. Math. Soc. 134 (2006), 1459-1466.

Jerry Lodder

- Lodder, J., Knoebel, A., Laubenbacher, R., Pengelley, D., *Mathematical Masterpieces: Further Chronicles by the Explorers*, Springer Verlag, New York, 300 page book in press 2006.

- "Researches on the Curvature of Surfaces," (translation), The Euler Archive, Klyve D. Stemkoski, L. (eds.), Enestrom 333 (2006), 1–10.

Maria Mariani

- A general RLC system with complex values. P. Amster, M.C. Mariani and J. Zilber. Applicable Analysis 5, 10 (2005) 1-12.

- Analysis of Intermittence, Scale Invariance and Characteristic Scales in the Behavior of Major Indices near a Crash. M. Ferraro, N. Furman, Y. Liu, M.C. and D. Rial. Physica A, 359, (2006) 576.

- A new Analysis of Intermittence, Scale Invariance and Characteristic Scales applied to the Behavior of Financial Indices near a Crash. Maria Cristina Mariani and Yang Liu. Physica A 367 (2006) 345-352.

- Nonlinear boundary conditions for elliptic equations. P. Amster, M.C. Mariani, O. Mendez. Electronic Journal of Differential Equations. Vol. 2005(2005), No. 144, pp. 1-8.

- Truncated Levy walks applied to the study of the behavior of Market Indices. M. P. Beccar Varela, M. Ferraro, S. Jaroszewicz, M.C. Mariani. Proceedings of the South Central SAS Users group, 15th Conference, 2005, San Antonio, Texas.

- La matematica financiera y el nacimiento de una nueva disciplina. M. C. Mariani. Matematicalia, Vol. 2, 2 April 2006.

Patrick Morandi

- Profinite completions and canonical extensions of Heyting Algebras (with G. Bezhanishvili, M. Gehrke, and R. Mines), Order 23 (2006), 143-161.

Hung Nguyen

- A Text Book " *An Introduction to Random Sets*" , Chapman and Hall/CRC, 2006.
- A Research Monograph " *Fundamentals of Statistics With Fuzzy Data*" (co-authored with Berlin Wu), Springer-Verlag, 2006.
- A Text Book "*A First Course in Fuzzy Logic*" (co-authored with Elbert Walker), Revised an Expanded Version,Third Edition, Chapman and Hall/CRC, 2006.
- On modeling perception-based information for intelligent technology (December 2005), *Journal of Taiwan Intelligent Technologies and Applied Statistics* , 3 (2), 25-43.
- On foundations of fuzzy theory for soft computing (2006), *International Journal of Fuzzy Systems* 8(1), 39-45.
- Which fuzzy logic is the best : Pragmatic approach and its theoretical analysis (2006), co-authored with Vladik Kreinovich, *Fuzzy Sets and Systems* (157), 611-614.
- A note on random upper semicontinuous functions (2006), co-authored with Y. Ogura, S. Tasena and H. Tran, in *Soft Methods for Integrated Uncertainty Modeling Conference*, Springer-Verlag (edited by J. Lawry et al), Proceedings of the International Conference on Soft Methods in Probability and Statistics, Bristol, UK, September 2006, pp. 129-135.

Bruce Olberding

- "Holomorphy rings of function fields," in the volume Multiplicative Ideal Theory in Commutative Algebra, 331-348, Springer-Verlag, 2006.
- "The minimal number of generators of an invertible ideal," with Moshe Roitman, in the volume Multiplicative Ideal Theory in Commutative Algebra, 349-368, Springer-Verlag, 2006.
- "Commutative ideal theory without finiteness conditions: completely irreducible ideals," with Laszlo Fuchs and William Heinzer, Transactions of the American Mathematical Society, 358 (2006), no. 7, 3113-3131.

- "Commutative ideal theory without finiteness conditions: irreducibility in the quotient field," with Laszlo Fuchs and William Heinzer, in Abelian groups, rings, modules, and homological algebra, 121-145, Lecture Notes in Pure and Applied Mathematics, 249, Chapman & Hall/CRC, Boca Raton, FL, 2006.

- Coeditor with James Brewer, Sarah Glaz and William Heinzer of the book, Multiplicative Ideal Theory in Commutative Algebra, Springer-Verlag, 2006.

David Pengelley

- *Did Euclid need the Euclidean algorithm to prove unique factorization?* (with Fred Richman), American Mathematical Monthly **113** (2006), 196-205.

- *A project in algorithms based on a primary historical source about Catalan numbers* (with I. Pivkina, D. Ranjan, K. Villaverde), Special Interest Group in Computer Science Education, Association of Computing Machinery, Proceedings of the Thirty-Seventh SIGCSE *Technical Symposium on Computer Science Education*, a refereed national conference, 37 (2006), p. 318 ff.

- *A multi-week project on mathematical induction and combinatorics for university students, based on Pascal's Traité du Triangle Arithmetique*, abstract published of presentation in the *Mini-Workshop on Studying Original Sources in Mathematics Education*, Oberwolfach Report No. 22/2006, Mathematicsches Institut Oberwolfach, 2006.

Adam Sikora

- F. M. ter Elst, Derek W. Robinson, Adam Sikora and Yueping Zhu, Dirichlet forms and degenerate elliptic operators. Partial Differential Equations and Functional Analysis. Birkhauser.Philippe Clement Festschrift. Operator Theory: Advances and Applications, vol. 168 (2006), 73–95.

Robert Smits

- with T. Giorgi, Eigenvalue Estimates and Critical Temperature in Zero Fields for Enhanced Surface Superconductivity, Z. angew. Math. Phys., Vol. 57, pp. 1-22, 2006.

- with T. Giorgi, Monotonicity results for the principal eigenvalue of the generalized Robin problem, Illinois J. Math., Vol. 49, No. 4, pp. 1133-1143, Winter 2005

- with R.D. DeBlassie "Brownian Motion in Self-Similar Domains" Bernoulli 12 (2006) , no. 1, pg 113-132.

Theodore Stanford

- As part of a series of workshops for middle school teachers, Ted and his MCC colleagues put together packets of classrooms lessons. They designed some of them ourselves, and adapted some from other sources. They did about nine of these altogether—an Algebra packet, a Geometry packet, and a Data and Probability packet for each grade level 6–8.

- He collaborated with Kristin Umland of the Mathematics Department at UNM on a Lesson Study experiment, where the "students" in the study were inservice teachers. Lesson Study is a protocol that originated in Japan, but is being used increasingly in the U.S. to improve student learning in public schools. Dr. Umland and Ted are interested in adapting this protocol for use as a tool in analyzing and improving professional development of math teachers. They taught a lesson at the annual meeting of the New Mexico Council of Teachers of Mathematics in November 2006. They had learners and observers, and after the lesson they discussed carefully what had gone well and what had not gone well. Then they modified the lesson and taught it again the next day to a different group of teachers, again with observers present. They are going to continue this experiment in June 2007, at a meeting in Taos of teachers and teacher educators from all over New Mexico.

- As part of his work with the Matrix grant, he wrote a framework for teaching fractions, ratios, and proportions to middle school students. This framework is being used for product development by their partners in Ohio, Kansas, and California.

Caroline Sweezy

- "The maximal function on spaces that lie between L^∞ and BMO" Proceedings of WSEAS International Conference on Applied Mathematics, Dallas, Texas, Nov., 2006.

- "Rearrangement invariant sets related to subspaces of BMO" , WSEAS Transactions on Mathematics, Issue 2, Volume 6, February, 2007.

11. International Activities 2006

Josefina Alvarez

- Most of her collaborators work at institutions outside the U.S.
- Regularly reviews and referees papers for foreign journals.
- Editor of *Matematicalia* (http://www.matematicalia.net), electronic journal published by the Spanish Royal Mathematical Society with the support of the Spanish Department of Science and Technology.
  - In charge of the column "*ˆ?Qué pasaría si...?* (What if ...?) that explains the mathematics behind the answers to very simple minded questions.
- Editor of *The Rocky Mountain Journal of Mathematics*, and is in frequent contact with authors and referees who work at foreign institutions. Presently is handling submissions and references from mathematicians working at insituttions in 12 countries.
- Liaison Argentinean Mathematical Union. She communicates regularly with the members residing in the U.S. and collects the membership dues.

Patricia Baggett

- Baggett, P. & Ehrenfeucht, A. A New University Course: Calculus with Hands-on Applications for teachers. Accepted for presentation at SIPEMAT, International Research Symposium in Mathematics Education, Federal University of Pernambuco, Recife, Brazil, July 2006.

Guram Bezhanishvili

- At the Amsterdam-London Workshop on Modal Logic (16 March, 2006, University of Amsterdam, Amsterdam, The Netherlands), he gave an invited lecture "Completions and compactifications", 16 March, 11:30-12:30.

- An associate editor of Studia Logica, an International Journal for Symbolic Logic.
- A program committee member of Advances in Modal Logic 2006, a premier conference in modal logic.
- A steering committee member of an international conference series Algebraic and Topological Methods in Non-classical Logics.
- In collaboration with Johan van Benthem of University of Amsterdam, The Netherlands, and Stanford University, Palo Alto, California, they completed an invited chapter "Modal logics of space" for the Handbook of Logics of Space. The handbook will be published in 2007 by Kluwer Academic Publishers.
- Was invited to be the second reader of the chapter by Steven Vickers of The Open University, United Kingdom, for the same handbook. He was an invited speaker at the Amsterdam-London Workshop on Modal Logic, University of Amsterdam, Amsterdam, The Netherlands, 16 March, 2006.
- Collaborating with Silvio Ghilardi of Milan University, Italy.
- Collaborating with Ramon Jansana of University of Barcelona, Spain.
- Collaborating with Johan van Benthem, Dick de Jongh, and Balder ten Cate of University of Amsterdam, The Netherlands.
- Collaborating with Alexander Kurz and Nick Bezhanishvili of University of Leicester, United Kingdom.
- Collaborating with Leo Esakia, Revaz Grigolia, and David Gabelaia of Georgian Academy of Sciences, Georgia.

David Finston

- Invited speaker at the International Conference on Polynomial Automorphisms, Hanoi, Vietnam, 2006
- Conducts joint research with Stefan Maubach, a mathematician from the Netherlands.

- Was an invited speaker at the International Conference on Polynomial Automorphisms in Hanoi, October, 2006. Several contact he made there are likely to result in collaborative research projects.

Jens Funke

- Research visits at international institutions:
  - Forschungsinstitut für Mathematik (FIM), Zurich, Switzerland, June 2006, November 2006 (one week each). Collaboration with Prof. Imamoglu. Funded by FIM
  - University of Cologne, July 2006 (one month). Collaboration with Prof. Bruinier. Funded by NSF-grant
  - International Graduate College, Humboldt University, Berlin/Germany, July 2006 (one week). Discussions with Profs. Kramer and Kühn. Funded by Humboldt University
- Seminar lectures:
  - Number Theory Seminar, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland, June 2006
  - Lecture, Siegen University, Germany, June 2006
  - Colloquium, Hanover University, Germany, July 2006
  - Arithmetic Geometry Seminar, Humboldt University Berlin, Germany, July 2006.

  All visits were funded by the respective host institutions
- Conferences and Workshops
  - *Aachen-Cologne-Lille-Siegen Seminar on Automorphic Forms*, Cologne, Germany, June 2006: attendance. Funded by NSF-grant as part of his visit of Prof. Bruinier
  - Workshop on *Recent developments in the arithmetic of Shimura varieties and Arakelov Geometry*, Centre de Recerca Matèmatica, Bellaterra, Spain, July 2006: attendance. Funded by organizers.

Elizabeth Gasparim

- Speaker in the international conference of Resolution of Singularities at the international Centre for Theoretical Physics, Trieste, Italy.
- Speaker at international seminars/coloquia in: Münster (Germany), Bonn (Germany), Berlin (Germany), Stanford (USA).

Mai Gehrke

Conferences:

- Currently organizing an international conference, in collaborating with Hilary Priestely, Alxander Kurz and Nick Bezhanishvil. The conference will take place in Oxford, Uk, in August 2007.
- Is on the program committee of an international conference to be held in Nashville, USA, in June 2007.

Lectures:

- *Représentation concréte des algébres ordonnées*, LIAFA Automata seminar, Paris VII, May 2006
- *Generalized Kripke structures for substructural logics, seminar* of the PPS, Paris Vii, May 2006.

Tiziana Giorgi

- She was an invited participant to the Workshop on Singularities in PDE and the Calculus of Variations, Centre de Recherches Mathematiques, held in Montreal, Canada July 2006.
- She is a member of the Canadian Mathematical Society (CMS) and of the Canadian Applied and Industrial Mathemtics Society (CAIMS).

John Harding

- Member of the Council of the International Quantum Structures Association.

- Collaborates with a number of people from overseas, include Yde Venema from Amsterdam, Bob Coecke from Oxford, Issar Stubbe from Brussels, Paval Ptak and Mirko Navara from Prague, and Michael Roddy from Canada.

Martin Krupa

- May 2006: Roskilde University Center, Denmark, colloguim talk on "Mixed mode oscillations and applications to the model of a dopamine neuron".

- Hoping to establish a new collaboration Krupa visited Professors Osinga and Krauskopf at the University of Briston in the UK. This joint research will be numerical in nature and will advance Krupa's standing in the field by adding a numerical component to his work.

Jerry Lodder

- Continues to jointly work on Leibniz cohomology with Director of Research Jean-Louis Loday of the Pasteur Institute in Strasbourg, France, and is now expanding the theory to Hamiltonian vector fields and contact homology. Professor Loday is impressed with his most recent paper "Mapping Leibniz Homology to Cyclic Homology."

Maria Mariani

- Has been working with Professor M. Ferraro, and S. Jaroszewicz from the Physics Department of the University of Buenos Aires in Econophysics, and applications to Biology.

- Has been working with several Professors and researchers from the Department of Mathematics and the Physics Department of the University of Buenos Aires in Differential Equations, Econophysics, and applications to biology.

- Is working with Professor DeliaValles from the Department of Industrial Engineering, in the Analysis of evolution of temperature in semiconductors devices. They want to identify vortices, that could lead to magnetization phenomena as well as turbulence in the heat flux in each channel that could alter the heat transfer equations.

- Is an advisor of the following Ph.D. students at the University of Buenos Aires: M. De Leo and J.P. Borgna.

  - Dr. J.P. Borgna defended his Ph.D. dissertation on Solutions to Differential Equations arising in Physics during July 2006. She is currently working as a full-time instructor and researcher at the Department of mathematics, University of Buenos Aires. She worked with Dr. Borgna, and with his Co-advisor several hours per week to July 2006.
  - M. De Leop is working on his dissertation. She continues to work with him and with his Co-advisor about two hours per week during 2006.

Patrick Morandi

- In summer he spent a month at the Université of Artois in Lens, France conducting collaborative research with two of the mathematicians there.

Bruce Olberding

- Invited lecture: International Algebra Conference, Universita degli Studi di Padova, Padova, Italy, June 2006. Title: Colon and injective properties of ideals of integral domains, 50 minute lecture. He was one of 12 main speakers who gave 50 minute lectures at the conference. His expenses were paid by the conference organizers.

- Invited series of lectures: Workshop on Commutative Rings, Cortona, Italy, June 2006. Title: Representations of integrally closed domains as intersections of valuation rings, series of four 45 minute lectures. He was one of two main speakers who gave four 45 minutes talks. His room, board and other incidental expenses were funded by Istituto Nazionale di Alta Matematica, and his airfare was funded by an international travel grant from NMSU.

Hung Nguyen

- *Saga University, Japan* : January 8-12, 2006. Invited talk "The Lawson topology for upper semicontinuous random functions".

- *Departmental Statistics Seminar :* Speaker "Randomized confidence intervals", March 2006.

- *The Chinese University of Hongkong, Hongkong* : July 6, 2006. Invited talk "Decision-making in management problems".

- *National Chengchi University, Taipei, Taiwan* : June 22-25, 2006. Invited talks "Statistics with coarse data" and "Random upper semicontinuous functions".

- *Chon Buri University, Thailand* : June 29-30, 2006. Invited talk "Random fixed point theorems and set-valued analysis".

- *Southwest Sichuan University of Economics, China* : July 7, 2006. Invited talk "Data mining and related topics".

- *Beijing University of Technology, Beijing, China* : July 12-15, 2006. Invited talk "Random closed sets and Choquet theorem".

- Invited lectures and Seminars at: Chon Buri University, Thailand; National Chengchi University, Taiwan ; Southwest Sichuan University of Economics, China ; Beijing University of Technology, China; Macau University of Science and Technology, Macau; The Chinese University of Hongkong, Hongkong; Saga University, Japan.

- Member of program committee for : 2006 IEEE International Conference on Fuzzy Systems ,Vancouver, Canada, July 2006; International Conference on Soft Methods in Probability and Statistics, Bristol, UK, September 2006 ; General Chait of the Fifth International Conference on Information and Management Sciences, Chengdu, China, July 2006 ; International Conference on Information Processing and Management of Unicertainty, Paris, France, July 2006 ; First International Conference on Knowledge Management, Chiangmai University, Thailand, December 2006; Honoray Chair of the Seventh International Conference on Intelligent Technologies, Taipei, Taiwan, December 2006.

David Pengelley

- Co-organizer of the international conference on *Complex cobordism in homotopy theory: its impact and prospects*, March 2007 at the Johns Hopkins University, with National Science Foundation support.

- Continually updates and expands his website, *Teaching with Original Historical Sources in Mathematics*, which is the main international resource on this topic.

- *Mini-Workshop on Studying Original Sources in Mathematics Education*, mathematiches Institut Oberwolfach, Oberwolfach, Germany, April 30-May 6, 2006. Presented two-hour session on *A multi-week project on mathematical induction and combinatorics for university students, based on Pascal's Traité du Triengle Arithmetique.*

Susana Salamanca-Riba

- Attended the conference in Mumbai, India, Tata Institute of Fundamental Research in honor of Professor Parthasarathy's 60th Birthday. Lecture: 'On Representations with regular Infinitesimal Character and Parthasarathy's Dirac Operator Inequality'

- Have initiated a liaison between High School teachers in Las Cruces High School and a High school teacher in Chenai, India. She was Sloan Fellow visiting Las Cruces High School and is very interested in continuing interaction with teachers in Las Cruces.

Adam Sikora

- In Spring 2006 he visited the Australian National University as a Research Fellow where he collaborated with Derek Robinson from the Australian National University and Tom ter Elst from the University of Auckland. Papers were written.

- During his visit to Australia he collaborated with Thinh Duong form Macquarie University and with Michael Cowling from the University of New South Wales. Results were listed in a paper

Robert Smits

- Attended the 3rd Summer School in Analysis and Applied Mathematics at the University of Rome "Sapienza" from the 5th to the 9th of June 2006.

- Is working on a project in probability with Pedro Mendez-Hernandez of the University of Costa Rica.

- Reviewed numerous articles and discussed other activities for Bridges 2006 in London.

Ross Staffeldt

- Is one of the managing editors of a newly founded electronic journal, *Journal of Homotopy and Related Structures*. The founding editor and editor-in-chief is Hvredi Inassaridze of the Razmadze Mathematical Institute in Tbilisi, Georgia. The activities of the journal are supported by an editorial staff of 43 from countries in North America, South America, Europe, Asia and Australia. In 2006 the journal published about 400 pages. In 2007 they will explore ways to generate publicity for the journal and to forge links with other independent electronic journals, toward the ends of increasing the amount of material published.

Caroline Sweezy

- Third International Conference on Applied Mathematics, Plovdiv, Bulgaria, August 12 - 18, 2006. Gave a 30 minute talk on "Bounds for elliptic and parabolic gradients for Holder norms using g*-functions". Served as Chair of a 2.5 hour session at this conference.

Tonghui Wang

- Expert consultant, Business Data Mining Center of Southwestern University of Finance and Economics, China.

12. Interdisciplinary Activities 2006

Patricia Baggett

- Working with Prof. Ralph Preszler of the NMSU Biology Department on supplementary instruction in introductory biology.

Mary Ballyk

- Council of Research Centers Mini-grant Award: Her work with Dr. J. Cook (Electrical Engineering), Dr. M. Mitchell (Chemical Engineering), and Dr. I. Pivkina (Computer Science) is completely interdisciplinary. They are looking at the problem of predicting the execution time of scientific applications across computing platforms.

- UBM-Group: Undergraduate Mentoring in Mathematical Biology at New Mexico State University: she has worked, together with Dr William Boecklen (Biology), Dr. Ernest Barany (Mathematical Sciences), Dr. Avis James (Biology), Dr. Ralph Preszler (Biology), to develop undergraduate research opportunities and a program of study at the interface of the Mathematical and Life Sciences.

- In 2005 she wrote two-pages of input at the request of Dr. Dan Howard (Biology Department) as part of a two-million dollar grant proposal to the Howard Hughes Medical Institute. Her contribution focused on the need to improve Mathematics skills among life-science majors, and the various approaches the two departments might take. The grant was subsequently approved in the amount of $1,500,000.

Ernest Barany

- He considers virtually all of his teaching and research activities to be interdisciplinary. His research projects are in the areas of mathematical biology and control theory, and he teaches all applied math courses to audiences that always contain a substantial fraction of engineering and science students. Even the graduate courses he teaches (such as Math 531/2 and Math 586/686) always have students from outside the department. For example, his current Math 531 class contains 5 math students and 5 engineering students. A result of this exposure is that he sits on many graduate committees from other departments and colleges. Indeed, there are several professors who habitually send their graduate students to him as a prospective outside member. All told, he was on seven graduate committees from outside the department this year.

- More specifically, he is rather deeply involved with the research of a PhD student in EE (Olsen Rodrigues, advisor: Satish Ranade) and one in biology (Aysegul Birand, advisor: Dan Howard. Also, another biology student

(Michael Golinski, advisor: Bill Boecklen) worked with him before he graduated in Spring '06 to the extent that we were co-authors on a paper in Journal of Mathematical Biology.

- He am also involved in two interdisciplinary teaching grants:
  - The NSF-funded UBM grant in mathematical biology, continued from the
  - 2002-3 AY, and follow-up proposal (unfunded).
- The MESH grant with PIs D. Finston et al.

Roger Beck

- Served as a reviewer of two proposals submitted to USDA Business Development Program for funding.

Guram Bezhanishvili

- The NMSU mini-grant "Learning Discrete Mathematics via Historical Sources" with the Computer Science Department of New Mexico State University.
- The chapter for the handbook of Logics of Space that he has written in collaboration with Johan van Benthem of the Institute of Logic, Language, and Information (ILLC) of University of Amsterdam and Philosophy Department of Stanford University, Palo Alto, California.
- His collaboration with Dick de Jongh and Balder ten Cate of the Institute of Logic, Language, and Information (ILLC) of University of Amsterdam, Amsterdam, The Netherlands.
- His collaboration with Silvio Ghilardi of the Computer Science Department of Milan University, Italy.
- His collaboration with Ramon Jansana of the Philosophy Department of University of Barcelona, Spain.
- His collaboration with Alexander Kurz and Nick Bezhanishvili of the Computer Science Department of University of Leicester, United Kingdom.

- His collaboration with Revaz Grigolia of the Institute of Cybernetics, Georgian Academy of Sciences, Georgia.

Marcus Cohen

- Continues to nurture the dialogue between Math, Physics, and Electrical Engineering departments, not only discussing mathematical physics, but also attempting to unify the approach to teaching calculus and other "physical" mathematics.

David Finston

- Organized the interdisciplinary group of scientists and engineers that form the staff for Project MESH.

Elizabeth Gasparim

- Her undergraduate research students are from other departments, namely: Physics, Chemical Engineering and Mechanical Engineering.

- Publication to appear in the proceedings of the Bogomolov conference is partly Physics and written jointly with a Physicist.

Mai Gehrke

- Collaborates wtih H. Bruun and Jørgen Fischer Nilsson on lattice-structured ontologies is an interdisciplinary collaboration on the interface of computer science and mathematics.

- Collaboration with Jean-Eric Pin and Serge Grigorieff applications of duality theory to do seigroups and automata, making a connection to modal logic is a project on the interface of computer science and mathematics.

Tiziana Giorgi

- Invited Dr. Igor Vasiliev of the Physics Department to present a colloquium in our department. Dr. Giorgi believes this type of interaction between departments encourages interdisciplinary collaboration and fosters the learning environment of the institution.

- Presented the poster *Vortices with Antiferromagnetic Cores in the SO(5) Model of High temperature Superconductivity* at the 2005 Research and Creative Activities Fair held October 7, 2005 at NMSU.

- Currently working in her research area on problems of interest in Physics and nanotechnology. Dr. Igor Vasiliev of the Physics department lent his help in understanding some of the Physics involved.

John Harding

- Worked with Alex Pogel (PSL) on applications of lattice theory to the social sciences. The mathematical framework for this is an area known as Formal Concept Analysis.

- A portion of his research focuses on applications of ordered structures to foundational aspects of quantum mechanics. Another portion involves the application of ordered structures to logic, and is of current interest in theoretical computer science.

Martin Krupa

- Krupa would like to develop collaborations with neuroscientists and bioengineers. Visits to the Biodynamics Institute at Boston University are a part of this effort, although the collaborations initiated to this point only involve mathematicians specializing in neuroscience (Nancy Kopell). Another aspect of this endeavor is a grant application in the Netherlands. An integral part of the planned research activitiy during this visit would involve joint work with bioengineers at the University of Twente and a neuroscience research lab at Philips in Eindhoven.

Douglas Kurtz

- The Master of Arts in Teaching for middle school mathematics teachers, the MC^2 program, and the Gadsden MAT program discussed above are interdisciplinary programs with the College of Education, designed for in-service teachers.

Joseph Lakey

- The DARPA grant is joint work with Professors Creusere and Ramirez - Angulo in Electrical and Computer Engineering.
- Then NIH Grant is joint work with Professor Kroger in Psychology.

Gabriel Lampert

- Taught Hon 364G, Jewish Literature and Culture this past Spring, and expect to do so again this coming Spring.

Jerry Lodder

- Is the Principal Investigator on the interdisciplinary NSF grant "Teaching Discrete Mathematics via Original Historical Sources," awarded jointly to the departments of Computer Science and Mathematical Sciences. A summary from the review committee of the grant proposal states: "The panel applauds the collaboration between math and CS faculty and views the fact that CS majors and pre-service teachers will be exposed to mathematics in the context it was developed as a great strength. This historical aspect also gives richness and a human dimension to some very algorithmic or formulaic topics." To quote from the individual reviewers: "Teaching from historical sources brings context to the topic at hand and a better understanding of the development of the mathematics that exists 'ready-made' today." "The creation of 12–15 historical-based projects to be incorporated into the discrete math curriculum has strong intellectual merit. This project addresses a need to get away from the standard, formulaic approach to a subject that has a rich and deep history associated with it." "Today we emphasize technological enhancements. Unfortunately, the historical perspective . . . is often left out. The . . . proposal shows courage on the part of the PI to embark on such a project." "Focusing on mental processes rather than applications of formulas of unknown origin is a good idea, reminiscent of the guiding principles of calculus reform."

Maria Mariani

- Works with Professor M. Ferraro, and S. Jaroszewicz from the Physics Department of the University of Buenos Aires in Econophysics, and applications to Biology.

- Is working with Professor Ken Martin from the Department of Finance, in the Analysis of the behavior of different stock prices near a crash, and analysis of high frequency data.

- Is working with Professor Inna Pivkina from the Computer Science Department in the analysis of the behavior of different stock prices near a crash, and analysis of high frequency data.

- Is working with professors C. A. Erickson, J.D. Libbin and D.J. Valles-Rosales in modeling the evolution of the optimal harvest date/quantities of Southwestern U.S. red chile peppers [Capsicum annuum (L.)] used to forecast optimal planting and growth schedules. They are performing a new analysis of the behavior of the optimal harvest of red chile peppers based on farmer survey by using a normalized Truncated Levy walk model. They want to predict how farmers can decrease field waste by lengthening the harvesting season.

- Is beginning a collaboration with Professor Paola Bandini from Civil Engineering.

- Is beginning a collaboration with Professor John D. McNamara from Civil Engineering.

Patrick Morandi

- Works with members of the College of Education on the Mathematically Connected Communities grant, which runs teacher workshops. Also collaborates with the College of Education on their MAT in teaching mathematics degree and the contract Master's program currently running for a group of Gadsden district teachers.

Hung T. Nguyen

- Member of the interdisciplinary Ph.D. programs for I. Chairez and Chris Weaver.

- Collaborating with Dr. J. Wright of the Department of Geography in a joint research grant funded by Los Alamos National Laboratory.

- Collaboarting with members of the computing Research Laboratory (CRL/PSL) in a research grant funded by DTRA (Dr. J. Cowie).

Bruce Olberding

- Is a participant on the grant, Mathematically Connected Communities (co-PI's: Karin Wiburg, Rick Scott, Doug Kurtz). Is a member of a team of faculty members from the Department of Mathematical Sciences and the College of Education working on different issues related to the grant.

David Pengelley

- David's NSF teaching grant work is joint work with PIs from mathematics and computer science. The bridges they are building between mathematics and computer science are very important.

- Much of Dr. Pengelley's creative activity is interdisciplinary, combining history with mathematics.

Susana Salamanca-Riba

- The $(PD)^3$ project described in III.2 is a collaboration with the College of Education and Mathematically Connected Communities, a Mathematical Sciences Partnership between Mathematical Sciences and Education departments at NMSU and many school districts in the state.

- The New Mexico component of the $(PD)^3$ is a Partnership between Gadsden Independent School District, Las Cruces Public Schools,the College of Education and The Mathematical Sciences Department at NMSU. He has started a two year program with secondary school teachers from the two districts mentioned above.

Adam Sikora

- As a result of his active search for multidisciplinary collaboration in working with Raphael J. Lyman who was a faculty member of the Klipsch School of Electrical and Computer Engineering at NMSU. Their joint note "Prediction of fading envelopes with diffuse spectra" was published in 2005 IEEE International Conference on Acoustics, Speech, and Signal Processing. Another joint paper "Prediction of fading envelopes with arbitrary Spectral Shape" has been accepted by IEEE Transactions on Wireless Communications. Unfortunately Dr. Lyman has left New Mexico State University

and academia. During his last visit in Australia and has been discussing this project with Professor Jonathan H. Manton from the Department of Information Engineering, Research School of Information Sciences and Engineering (RSISE) at the Australian National University. The possibility of discussing the project with somobody who has background in electrical engineering should enable him to continue his resarch in this direction despite Dr. Lyman's departure. He's also discussed the project with Dr. Joseph Lakey from our department.

Robert Smits

- Dean Cruzado-Salas, Kelle Hoskins and Robert Smits worked together to secure the acquisition of "Golden Fear" a mathematical piece of art which is currently hanging in the entrance to the math department. The piece was officially approved by the acquisitions committed and is on loan from the art gallery. The piece has an estimated value of between $3000 and $5000 and its donation was the result of ongoing interactions between me and the artist Kaz Maslanka at the Bridges Conference. Dean Cruzado-Salas was instrumental in connecting the appropriate people in the art department, the Provost and the math department. Ms. Hoskins helped a great deal with the paperwork and the eventual placement of the piece.

- Dr. Smits was contacted by Dean Czerniak about participating with the El Paso MPO. Dean Czerniak had been working for over a year on a project and was unable to provide NMSU with parameters for the model. Dr. Smits looked at the literature for the model and the Dean was willing to approach the MPO to fund Dr. Smits' work, but the work needed to be done over the summer and he was already committed with the NSA grant for his research.

- Dr. Smits was in a working group of mathematicians, statisticians and biologists through some material on stochastic models in ecology as part of the Statistics seminar in 2006. He is currently working with Dr. Barany and a professor of biology from UTEP on stochastic population models with age distributions.

- Dr. Smits is part of the Water Sub-Cluster within the Natural Resources Sustainability Cluster at NMSU. His background in diffusion processes, especially his Postdoctoral work in porous media will be relevant as the subcluster takes a clearer form. He presented a poster at the annual URC in

support of the sub-cluster and am active in working with other members to seek out funding opportunities. He attended meetings with assistants to Senator Domenici in the Spring and hope to continue doing so as opportunities present themselves.

- He is a member of the Center for Stochastic Modeling, an interdisciplinary group whose focus is to connect the departments on campus where stochastic processes are fundamentally used. He has attended numerous meetings of the CSOM, gave a presentation at one of its sponsored colloquia and have discussed funding possibilities for research and teaching with the other members of the center.

Theodore Stanford

- His work with public schools, with the MCC and Matrix grants, and with the Public Education Department in Santa Fe, as listed above, is all interdisciplinary work with the College of Education and/or with the public school system.

Caroline Sweezy

- Participated as senior personnel in the development and submission of a proposal on Minority Science and Engineering Improvement to the Department of Education, in Summer 2006, PI David Finston. This proposal was developed jointly with professors from Civil Engineering, Chemistry and Biology, who are serving as key personnel on the grant. The MSEIP was funded for three years.

- Assisted Prof. Ross Staffeldt in collecting material from the Mentoring through Critical Transition Points proposal (see Grants & Contracts) that was included in an interdisciplinary legislative proposal. The proposal was written up by Karen Wiburg, College of Education, August 2006.

Tonghui Wang

- He is an active member (together with Hung Nguyen and Robert Smits from the Department of Mathematical Sciences) in the Center of Stochastic Modeling (CSM) at New Mexico State University. CSM at NMSU is a multidisciplinary organization of individuals from various multinational

industrial, academic, and government institutions. Their objective is to promote the broad advancement of the theoretical and applied aspects of stochastic processes in a collaborative framework. They recognize the broad base if interest in this subject and the potential benefit to society of its continued expansion. The synergy generated through the center promotes the rapid evolution of key research and educational advancements that cut across traditional discipline specific bounds.

- Since the Spring of 04, he has been working together with Dr. Jinfa Zhang of the Agronomy and Horticulture Department, College of Agriculture and Home Economics on"Cotton Breeding and Genetics Problems," as a statistical consultant. As the result of this collaboration, a joint paper on the topic was accepted for publication. New they are working on the topics in variance component estimation in a genetic designed model, using Monto Carlo simulations.

13. Departmental Colloquia in 2006

The department uses some of its limited budget to fund speakers for our colloquia series. Thanks to many personal and professional connections, we are able to bring in many world-renowned people to visit the department. While our colloquia are primarily geared toward mathematical topics, we invite faculty members from other departments at NMSU in order to broaden the topics of the colloquia and to keep good relations with other departments.

The following is the list of colloquium speakers and titles for 2006.

- Skip Garibaldi, Emory University, *The Characteristic Polynomial and Determinant Are Not Ad Hoc Objects*. January 19.

- Ramon Jansana, University of Barcelona, Spain, *Weakly Heyting Algebras*. February 2.

- Delia Valles-Rosales, New Mexico State University - Industrial Engineering, *Industrial Engineering of MEMS Systems Integration*. February 9.

- Dan Freed, University of Texas at Austin, *Twistings and Representations*. February 16.

- Ted Stanford, Linda Zimmerman, Maribeth Olberding, Bruce Olberding, New Mexico State University - MC^2 Program, *Mathematically Connected Communities: A Collaborative Effort*. February 23.

- Tian-You Hu, University of Wisconsin-Green Bay, *Self-similar Measures and Harmonic Analysis*. March 16.

- Agate Ponder-Sutton, Los Alamos National Laboratory, *Modeling of Protein-Protein Interactions with the Lennard-Jones Potential and a Random Walk*. March 31.

- Dmitry Kaledin, Steklov Institute, *McKay Correspondence and Generalizations*. April 6.

- Alan Loper, Ohio State University, *Valuation Overrings of Integral Domains*. April 13.

- George Fernandez, RMIT University, Melbourne Australia, *Teaching and Learning Online: 10 Years of Experience at RMIT*. April 20.

- Alec Kercheval, Florida State University, *Forecasting Risk for a Portfolio of Portfolios*. April 27.

- Jens Funke, New Mexico State University - Mathematical Sciences, *A Little Bit of Number Theory: Langlands and Quadratic Forms, Elliptic Curves, and Modular Forms*. May 4.

- Charles Swartz, New Mexico State University, *The Orlicz-Pettis Theorem*. September 7.

- Cliff Joslyn, Los Alamos National Laboratory, *Order Interval Rank for Order Theoretical Knowledge Discovery*. September 21.

- Bruce Olberding, New Mexico State University, *Success and Failure of Some Ideal Decompositions in Commutative Algebra*. September 28.

- Science Education Alliance Science Advisor Program Panel: Pat Bagett, Pleddie Baker (Camino Real Middle School), Doug Brown (astrophysicist), Pamela Egan (SCIAD program coordinator), Marcie Galbreath (SEA Board President & Las Cruces Museum of Natural History Education Curator), Harry Johnson (White Sands Test Facility), Sandra Nakamura (Staff Dev.

Specialist, Elementary Math and Science, LCPS), Jim Pudlewski (Science Education Consultant), Megan Richardson (NMSU Student and SCIAD). *A Proposal for NMSU Math Students to Work in the Las Cruces Public Schools*. October 5.

- Misha Verbitskiy, University of Glasgow, *Quaternionic Structures in Geometry and Physics*. October 9.
- Scott Chapman, Trinity University, *Congruence Monoids and their Associated Factorization Problems*. October 12.
- Piotr Wojciechowski, University of Texas at El Paso, *Multiplicative Bases in Matrix Algebras*. October 19.
- Alexander Outkin, Los Alamos National Laboratory, *Game-Theoretic and Agent-Based Modeling of Social Systems*. October 26.
- Igor Vasiliev, New Mexico State University - Physics, *Optical Excitations in Nanoscale Materials*. November 2.
- Ralph Cohen, Stanford University, *The Space of Surfaces in a Manifold*. November 9.
- Huseyin Kocak, University of Miami, *Rigorous Computations in Choatic Dynamical Systems*. November 13.
- Fridolin Ting, Lakehead University, Canada, *Asymptotic Stability of Pinned Fundamental Vortices*. November 16.
- Janet Heine Barnett, Colorado State University-Pueblo, *Power and Politics, Conquest and Crusade: War, Revolution and the History of Mathematics*. November 30.

14. Summary of Grants and Grant Proposals in 2006

Patricia Baggett

- **Title:** Interdisciplinary Supplemental Instruction of Biology
  Co-PI's: Ralph Preszler, PI

Submitted	**Agency**	**Amount**	**Duration**	**Status**
May 2006	NSF	$127,726	3 years	pending

- **Title:** ADVANCE

Submitted	Agency	Amount	Duration	Status
May 2002	NSF	$20,000	5 years	current

Mary Ballyk

- **Title:** MESH
  Co-PI's: P.I. Dr. David Finston

Submitted	Agency	Amount	Duration	Status
July 2006	DOE	600,000	3 years	Current

- **Title:** Council of Research Centers Mini-grant Award

Submitted	Agency	Amount	Duration	Status
June 2005	CORC	24,970	1 year	Current

- **Title:** Center for Research Excellence in Computational Biology Research and Education
  Co-PI's: P.I. Dr. Desh Ranjan

Submitted	Agency	Amount	Duration	Status
January 2004	NSF	4,997,241	5 years	Current

- **Title:** ADVANCE Startup Grant

Submitted	Agency	Amount	Duration	Status
n/a	NSF	30,666	01/03-12/06	Current

- **Title:** UBM: An Interdisciplinary Program in Mathematical Biology at New Mexico State University
  Co-PI's:

Submitted	Agency	Amount	Duration	Status
June 2003	NSF	100,311	3 years	Current

- **Title:** The Role of Resource Type i the Control of Chemostats
  Co-PI's: Dr. Ernest Barany

Submitted	Agency	Amount	Duration	Status
Jan. 2006	NSF	160,956	2 years	Declined

- **Title:** UBM-Group: Undergraduate Mentoring in Mathematical Biology at New Mexico State University
  Co-PI's: Dr. W. J. Boecklen

Submitted	Agency	Amount	Duration	Status
May 2006	NSF	272,728	3 years	Declined

Ernest Barany

- **Title:** Ecological Dynamics of Chemostats, NSF
  Co-PI's: Mary Ballyk

Submitted	Agency	Amount	Duration	Status
January 15, 2006	NSF	$181,255	2 years	Declined

- **Title:** UBM: Undergraduate mentoring in mathematical biology at NMSU
  Co-PI's: W. Boecklen, M. Ballyk, A. James and R. Preszler

Submitted	Agency	Amount	Duration	Status
March 30, 2006	NSF	$1,087,617		Declined

Guram Bezhanishvili

- **Title:** Semantics of intuitionistic modal logic: algebraic and topological models
  Co-PI's: PI: I. Esakia; Participants: G. Bezhanishvili, N. Bezhanishvili, D Gabelaia, M. Jibladz and D. Pataraia

Submitted	Agency	Amount	Duration	Status
May 2006	GNSF	36,942	2 years	Funded

- **Title:** Learning Discrete Mathematics via Historical Sources
  Co-PI's: G. Lodder, D. Pengelley, H. Leung, I. Pivkina and D. Ranjan

Submitted	Agency	Amount	Duration	Status
April 2006	ISSS Cluster Award	9,900	1 year	Funded

- **Title:** Extracting Knowledge and Discovering Relationships in Unstructured Data Sets
  Co-PI's: F. Gilfeather (CUAC), G. L. Heileman (NM-DSC), J.A. Sears (CNRI), V. Koltchinski (Georgia Institute of Tech.), H. Nguyen, and C.C. Wood (Santa Fe Institute)
  Supporting Personnel: C. T. Abdallah (UNM), G. Bezhanishvili, T. P. Caudell (UNM), M. Gehrke, J. Harding, M. J. Healy (UNM), H. N. Jerez (CNRI), C. Moore (UNM), A. Pogel (PSL), J. C. Saia (UNM)

Submitted	**Agency**	**Amount**	**Duration**	**Status**
Feb. 2006	NSF	3,000,000	3 years	Not Funded

- **Title:** Logics of Space

Submitted	**Agency**	**Amount**	**Duration**	**Status**
Oct. 2005	NSF	254,657	3 years	Not Funded

David Finston

- **Title:** Mentoring to Advance Mathematics Achievement I
  Co-PI's: Caroline Sweezy, Kathleen Berver

Submitted	**Agency**	**Amount**	**Duration**	**Status**
2006	NSF	2.5 million		Declined

- **Title:** Project MESH
  Co-PI's: Carmen Gonzalez

Submitted	**Agency**	**Amount**	**Duration**	**Status**
2006	US Dept of Education	600,000	2006-2010	Awarded

- **Title:** Sloan Scholars

Submitted	**Agency**	**Amount**	**Duration**	**Status**
1999	Sloan Foundation		Indefinite	Active

- **Title:** Information Sciences and Security Systems Cluster Minigrant

Submitted	Agency	Amount	Duration	Status
2006	Internal	8,000		Awarded/Expired

Jens Funke

- **Title:** Cycles in locally symmetric spaces of orthogonal and unitary type and modular forms

Submitted	Agency	Amount	Duration	Status
Oct 2002	NSF	88,190	6/2003 - 6/2007	Funded

- **Title:** Geometric and Arithmetic Aspects of the Theta Correspondence

Submitted	Agency	Amount	Duration	Status
Oct. 2005	NSF	195,898	7/2006 - 6/2009	Declined

- **Title:** Geometric Theta Lifts

Submitted	Agency	Amount	Duration	Status
Oct. 2006	NSF	241,242	6/2007 - 5/2010	Pending

Elizabeth Gasparim

- **Title:** Supervisor of the Undergraduate Research
  Co-PI's: Samantha Kilroy, Megan Lockwood, and Zac Harlow

Submitted	Agency	Amount	Duration	Status
2005	NMSU Advance	$1,000	6 months	completed
2005	NMSU Advance	$2,000	1 year	active
2006	AS Research Center	$1,000	6 months	active

Mai Gehrke

- **Title:** Algebraic, coalgebraic, and relational semantics for substructural and other logics
  Co-PI's: PI: H. Priestley, Alexander Kurz

Submitted	Agency	Amount	Duration	Status
	Oxford University	30,000 GBP		active

- **Title:** Plumer Visiting Fellow

Submitted	Agency	Amount	Duration	Status
	St. Anne's College, Oxford		Sept. 2006	Funded

- **Title:** Scheme 7 grant - Computer Science
  Co-PI's: PI H. A. Priestly

Submitted	Agency	Amount	Duration	Status
	London Math. Soc.	500 £	Sept. 2006	Funded

- **Title:** Distributive lattice ontologies
  Co-PI's: PI: Jørgen Fischer Nilsson

Submitted	Agency	Amount	Duration	Status
	Technical University Denmark	10000 Danish Crowns	three visits fall 2006	active

Tiziana Giorgi

- **Title:** MESH
  Co-PI's: PI: David Finston

Submitted	Agency	Amount	Duration	Status
July 2006	DOE	$600,000	3 years	Awarded

- **Title:** Nonlinear Partial Differential Equations in Heterogeneous Superconducting Systems

Submitted	Agency	Amount	Duration	Status
November 2005	NSF	$122,000	3 years	Awarded

- **Title:** New Mexico Analysis Seminar
  Co-PI's: T. Giorgi, J. D. Lakey, A. Sikora, R. Smits, PI: M. C. Pereyra

Submitted	Agency	Amount	Duration	Status
March 9, 2004	NSF	$15,000	2 years	Awarded

- **Title:** Start-up Funding

Submitted	Agency	Amount	Duration	Status
January 1, 2002	NSF/Advance INST TRA	$8,000	4 years	Awarded

John Harding

- **Title:** Mathematical Foundations of Quantum Mechanics

Submitted	Agency	Amount	Duration	Status
May 2006	NMSU	$1,000	July 2006 0 June 2006	Funded

- **Title:** Extracting Knowledge and Discovering Relationships in Unstructured Data Sets
  Co-PI's: Frank Gilfeather UNM, PI: Gregory Heileman UNM.

Submitted	Agency	Amount	Duration	Status
February 2006	ONR	$3,000,000	July 2006-July 2009	Not Funded

Martin Krupa

- **Title:** Dynamical phenomena due to the presence of Canards

Submitted	Agency	Amount	Duration	Status
November 2003	NSF	$140,000	3 years	Active

- **Title:** Oscillation patterns due to canards and Hop bifurcations

Submitted	Agency	Amount	Duration	Status
November 2006	NSF	$190,000		Pending

- **Title:** Visiting Position
  Co-PI's: PI: S. A. van Gils

Submitted	Agency	Amount	Duration	Status
September 2006	NWO Dutch Sci Found.	30000 Euro		Funded

Douglas Kurtz

- **Title:** Mathematically Connected Communities
  Co-PI's: Scott, Wiburg.

Submitted	**Agency**	**Amount**	**Duration**	**Status**
January 2004	NM Public Ed. Dept.	$1,600,000	3 years	Funded
April 19, 2006	NM Public Ed. Dept.	$590,000	1 year	Funded

Joseph Lakey

- **Title:** New Mexico Analysis Seminars
  Co-PI's: T. Giorgi, A. Sikora, R. Smits, PI: C. Pereyra

Submitted	**Agency**	**Amount**	**Duration**	**Status**
7/2003	NSF	$15,000	3 years	ended 5/2006

- **Title:** Functional Role of Frontopolar Cortez: Dynamics of Frontopolar Recruitement
  Co-PI's: J. Kroger - PI

Submitted	**Agency**	**Amount**	**Duration**	**Status**
9/2004	NIH	$200,000	2 years	current

- **Title:** Interference Suppression: LANL subcontract
  Co-PI's: C. Creusere, Ramirez

  Note: Subcontract of a larger ($400K) DARPA/MTO contract awarded to LANL

Submitted	**Agency**	**Amount**	**Duration**	**Status**
4/2006	DARPA	$107,000	1 year	current

- **Title:** Signal Detection/ Adapted Filter Banks: LANL-NMSU-MOU

Submitted	**Agency**	**Amount**	**Duration**	**Status**
2/2005	LANL	$105,399	2 years	current

  Note: Funded through LANL-NMSU-MOU

Jerry Lodder

- **Title:** Teaching Discrete Math via Original Historical Sources
  Co-PI's: G. Bezhanishvili, H. Leung, D. Pengelley and D. Ranjan

Submitted	**Agency**	**Amount**	**Duration**	**Status**
June, 2002	NSF	$74,432	3 years	Funded

- **Title:** Teaching with Historical Sources
  Co-PI's: G. Bezhanishvili and D. Pengelley

Submitted	**Agency**	**Amount**	**Duration**	**Status**
May, 2006	NMSU Cluster Award	$4,000	1 year	Funded

- **Title:** Learning Discrete Math and Computer Science via Primary Sourses
  Co-PI's: G. Bezhanishvili, H. Leung, D. Pengelley, I. Pivkina and D. Ranjan

Submitted	**Agency**	**Amount**	**Duration**	**Status**
December, 2006	NSF	$497,313	4 years	Pending

Maria Christina Mariani

- **Title:** Resolution to nonlinear problems arising in Finance

Submitted	**Agency**	**Amount**	**Duration**	**Status**
2004	NSF-ADVANCE	2,500	2005-2006	Active

- **Title:** Applied Border Environmental Research Program
  Co-PI's: Co-PI

Submitted	**Agency**	**Amount**	**Duration**	**Status**
To be submitted	SCRP	50,000		Pending

- **Title:** Funding for buying tick data and high frequency data
  Co-PI's: Co-PI

Submitted	**Agency**	**Amount**	**Duration**	**Status**
2006	Finance Dept., NMSU		2006	Active

- **Title:** Chile Industry System Analysis: Optimal harvest of Southwestern U.S. red chile peppers [*Capsicum annuum (L.)*]
  Co-PI's: Co-PI

Submitted	**Agency**	**Amount**	**Duration**	**Status**
2004	NM Chile Task Force	3,669,376.90	2003-2007	Active

Patrick Morandi

- **Title:** Mathematically Connected Communities
  PI: Participant

Submitted	**Agency**	**Amount**	**Duration**	**Status**
January 204	NM Public Ed. Dept.	$1,600,000	3 years	Funded

- **Title:** Mathematically Connected Communities
  PI: Participant

Submitted	**Agency**	**Amount**	**Duration**	**Status**
April 2006	Education	$592,099	1 year	Funded

Hung Nguyen

- **Title:** CB Defense Decision Support System
  PI: Hung Nguyen

Submitted	**Agency**	**Amount**	**Duration**	**Status**
2005	DTRA	$399,922	2006-2007	Funded

- **Title:** Social Dynamic Modeling
  PI: Hung Nguyen

Submitted	**Agency**	**Amount**	**Duration**	**Status**
2006	LANL	$139,000	2006-2008	Funded

- **Title:** Applying to an interdisciplinary research grant
  PI: Hung T. Nguyen.

Submitted	**Agency**	**Amount**	**Duration**	**Status**
November 2006	VPR Office	$50,000	12 months	Pending

Bruce Olberding

- **Title:** Intersections of valuation overrings of two-dimensional Noetherian domains
  PI: Bruce Olberding

Submitted	Agency	Amount	Duration	Status
October 2006	NSA	$49,051	2 years	Pending

- **Title:** Intersections of valuation overrings of two-dimensional Noetherian domains
  PI: Bruce Olberding

Submitted	Agency	Amount	Duration	Status
October 2006	NSF	$231,767	3 years	Pending

- **Title:** International Matching Travel Grant
  PI: Bruce Olberding

Submitted	Agency	Amount	Duration	Status
Summer 2006	NMSU	$840	N/A	Funded

- **Title:** Mathematically Connected Communities
  PI: Participant

Submitted	Agency	Amount	Duration	Status
January 204	NM Public Ed. Dept.	$1,600,000	3 years	Funded

- **Title:** Mathematically Connected Communities
  PI: Participant

Submitted	Agency	Amount	Duration	Status
April 2006	Education	$592,099	1 year	Funded

- **Title:** Overrings of two dimensional Noetherian domains
  PI: Bruce Olberding

Submitted	Agency	Amount	Duration	Status
October 2005	NSA	$30,000	2 years	Rejected

David Pengelley

- **Title:** Teaching Discrete Mathematics via Original Historical Sources
  Co-PI's: G. Lodder, G. Bezhanishvili, H. Leung, D. Ranjan.

Submitted	**Agency**	**Amount**	**Duration**	**Status**
June 6, 2002	NSF	\$74,432	6/03-5/06	Funded
April 28, 2006	ISSS cluster	\$8,000	2006-2007	Funded

Susana Salamanca-Riba

- **Title:** Unitary Dual of Real Lie Groups

Submitted	**Agency**	**Amount**	**Duration**	**Status**
10/3/2001	NSF	\$82,002	6/1/2002-5/31/2006	Funded

- **Title:** Professional Development and Outreach

Submitted	**Agency**	**Amount**	**Duration**	**Status**
1/1/2004	Institute for Advanced Studies, Park City Mathematics Institute	\$40,000	7/1/2004 to 6/30/2008	Funded

- **Title:** Sloan Minority Ph.D. Program in the Mathematical Sciences
  Co-PI's: David Finston, Caroline Sweezy.

Submitted	**Agency**	**Amount**	**Duration**	**Status**
8/25/2000	Sloan Foundation	per Sloan formula	Indefinite	Funded

- **Title:** Atlas of Lie Groups

Submitted	**Agency**	**Amount**	**Duration**	**Status**
9/17/2003	American Institute of Mathematics and NSF/IAS/PCM	\$19,962	Fall 2005 to Summer 2008	Funded

- **Title:** PCMI Partners with the Districts to Design Professional Development ((PD^3))

Submitted	**Agency**	**Amount**	**Duration**	**Status**
9/27/2006	NSF/IAS/PCMI	\$200,000	9/1/2008 to 8/30/2008	10/30/2006

- **Title:** Improving Recruiting and Retantion in Science, Technology, Engineering and Mathematics

Submitted	**Agency**	**Amount**	**Duration**	**Status**
Deadline: 2/10/2005	NSF	$1,997,793	8/1/2005 to 7/31/2010	Not granted

Adam Sikora

- **Title:** New Mexico Analysis Seminars
  PI: Maria Pereyra
  Co-PI's: Tiziana Giorgi, Robert Smits,Joseph Lakey, Adam Sikora

Submitted	**Agency**	**Amount**	**Duration**	**Status**
July 31,2003	NSF	$15,000	36 months	Current

- **Title:** Properties of spectral multipliers corresponding to Schrodinger operators with linearly growing potentials
  PI: Adam Sikora

Submitted	**Agency**	**Amount**	**Duration**	**Status**
October 24, 2005	NSF	$165,091	36 months	Unfunded

Robert Smits

- **Title:** CBMS-Conference Board in Mathematical Sciences
  Co-PI's: Joe Lakey; Cristina Pereya; Tiziana Giorgi, Adam Sikora, Robert Smits

Submitted	**Agency**	**Amount**	**Duration**	**Status**
April 2004	NSF	$31,329	1 year	Funded

- **Title:** Singular Stochastic Differential Equations
  PI Robert Smits

Submitted	**Agency**	**Amount**	**Duration**	**Status**
October 2003	NSA	$25,367	2 years	Funded

- **Title:** New Mexico Analysis Seminar Cristina Pereya
  PI Cristina Pereya
  Co-PI's: Joe Lakey, Tiziana Giorgi, Adam Sikora, Robert Smits

Submitted	Agency	Amount	Duration	Status
February 2004	NSF	$15,000	2 years	Funded

- **Title:** Minigrant-Interest Rate Models
  PI Robert Smits.

Submitted	Agency	Amount	Duration	Status
Spring 2004	A&S Research Center	$1,000	6 months	Funded

- **Title:** UBM-AN Interdisciplinary Program in Math Biology
  PI Wiliam Boecklen
  Co-PI's: Mary Ballyk, Ernest Barany, Avis James, Ralph Preszler, Robert Smits

Submitted	Agency	Amount	Duration	Status
Spring 2005	NSF	$272,728	3 years	Unfunded

- **Title:** Simulation of Large Deviations for Singular Diffusions with applications to Queuing Theory and Extinctions Problems

Submitted	Agency	Amount	Duration	Status
Spring 2006	NSA-BAA	$113,105	3 years	Unfunded

- **Title:** Diffusions in Unbounded Domains

Submitted	Agency	Amount	Duration	Status
Fall 2005	NSA	$30,000	2 years	Unfunded

Ted Stanford

- Mathematically Connected Communities, a joint project between the Department of Mathematical Sciences and the College of Education. He has had course releases for several semesters to work with middle school teachers. Also summer institutes for teachers. MCC is paying for some of his current sabbatical.

- Matrix, a project funded by the Ohio Board of Regents and involving teams from Ohio, Kansas, California, and New Mexico. The overall goal is to provide supplemental mathematics content to middle school kids using emerging technologies like iPods. Matrix is paying for some of his current sabbatical.

- Grant from Dean's office to design new 3-course sequence for the Mathematics Success Center.
- Grant from the Park City Mathematics Institute to assist Lesson Study teams of teachers in Las Cruces and Gadsden. Principal Investigator is Susana Salamanca-Riba of the Math Department. I am involved as a facilitator of one of the teams.
- Applied for an Interdisciplinary Research Grant from the office of the Vice President for Research. Joint application with Wanda Guzman of MCC and the College of Education. Title of application is "Connecting Mathematical Thinking in Children and Adults". Status is pending.

Caroline Sweezy

- **Title:** Mentoring Through Critical
  PI: David Finston
  Co-PI's: Caroline Sweezy, Kathleen Berver

Submitted	**Agency**	**Amount**	**Duration**	**Status**
May 2006	NSF	$2,000,000	5 years	Declined

- **Title:** Minority, Science, Engineering Improvement
  PI: David Finston

Submitted	**Agency**	**Amount**	**Duration**	**Status**
July, 2006	DOE	$600,000	3 years	Funded 10/02/06

Tony Wang

- **Title:** Mathematical Connected Communities
  Co-PI's: Douglas Kurtz and Karin Wiburg

Submitted	**Agency**	**Amount**	**Duration**	**Status**
January 2004	NM Public Ed. Dept.	$1,600,00	3 years	Funded

- **Title:** Mathematical Connected Communities (Expansion)
  Co-PI's: Douglas Kurtz and Karin Wiburg.

Submitted	**Agency**	**Amount**	**Duration**	**Status**
April 2006	NM Public Ed. Dept.	$592,099	1 year	Funded

- **Title:** GEPR: Genetic and functional genomic dissection of fiber yield and quality in cultivated tetraploid cotton
  Co-PI's: Dr. Jinfa Zhen and Dr. Brian Scheffler (I am a collaborator).

Submitted	**Agency**	**Amount**	**Duration**	**Status**
November 2005	NSF	$3,348,567	3 years	Not funded

- **Title:** Mentoring to Advance Mathematics Achievement
  Co-PI's: Dave Finston, Kathleen Berver and Caroline Sweezy.

Submitted	**Agency**	**Amount**	**Duration**	**Status**
May 2006	NSF	$2,479,385	5 years	Not funded