

NEW MEXICO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES
Department of Mathematical Sciences

Activities and Programs
1989

A. Teaching

1. **Departmental teaching evaluation program:** The teaching evaluation program for the courses MATH 10N, 102N, 115, 180 and 185 is administered by the Director of the Mathematics Learning Center. The evaluation consists of a combination of peer evaluation and student evaluations. The supervisor on duty at each hour is responsible for visiting all of the classes of that hour on a regular basis. Once a semester, student evaluations are collected in all sections of these courses. These evaluations are reviewed and summarized by the Director and one of the Assistant Directors of the Mathematics Learning Center (Kitty Berver and Jeannine Vigerust). The results are discussed with the instructors. There are two evaluation forms approved for use in these courses, one for individually paced sections and one for lecture sections. Copies of these forms are attached.

The teaching evaluation program for other classes is coordinated by the chairman of the departmental Committee on Teaching. (In the spring Ray Mines was chairman and Mark Mandelkern, Gerald Rogers and Frank Williams were members. This fall Gerald Rogers is chairman, and Doug Kurtz and David Pengelley are members.) For each of the untenured, tenure-track faculty at least two members of the Committee on Teaching have been scheduled for classroom visit at some time this fall. After a teaching committee member makes a classroom visit, a report is written and discussed with the faculty member. A similar but less elaborate schedule was carried out during the spring. The Committee on Teaching plans to broaden their visitation program in the spring to include interested senior faculty, as well as junior faculty.

The departmental student evaluation forms are made available each semester, and faculty and graduate students are reminded of the recommended procedures for their handling. Copies of the form and of the departmental procedures are attached. A large majority of the faculty have submitted summaries of student evaluations from at least one course with their annual reports. The Advisory Committee and Department Head read annual reports, student evaluations and teaching committee reports, and consider these together with other information and observations of their own to make the final evaluation of tenure track faculty.

2. **Departmental program for improvement of teaching:** The work of five faculty members-- Marcus Cohen, Ed Gaughan, Arthur Knoebel, Doug Kurtz, and David Pengelley-- as Principal Investigators of the Calculus Curriculum Development Grant is part of a nationwide effort to improve the teaching of calculus. The development of the calculus projects and the incorporation of these into the teaching of calculus courses has received much of their time and attention for the past two years. They have been invited to present their work at panels around the country, and will be recognized in the retiring president's address of the Mathematical Association of America in January as one of five outstanding mathematics teaching improvement programs in the country.

Two members of the faculty have explored new territory with the honors courses HON 411 and HON 275. These courses will offer stimulating general education alternatives for advanced students.

This year the trigonometry course has undergone careful scrutiny by the college-track faculty. The syllabus has been revised and test banks have been created. The course, which had previously been taught primarily by graduate assistants supervised by a faculty coordinator, has been staffed by college-track faculty this year. Student research projects were used in one section.

The department faculty devoted a large amount of time discussing the philosophy of General Education. Three courses, MATH 110 Mathematics Appreciation (new course), MATH 112 Fundamentals of Elementary Mathematics (revised course), and STAT 210 Statistics for Contemporary Living (new course) were submitted to the University General Education Committee. The two mathematics courses have been approved by the committee. Discussion is still in progress with regard to statistics courses for general education. A more detailed syllabus for STAT 210 was requested by the committee, and this has been submitted. Also, we have arranged a meeting with faculty from Mathematical Sciences and from Experimental Statistics to discuss the pro's and con's of submitting the crosslisted course STAT\ E ST 251 for approval for general education.

3. **Departmental advising for majors:** In the spring, members of the committees for advising undergraduate mathematics majors and mathematics education majors were Doug Kurtz, chair, Ed Gaughan, Dave Arnold and Mark Mandelkern. This fall the members are Frank Williams, chair, Ed Gaughan, Doug Kurtz and David Pengelley. In addition to advising students at registration times, members of this committee verify degree checks for majors and minors, consider requests for substitutions or waivers for mathematics or mathematics education majors, send newsletters and advising information to students, and arrange for an annual honors assembly for mathematics students. (The honors assembly is discussed in more detail in section B.4.) The committee has worked closely

with Bill Soules, College of Education Advising Center, on the advising of mathematics education majors. The committee has spent the past year studying the requirements for the mathematics major, and expects to make a proposal to the faculty early spring 1990, to impose additional requirements for majors which would strengthen the degree.

4. **Recognition and awards given for teaching:** The teaching of five members of the department was recognized with the award of the calculus curriculum grant. All have been invited to speak at panels at regional and national meetings, and their work will be cited at the national meetings in January by the retiring president of the American Mathematical Society. The program will be the subject of a feature article in an upcoming book on innovative programs in calculus instruction. The teaching of David Pengelley and Reinhard Laubenbacher was recognized by the publication of their article in National Honors Report.

B. Research and other Creative Scholarly Activity

1. **Participation in research and creative activity:** Eighteen faculty members presented their research in talks given at professional meetings or in colloquium talks at other universities. Three members of the faculty presented colloquium talks at NMSU. The majority of the tenure track faculty participate actively in weekly research seminars throughout the semester. (Also see D.5 for a discussion of invited participation at conferences.)
2. **Quality and number of publications:** Sixteen of the thirty-one members of the tenure-track faculty published twenty-seven research papers in refereed journals and six research papers in conference proceedings. The latter had been presented as invited talks at the conferences. They also published two books and one magazine article during the year. Among the other fifteen members of the tenure-track faculty, five had research papers accepted for publication during the year, two had a textbook or instructional article accepted for publication, and three have research papers submitted for publication. One has an extensive research monograph in progress. The others are carrying higher than average teaching and/or administrative loads.
3. **Recognition by national and international organizations:** Most of the research faculty are active members of national professional organizations. Offices held and committee memberships in national organizations are listed under C.1. David Pengelley was accepted as a member of the Mathematical Sciences Research Institute in Berkeley for the duration of his Sabbatical Leave year. Joe Zund was elected a Fellow of the Royal Astronomical Society. He is a member (available by invitation only) of three study groups of the International Association of Geodesy.

4. **Student quality and productivity:** One of our undergraduate majors, Mark Walker, was selected to participate in a summer research program for undergraduates at Rose-Hulman Institute, supported by the National Science Foundation. He and a student from Harvard collaborated on a research project which produced original results and is being reported on at the national meetings of the American Mathematical Society in January. A copy of a page from the January program is attached.

Seven mathematics majors were awarded scholarships at the 1989 Mathematics Honors Assembly in April. Ten mathematics majors and eleven other students were honored for outstanding performance in mathematics courses. Four mathematics majors were recognized for their participation in national competitions as members of the Putnam Team and/or the Mathematics Modeling Team. Two students received the Deborah Louise Thomas Memorial Awards for outstanding service as mathematics tutors. Seventeen mathematics majors were recognized for their status as Crimson Scholars.

5. **Evidence of atmosphere conducive to research and creative and scholarly activity:** Departmental faculty have formed research seminars in harmonic analysis, functional analysis, algebraic topology, algebra and algebraic k-theory, and statistics that meet weekly. Both faculty and advanced graduate students participate in these seminars, either presenting their own research in progress or presenting other papers of general interest to researchers in their area.

The group of faculty members working in algebraic k-theory and algebraic topology work together closely in research. They have submitted proposals for support for a "special year" in this area. The Mathematical Sciences Research Institute in Berkeley is having a special year in these subjects, making it relatively inexpensive to invite visitors. A "mini-special year" is under way with support from the department and the Arts and Sciences Research Center. A proposal is pending with the National Science Foundation which could turn this into a fullblown special year. A short narrative from their proposal is attached, as this describes not only what they hope to do, but also gives a picture of the variety of joint research projects being carried on by this group of people. These faculty members have also laid the ground work for a Special Seminar in algebraic topology and algebraic k-theory which will meet once or twice a year and involve faculty from UNM, UTEP, Arizona and possibly other nearby universities.

Under the leadership of Bob Wisner, the department sponsored a Holiday Symposium, both in December 1988 and December 1989. A number of the faculty and graduate students participated in the 1988 Holiday Symposium, and we anticipate a high level of participation for the 1989 Symposium. These symposia are held during academic holidays--December 27 to 31, and feature a series of lectures by a world class mathematician.

6. **Quality and number of grant proposals:** A listing of grant proposals funded, pending, and not funded during the year is attached. Generally these proposals are of very good quality. The number funded is relatively small, reflecting the fact that funding for mathematical research is highly competitive. David Arnold and Fred Richman were supported by a research grant from the National Science Foundation, and Joe Zund received a research grant from the Office of Naval Research. The Calculus Curriculum Development grant from the National Science Foundation, with five principal investigators Marcus Cohen, Ed Gaughan, Art Knoebel, Doug Kurtz, and David Pengelley, is the largest grant in the department this year. Twelve mathematics research grant proposals were submitted this fall, and are pending. Four biology research proposals are pending partially through our department, submitted with Marsha Conley, College Assistant Professor of Mathematics, as one of the principal investigators.

C. Service

1. **Participation of departmental members in nationally recognized organizations and publications:** Most faculty members are members of one or more professional organizations. Ed Gaughan and Gerald Rogers hold regional offices in the Mathematics Association of America. Carol Walker is a member of two national committees of the American Mathematical Society. Ray Mines is joining the Board of Governors of the Pacific Journal. Charles Swartz is NMSU representative for the Rocky Mountain Mathematics Consortium, and Gerald Rogers is NMSU representative for the Institute for Mathematical Statistics. Joseph Zund is a member of two study committees of the Geophysical Society. Many department members are reviewers for the Mathematical Reviews, and most serve as referees for one or more professional journals. Several faculty members refereed proposals for the National Science Foundation.
2. **Participation of departmental members in activities that help in the administration of the university and college:** Section III of INFORMATION FOR THE STAFF gives descriptions of all departmental committees, and lists the members of these along with memberships of our faculty on College and University committees. There is a member from Mathematical Sciences on the Faculty Senate, the President's Teaching Committee and on most of the committees of the College of Arts and Sciences.
3. **Department and faculty enhancement of their profession through campus or off-campus activities:** The department has begun formal communication with high school mathematics teachers. Doug Kurtz and Kitty Berver met with mathematics teachers from the Las Cruces high schools this fall, and have been invited to attend regular monthly meetings of this group. During the summer, Bob Wisner taught in high school honors programs sponsored by NMSU, the Waco Schools, and the Ysleta Independent School District, and he was a teacher in the National Science Foundation Institute for Junior High School Teachers at Los Alamos National Laboratories for the month of June.

4. **Recruitment of good students:** The department has a promising set of new graduate students this year. A list of these students with their credentials is attached, along with a copy of the recruiting materials which are mailed in response to inquiries. Also attached is a set of the materials which are mailed to prospective undergraduate students. Students are also recruited into mathematics as a major by courses which capture their interest, or by participation in the undergraduate mathematics club or the scholarships program for mathematics majors. The calculus projects program has attracted the interest of many students, and has been useful for recruiting new majors.
5. **Placement of graduates and continued relations with graduates:** Attached is a list of 1989 graduates. The current location and employment of the Ph.D. graduates is described and of some of the M.S. graduates. The B.S. graduates are more difficult to stay in contact with. We have plans for starting a newsletter in 1990 to foster increased communication with these graduates.

D. Performance of the Department as a Whole

1. **Goals and objectives regarding teaching, research, service and program development:** The department statements of teaching functions, and criteria and procedures for evaluation, promotion and tenure are attached.
2. **Integration of teaching and research interests with the goals and objectives of the department, and the broader goals and mission of the college and university:** The members of the faculty are aware of the goals, objectives and mission of higher education, and are very conscientious in their dealings with this. Some examples which come to mind for this year are the seriousness and thoroughness with which they approached the questions of the new general education program, the concern they showed with regard to some awkward relationships with engineering relating to the pre-calculus program, and the thoroughness of the new hiring committee in advertising and screening for new faculty.
3. **Collegiality among the faculty, atmosphere of unity and mutual helpfulness in carrying out goals in teaching, research, service:** This is one of the real strengths in our department. The group of principal investigators working together on the calculus development grant, the group of faculty working together for the algebraic topology/algebraic k-theory special year, the variety of combinations of faculty members publishing joint papers, the collaboration of two faculty members on honors courses, the hiring committee, the advisory committee, the graduate committee, the undergraduate advisors committee, the Learning Center Supervisors all leap to mind as excellent examples of professional people working together in a spirit of unity and mutual helpfulness.

4. **Distinguished visitors to the department:** In December 1988, Professor John Tate of Harvard presented a series of lectures on Fermat's Last Theorem at our Holiday Symposium. There were about two dozen out of town participants, several of them quite distinguished mathematicians, along with a number of local faculty and graduate students. This December Professor Joan Birman of Columbia University will be the featured speaker at our Holiday Symposium, giving a series of lectures on Braids and Knots. A copy of the program announcement is attached.

Colloquium speakers were scheduled throughout the year, many of them distinguished visitors to the Department. A collection of colloquium announcements is attached. Other distinguished visitors have come to confer with the faculty developing calculus projects, including Leonard Gillman, the University of Texas and President of the Mathematical Association of America, and Murray Klamkin, University of Alberta, a well known "problem solver."

5. **National and international recognition of the department through invitations to faculty to participate in meetings and conferences:** Although the number of invitations to the Abelian Group Theory conference in Oberwolfach was strictly limited, six members of our department were invited and attended: David Arnold, Roger Hunter, Ray Mines, Fred Richman, Carol and Elbert Walker. David Arnold and Fred Richman gave invited hour addresses. There were also several NMSU Ph.D.'s and former NMSU faculty members and visitors in attendance at this meeting. Dick Bagby and Doug Kurtz were invited to participate in an analysis conference in Spain, and Joe Zund gave invited addresses at two geodesy conferences in Italy. Dave Arnold was the invited major speaker at an algebra conference in Connecticut. Bill Julian was an invited speaker at a workshop on the rotation of the comet Halley nucleus, a national conference held in Tucson. Art Knoebel was an invited speaker at a conference on the nature of mathematical thinking and problem solving held in Berkeley. Reinhard Laubenbacher was an invited participant in an algebraic k-theory workshop in Italy. Gerald Lodder was an invited speaker at a conference on geometry and topology at Lehigh University. Frank Williams was an invited speaker in a special session in topology at an American Mathematical Society meeting in Los Angeles, and an invited speaker at a conference on homotopy theory at the Mathematical Sciences Research Institute in Berkeley. In connection with the calculus projects progream, Doug Kurtz was an invited panelist at the joint mathematics meetings in Phoenix and at a workshop in Berkeley, and Ed Gaughan was an invited speaker at a conference in San Antonio.
6. **Ability of the department to attract outside funds for programs, students, and research:** This is discussed in Section B.6 above.