

I. GENERAL DEVELOPMENTS

A. PERSONNEL AND DEPARTMENTAL ACTIVITIES

The department is administered by a chairman with the aid of an associate chairman, the advice of an elected Advisory Committee of faculty member and, when major considerations arise, the consent of the departmental faculty. Faculty meetings were, on the average, held every two weeks during the fall term--somewhat less often during the summer.

The department chairman, John DePree, was on sabbatical leave at the University of British Columbia. Professors Richard Bagby (at Washington University) and Eldon Boes (Sandia, Albuquerque) were also on sabbatical leave during the year. On leave without pay were Professors Mark Mandelker (at Berkeley), Wolfgang Liebert (West Germany), and Irvin Vance (Educational Development Corporation, MA). Professor Paul Randolph resigned in August to accept a visiting professorship at Iowa State University. The department had two visiting professors: George Akst and Y. K. Chan. Drs. J. Daly, T. Dence, J. W. Pendergrass, and R. Shannon had post-doctoral fellowships (supported through leaves without pay). These young people are an important asset to a department that is far from other active departments of mathematics.

The department has an active colloquium program and held 16 colloquia, primarily during the fall semester. In addition, regular seminars, each meeting on an average of once a week, were conducted by students and faculty in the areas of algebra, algebraic topology, constructive mathematics, analysis, combinatorics and algorithms. Two interdisciplinary seminars were held in statistics and in applications of mathematics to the biological sciences. The department again received from the National Science Foundation partial support for its Twelfth Annual Holiday Symposium. Professor Gian-Carlo Rota of the Massachusetts Institute of Technology was the main speaker. The National Science Foundation has supported this symposium for the past ten years, and it was used as a model by the Conference Board of the Mathematical Sciences in setting up (with NSF support) a nationwide program of similar symposia. This annual Holiday Symposium has received minimal local recognition and support despite the fact that its speakers have the international stature of the speakers in the president's Distinguished Speaker's Program.

The wide range of professional service of the faculty is almost impossible to summarize: many review for one of both of the major review journals; many referee papers for journals or

D. PHYSICAL PLANT

The proposal by the Physical Plant Department to install an elevator in Walden Hall to provide access to classrooms by the physically handicapped necessitated a number of changes. An ad hoc committee proposed moving the mathematics reading room to the basement (off the Learning Center) and using the present faculty lounge as an undergraduate lounge. What space remains of the present reading room will become a faculty lounge. The work will presumably be done in the spring of 1975.

E. STEPS TAKEN TO INCREASE AND UPGRADE THE STUDENT MAJORS

The undergraduate bulletin continues to be updated and is mailed to all students inquiring about the mathematics programs as well as to all people on the lists supplied by the Admissions Office recruiting team.

A problem-solving seminar for undergraduates will be revived in the spring of 1975. The group will meet weekly with the goal of preparing a team for the nationwide William Lowell Putnam examinations of the Mathematical Association of America.

In the plans for remodeling Walden Hall (see "D"), an area has been set aside for an undergraduate "lounge" area. This will be a place where undergraduate students may meet, study, and in general, interact mathematically with their peers. The lounge will contain textbooks currently in use as well as supplemental readings that are useful to undergraduates.

Letters are mailed to currently-enrolled undergraduate majors prior to preadvisement. These mailings include detailed and up-to-date course descriptions for upper-division course offerings as well as general information. Majors are encouraged to sign up for 30-minute advising sessions prior to prescheduling. Advising forms are kept and up-dated each semester to help provide continuity in advising.

Arts and Sciences Advising Center advisors have been provided information describing some of the special needs of mathematically-oriented students. An active and open line of communication with these advisors is maintained since the Advising Center advisors direct student progress during the first three semesters.

II. RESEARCH ACTIVITIES

A. RESEARCH PROPOSALS

Of the seven research proposals presented to the National Science Foundation, three have been funded (\$42,000) and four are still pending (\$42,500). Two NSF grants are continuing (\$25,300). Two minigrant proposals were presented to the Arts and Sciences Research Center, but were not funded.

B. PUBLICATIONS

In the period January 1974-December 1974, 24 research papers were presented at local, national, and international meetings; 43 research papers were published in recognized journals; and 22 faculty members attended professional meetings. (See Vol. II for details.)

III. SUMMARY

The department has had a reasonably good year. Research production has been high (see Vol. II), and there has been a continual re-evaluation of the department's program with a number of revisions made. The visiting professors and post-doctoral fellows have been particularly valuable in seminar activity and bringing in new ideas.

IV. STATUS OF LRP 1973-77

A. EDUCATION, PP. 18-19

1. Item (1): As mentioned, some have been organized and efforts continue.
2. Item (2): N/C.
3. Item (3): Will be attempted again this coming year.
4. Item (4): Accomplished and continuing.
5. Item (5): Not done.
6. Item (6): Not done--no support.
7. Item (7): Accomplished and continuing.
8. Item (8): Not accomplished.
9. Items (9), (10), and (11): Accomplished and continuing. Particularly important to the department is the continuing growth of its research and instructional program.

V. GOALS AND OBJECTIVES

It does not seem appropriate for an acting department head to set new goals for a department in such a short time. One can, of course, state the following as a first step:

Goal: Obtain departmental acceptance of revised goals for its graduate and undergraduate program.

Objective 1: Define the appropriate goals.

Objective 2: Develop the necessary departmental consensus.

I. PERSONNEL ACTIVITIES

A. PROFESSIONAL SERVICE OF THE FACULTY

David Arnold

Chairman: Departmental Business & Biological Science Committee;
Arts & Sciences Long-Range Planning Committee.

Member: Department Committee on Promotion of Associate and
Tenure; Arts and Sciences Council.

Richard Bagby

Reviewer, Mathematical Reviews.

Grader, William Lowell Putnam Mathematics Competition (nat'l.)

NMSU Representative, Rocky Mountain Mathematics Consortium.

Precinct Chairman, Democratic Party.

Vice Chairman, Southern New Mexico Civil Liberties Union.

Coordinator, Math 142.

Member, Departmental Committees: Real Analysis; Undergraduate
Scholarship.

Eldon Boes

Member, Departmental Committees: Math 141, 142, 241 Textbook
Selection; BA & Economics.

Y. K. Chan

Reviewer, Mathematical Reviews.

Henry Cheng

Member, Departmental Committees: Undergraduate Curriculum;
Physical Sciences & Engineering.

John DePree

Member, Board of Governors, Pacific Journal of Mathematics
(national).

Referee, Pacific Journal of Mathematics.

Reviewer: Mathematical Reviews; Zentralblatt fur Mathematik.

Edward Gaughan

President, Southwestern Section, Mathematical Association of
America.

Chairman, Annual Meeting, SW Section, Mathematical Association
of America.

Member: Departmental Complex Analysis Ph.D. Comprehensive
Examination Committee; Departmental Advisory Committee.

Director, Departmental Learning Center.

Chairman: Departmental Learning Center Committee; Department-
al Math Outside Committee.

Transportation Chief, Dept. Holiday Symposium Committee.

Advisor, Arts & Sciences Advising Center.

Workshop Chairman, NCTM El Paso Meeting.

John B. Giever

Member: Departmental Committees: Graduate; Applied Mathematics Curriculum Review.

C. Ward Henson

Member, Organizing Committee, Association for Symbolic Logic.
Referee, Journal of Symbolic Logic.
Activities at Duke University: Member, Departmental Graduate Affairs Committee; Member Departmental Undergraduate Faculty Council and Chairman of its Committee on Athletics; Advisor for Undergraduate Majors.

Donald G. Johnson

Delegate/representative of Greater El Paso Council of Teachers to National Council of Teachers of Mathematics.

William Julian

Referee: Astronomy and Space Science; The Astrophysical Journal.
Reviewer, Mathematical Reviews.
Member, Departmental Undergraduate Curriculum Committee.

R. Arthur Knoebel

Member of Departmental Committees: Screening for Job Applicants; Social Sciences Curriculum; Library.
Referee, Algebra Universalis.

Joseph Kist

Member, Departmental Committees: Advisory; Real Analysis Comprehensive Examination; Tenure/Promotion to Associate Professor; Promotion to Full Professor; Screening (chairman).
Referee: National Science Foundation; Pacific Journal of Mathematics; Canadian Journal of Mathematics; Australian Mathematics Society; Mathematische Annalen.
Reviewer: Mathematical Review; Zentralblatt fur Mathematik.

Warren Krueger

Chairman: Departmental Undergraduate Committee; Mathematics Educational Committee.
Member: Departmental Holiday Symposium Committee; PSL Scholarship Committee; University Appeals Board.
Reviewer, Zentralblatt fur Mathematik.

Arthur H. Kruse

An editor, Rocky Mountain Journal of Mathematics.
Reviewer: Mathematical Reviews; Zentralblatt fur Mathematik; Transactions, American Mathematical Society.
Member, Departmental Committee for Tenure/Promotion to Associate Professor.

Joaquin Loustaunau

President, Board of Directors, Las Cruces Boys' Club.

Ray Mines

Reviewer, Mathematical Reviews.

Director, 1974 Wm. Lower Putnam Examination Team (national).

Paper Grader, William Lowell Putnam Examination.

Member: Faculty Senate and Its Committees on Faculty Affairs;
Committees.

Member, Departmental Committees: Advisory; Undergraduate;
Teaching Assistantships.

Keith Phillips

Chairman, Departmental Library Committee.

Gerald S. Rogers

Reviewer, Cummings Publisher.

Advisor, Arts & Sciences Advising Center.

Sponsor, Girl Scouts.

Member, Departmental Committees: Undergraduate Advising;
Statistics ad hoc.

United Way Coordinator (departmental).

Fred Richman

Referee: Proceedings of the American Mathematical Society;
Rocky Mountain Journal of Mathematics.

Member, Dona Ana County Democratic Party Central Committee.

Member, Departmental Committees: Graduate; Advisory.

Member, Graduate Council.

Charles Swartz

Reviewer: Mathematical Reviews; Zentralblatt fur Mathematik.

Referee: Journal Mathematical Anal. and Appl.; Pacific Journal
of Mathematics.

Consultant, Tenure Evaluation for Univ. of California--Davis.

Assistant, NMSU Golf Team.

Chairman, Departmental Graduate Committee.

John Thomas

Mathematical Association of America representative to NMSU.

Member: Computer Advisory Group; APL Users Group; Arts and
Sciences Curriculum Committee.

Member, Departmental Committees: Graduate; Faculty Search.

Grader, William Lowell Putnam Examination (national).

Instructor, Continuing Education, Contract Bridge.

Robert H. Traxler

Member, Departmental ad hoc Statistics Curriculum Committee.

Carol Walker

President, Women Faculty and Chairman of its Steering Committee.
Member, Arts & Sciences Research Committee.
President, local chapter of Phi Kappa Phi.
Member of Departmental Committees: Graduate; Undergraduate;
Undergraduate Advising (chairman).

Elbert A. Walker

Consultant, CUPM Consultant Bureau.
NMSU representative, Rocky Mountain Mathematical Consortium.
Reviewer: Mathematical Reviews; Zentralblatt fur Mathematik.
Referee, NSF Research Proposals.
Member, Departmental Advisory Committee.

Robert Wisner

Member, National Advisory Committee, Center for Research in
College Instruction and Science and Mathematics, University
of Wisconsin.
Participating Member, Nat'l Council of Teachers of Mathematics.
Chairman, Holiday Symposium Committee.
Consultant, Teacher Education Committee.
Member, University Committee on Instruction.
Program Chairman, NCTM El Paso Meeting.

John Werth

Faculty Sponsor, Pi Mu Epsilon.
BIS Advisor, Arts & Sciences
Member, Departmental Committees: Social Science and Economics;
Statistics ad hoc; Graduate Assistantship; Scheduling and
Registration; Undergraduate Advising.

Francis Williams

Member, Arts & Sciences Faculty Affairs Committee.
Member, Departmental Graduate Committee.
Chairman, Dept. Engineering/Physical Sciences Committee.
Advisor, Arts & Sciences Advising Center.
Faculty Sponsor, Sigma Alpha Epsilon.

Dennis Young

Referee: Annals of Statistics; Econometrics.
Member, Department Committees: Learning Center; Biology &
Social Sciences.
Member, NMSU Statistics Center Advisory Committee.

Joseph Zund

Reviewer: Mathematical Reviews; Zentralblatt for Mathematik.
Referee: Rocky Mountain Journal of Mathematics; Journal of
Mathematical Physics; Journal of the Australian Mathematical
Society.
Member, Department Committees: Library; Hard Sciences; Promo-
tion to Full Professor.

B. PROFESSIONAL MEETINGS ATTENDED BY FACULTY

David Arnold

Ring Theory Conference, Lincoln, Nebraska (regional).
Twelfth Holiday Symposium.

Richard Bagby

Mathematical Association of America (presented paper).

Eldon Boes

Colorado Council of Teachers of Mathematics (presented paper).
El Paso Council of Teachers of Mathematics.
Southeast NMEA (invited speaker).
New Mexico Council of Teachers of Mathematics (invited speaker).

John DePree

International Congress of Mathematicians, Vancouver.
Pacific Journal Board of Governors.

Edward Gaughan

Nat'l Council of Teachers of Mathematics (presented paper)
(regional); Nat'l Council of Teachers of Mathematics, New
Orleans (regional); Nat'l Council of Teachers of Mathemat-
ics, Atlantic City (presented paper) (national).
El Paso Council of Teachers of Mathematics (invited speaker).
In-Service Institute, Ysleta Independent School District
(invited speaker).
Twelfth Holiday Symposium.

C. Ward Henson

Nonstandard Analysis, Mathematisches Forschungsinstitute,
Oberwolfach, West Germany (invited lecture, chaired session
on research problems).
Twelfth Holiday Symposium.

Donald G. Johnson

National Council of Teachers of Mathematics, Atlantic City
(presented paper); also, Regional Leadership Meeting.
Trans-Pecos Teachers Association (invited address).

William Julian

Twelfth Holiday Symposium.

R. Arthur Knoebel

Mathematical Association of America (presented paper).
Internat'l Congress of Mathematicians, University of British
Columbia, Vancouver (presented paper).
Twelfth Holiday Symposium.

Warren Krueger

Southern California Algebraic/Geometric Topology Conference,
UCLA (presented paper).
Twelfth Holiday Symposium.

Ray Mines

Mathematical Association of America (presented paper).
Twelfth Holiday Symposium.

Keith Phillips

Mathematical Association of America.

Gerald Rogers

Mathematical Association of America (presented paper).
Twelfth Holiday Symposium.

Robert Shannon

Twelfth Holiday Symposium.

Charles Swartz

Mathematical Association of America.
International Congress of Mathematicians, Vancouver, B.C.
Twelfth Holiday Symposium.

John Thomas

Mathematical Association of America.
Twelfth Holiday Symposium.

Robert Traxler

American Mathematical Heritage Symposium on the History of
Statistics & Probability, Southern Methodist University
(presented paper).

Carol Walker

Twelfth Holiday Symposium.

Elbert A. Walker

Mathematical Association of America.
Twelfth Holiday Symposium.

Robert Wisner

Southwestern Section, Mathematical Association of America.
Nat'l Council of Teachers of Mathematics (presented paper).
Metropolitan Houston Area Mathematics Conf. (presented paper).
Trans-Pecos Association of Teachers (invited speaker).
Conference for Advancement of Mathematics Teaching (presented
paper).
Twelfth Holiday Symposium.

John S. Werth

Mathematical Software Conference.
Assoc. for Computer Machinery (spring and fall).
Twelfth Holiday Symposium.

Francis Williams

Conference on Algebraic and Geometric Topology.
Twelfth Holiday Symposium.

II. SCHOLARSHIPS AND FELLOWSHIPS

A. UNDERGRADUATE

Physical Science Laboratory for incoming freshmen, @ \$500. . 6
awarded to: Patty A. Clanton, Santa Fe; Gary R. Hendricks,
T or C; Catherine Anne Lippe, Rio Rancho; Pamela Moon,
McAlister; David Thomas, Las Cruces; Gary Tolleson,
Roswell.

B. GRADUATE

Physical Science Laboratory graduate fellowship, awarded
to J. Glenn Brookshear.1
Teaching Associates, Level IV, awarded to: Y. S. Cooper,
M. Al-Khafaji, R. Thrasher, and R. Walters.4

III. GRANTS AND PROPOSALS

Name	Grants Funded		Grants Pending	
	Agency	Value	Agency	Value
Arnold, D.	NSF ^a	\$ 5,300		
Henson, C.			NSF	\$ 7,500 ^b
Julian, W.			NSF	15,000
Mines, R.			NSF	10,000
Phillips, K. (with J. Daly)			NSF	10,000
Thomas, J. (with J. Werth, F. Richman)			NSF	7,500
Walker, E.	NSF ^a	20,000		
Walker, E. (with D. Arnold, F. Richman, C. Walker)	NSF	26,000	NSF	130,000
Wisner, R.	NSF	9,000		

^a Continuing Grants

^b Approved

IV. RESEARCH PAPERS PUBLISHED BY THE FACULTY

- Arnold, D. M., On the Algebraic K-Theory of Torsion Free Abelian Groups of Finite Rank, Symposia Mathematica, Instituto Nazionale di Alta Matematica, Vol. XIII. 1974.
- Arnold, D. M., Abelian Group A such that $\text{Hom}(A, -)$ preserves direct sum of copies of A (with C. E. Murley), Pacific Jr. of Math.
- Arnold, D. M., Endomorphism rings and direct sums of torsion free Abelian groups (with E. L. Lady), Trans. Amer. Math. Soc.
- Arnold, D. M., Quasi-pure projective and injective torsion free Abelian groups of rank 2 (with Vinsonhaler and Wickless), Rocky Mountain J. Math.
- Bagby, R., Parabolic potentials with support on a half-space, Ill. J. Math. 18.
- Chan, Y. K., On constructive convergence of measures on the real line, Annals of Probability, Vol. 2., No. 1.
- Chan, Y. K., Notes on constructive probability theory, Annals of Probability, Vol. 2., No. 1.
- Chan, Y. K., A short proof of an existence theorem in constructive measure theory, Proceedings, American Mathematical Society.
- Henson, C.W., Nonstandard hulls of the classical Banach spaces, Duke Mathematical Journal 41 (with L. C. Moore, Jr.)
- Henson, C. W., Subspaces of the nonstandard hull of a normed space, Transactions of the American Mathematical Society 197 (with L. C. Moore, Jr.)
- Henson, C. W., The isomorphism property in nonstandard analysis and its use in the theory of Banach spaces, J. Symbolic Logic, 39.
- Knoebel, R. A., Unitary post algebras, American Mathematical Society Notices, 21:7.
- Kist, J., Two characterizations of commutative Baer rings, Pacific Journal of Mathematics, Vol. 50.
- Kruse, A., Some results on partitions and cartesian products in the absence of the axiom of choice, Zeitschrift für mathematische Logik und Grundlagen der Mathematik.
- Liebert, W., Endomorphism rings of free modules over principal ideal domains., Duke Mathematical Journal, Vol. 21, No. 2.
- Liebert, W., One-sided ideals in the endomorphism rings of reduced complete torsion-free modules and divisible torsion modules over complete discrete valuation rings, Symposia Mathematica Vol. XIII.
- Loustaunau, J., A characterization of Ptak Spaces, Mathematische Annalen, 207.
- Rogers, G. S., Testing and estimation when a normal covariance has interclass structure of arbitrary order, (with D. L. Young), Comm. Statistics, 3.
- Rogers, G. S., Mutual independence revisited. Delta, Vol. 4.
- Rogers, G. S., Some likelihood ratio tests when a normal covariance matrix has certain reducible linear structures (with D. L. Young), Comm. Statist.

- Richman, F., A constructive modification of Vietoris homology, *Fund. Math.*
- Swartz, C., Absolutely summing operators on $C_X(S)$, *Vector and Operator Valued Measures and Applications*, Academic Press.
- Swartz, C., Vector measures and nuclear spaces, *Revue Roum. Math.*, 18.
- Traxler, R. H., Contributed to Note 8. in Postulates of subadditive processes (by J. M. Hammersley), *Annals of Probability*, Vol. 2.
- Traxler, R. H., An L_1 local limit theorem in renewal theory, *Zeitschrift für Wahrscheinlichkeitstheorie*.
- Walker, C., Unique decomposition and isomorphic refinement theorems in additive categories (with R. B. Warfield), *Journal of Pure and Applied Algebra*.
- Walker, E. A., The groups P_β , *Instituto Nazionale di Alta Matematica, Symposia Mathematica XIII*. 1974.
- Walker, E. A., An algebraic treatment of algebraically compact groups (with M. Legg), *Rocky Mountain Journal*.
- Walker, E. A., Homological Dimension of Abelian Groups over their endomorphism Rings (accepted) (with F. Richman), *Proceedings of Amer. Math. Soc.*
- Werth, J. S., Maximal pure subgroups of torsion complete Abelian p-groups, *Pacific Journal of Mathematics*, Vol. 50, No. 1.
- Williams, F., An example for homotopy commutivity, *Journal of the Australian Mathematical Society*.
- Williams, F., Homotopy algebraic structures, accepted by *Rocky Mountain Journal of Mathematics*.
- Wisner, R. J., Problem Solving Strategies for Elementary Mathematics, Scott, Foresman & Company, Glenview, Ill.
- Wisner, R. J., Mathematics Around Us, (12 volumes, Grades 1-6, Teacher and Student Editions).
- Young, D., cf. Rogers, G.
- Zund, J., Electromagnetic theory in general relativity III: the structure of sources, Tensor N.S. 27.
- Zund, J., Second order divergence conditions in general relativity (with G. C. Debney), Lettere al Nuovo Cimento 11 (N.1).
- Zund, J., A note of the recent theory of Dirac (with D. Pandres), Lettere al Nuovo Cimento 11 (N.15).
- Zund, J., Electromagnetic theory in general relativity IV: a theory of light darts, Tensor N.S. 28.

V. RESEARCH PAPERS PRESENTED BY THE FACULTY

- Akst, G., An L^1 -algebra in Euclidean space, colloquium, NMSU (local).
- Akst, G., Linear projection operators on standard threads, *American Mathematical Society* (national).
- Boes, E. C., PSI in a College Mathematics Program, *Colorado Council of Teachers of Mathematics* (regional).
- Boes, E. C., Some Gambling Systems, *New Mexico Council of Teachers of Mathematics* (regional).

- Cheng, H., On a constructive partition of unity, Abstracts of Communications, International Congress of Mathematicians, Vancouver.
- Gaughan, E., The fine art of guessing, National Council of Teachers of Mathematics (regional, national).
- Gaughan, E., Topological Topics, In-Service Institute, Ysleta Independent School District (local).
- Henson, C. W., The model theory of Banach spaces, Vanderbilt University (invited lecture).
- Henson, C. W., When do two Banach spaces have isometrically isomorphic nonstandard hulls? Nonstandard Analysis Meeting, Mathematisches Forschungsinstitute, Oberwolfach, West Germany (international).
- Julian, W., Is the pulsar magnetosphere problem well posed? American Mathematical Society (regional).
- Johnson, D. G., Making Math Fun, Trans-Pecos Teachers Association (regional).
- Knoebel, R. Arthur, Post Algebras, International Congress of Mathematicians, Vancouver, B.C. (international).
- Knoebel, R. Arthur, A radical table of sines, Mathematical Association of America (regional).
- Krueger, W., Milnor's \lim^1 theorem on homotopy: a topological approach, Third Annual Southern California Algebraic/Geometric Topology Conference (national).
- Kruse, A., Classes of big classes, University of California-Irvine, (invited lecture).
- Rogers, G. S., Generalized Inverses for Infinite Dimensional Matrices, Mathematical Assoc. of America (regional).
- Traxler, R. H., A case against "Main Effects" in factorial experiments, American Mathematical Heritage Symposium on the History of Statistics and Probability (national).
- Williams, F., Higher products in homotopy and homology, University of California-Santa Barbara (invited lecture).
- Wisner, R., How big is space? National Council of Teachers of Mathematics (national).
- Zund, J., Unit gradient Cauchy problem with discontinuous initial data, American Society of Agronomy (regional).

VI. COLLOQUIA AND SEMINARS

Colloquia

- Prof. P. M. Cohn, University of London, "Homomorphisms of Rings into Skew-Fields."
- Prof. Irvin Vance, "Project 1: A Television Mathematics Program for Children in Elementary School."
- Prof. Boghos Sivazlian, University of Florida, "Optimal Site Deployment Pattern for Tracking Targets." (Joint w/Ind. Engr.)
- Prof. Otto Kegel, Queen Mary College, University of London, "Locally Finite Groups."

- Dr. William J. Leahey, Department of Mathematics, University of Texas at El Paso, "On the Probability that Integers be Relatively Prime."
- Dr. George Akst, NMSU, "An L^1 -algebra on Euclidean Space."
- Dr. Shashi Prabha Arya, Visiting Rhodes Fellow, Oxford University, "Remarks on Sum Theorems for Topological Spaces."
- Dr. Thomas Dence, "Cantor Sets and Cantor Functions."
- Prof. H. Gupta, University of Punjab, India, "A Diaphantine Equation and Partitions."
- Prof. Richard B. Darst, Colorado State University, "Basic Classes of Infinitely Differentiable Functions."
- Dr. John R. Harper, University of Rochester and UCLA, "H-spaces With Torsion."
- Prof. Peter John, University of Texas-Austin, "Designing Experiment for Bioavailability of Drugs, or Feeding Dairy Cattle," (a general non-technical talk), and "Octane Blending."
- Dr. Ronald J. Larsen, Wesleyan University, "Multipliers and the Hilbert distribution."

Seminars*

- Mr. Paul C. Box, WSMR, "The Probability of Motor Case Rupture."
- Prof. William Leahey, University of Texas-Austin "Several views of Cubics-Application of Algebraic Number Theory."
- Dr. Robert H. Traxler, NMSU, "Examples of Optical $C(\alpha)$ Tests." (Jointly w/Department of Experimental Statistics).
- Prof. Richard B. Darst, Colorado State University, "Generalized Martingales."

*In addition to regularly scheduled seminars (see Vol. I).

A. DEPARTMENTAL ORGANIZATION

The department is administered by a chairman and an associate chairman who are in turn advised by an elected committee of faculty members. Major policy decisions are made at general faculty meetings that are held biweekly. At a department retreat held in January it was decided to expand the committee structure of the department. This resulted in area committees to communicate with and serve the needs of users of mathematics in the university community; undergraduate and graduate program committees responsible for the curriculum and the requirements of majors at each of the respective levels; a committee to make recommendations on faculty hiring; and elected committees to make recommendations to appropriate faculty groups on tenure and promotion.

B. COLLOQUIA AND FACULTY SEMINARS

The department has an active colloquium program with lectures on an approximately biweekly basis when classes are in session. Most of the colloquia during the past academic year were given by speakers from outside the department.

Regular seminars were conducted by faculty and students in algebra, algebraic topology, constructive mathematics, and analysis. Interdisciplinary seminars were held in statistics and in applications of mathematics to the biological sciences. This year the department again successfully appealed to the National Science Foundation for support for its Eleventh Annual Holiday Symposium. This "institution" has been supported by NSF for the past ten years. Although the program has received minimal local recognition, it was used by NSF as a model for establishing its National Conference Board and it has had a nationwide impact on the sciences.

C. UNDERGRADUATE SCHOLARSHIPS

The department awarded four PSL Scholarships for 1973-74. Of these, two went unclaimed; the students who accepted them did not subsequently enroll. These two scholarships have been carried over to 1974-75 and will be awarded in addition to the four scholarships usually allotted to the department. The department no longer has funds available for departmentally-funded scholarships.

E. IMPROVEMENTSUndergraduate Instruction

Four of the seven departmental committees concerned with instruction deal with undergraduate instruction. These are the learning center, biology and social sciences, mathematics education, and physical sciences-engineering area committees. Each has responsibility, in

its area, for recommendations on textbook changes, course coordination, course content, level of presentation, and effective communication with course users. They often incorporate, on an ad hoc basis, a member from one of the user departments so they may share in the development of service courses.

Curriculum

The department is continuing to re-evaluate its undergraduate program with a view toward more efficiency in course offerings, new directions in curriculum, and the needs of the academic community.

In order to encourage majors to broaden their background in related areas, the department now suggests that they take at least two computer science courses, a numerical analysis course, and an elementary statistics course.

Advisor-Advisee Relations

The new (liberalized) general education requirements in the College of Arts and Sciences have altered the role of the advisors. Many more decisions must now be made by the students, and with the increased number of upper-division credits required, some careful planning is needed to make certain that lower-division prerequisites are taken at appropriate times.

Arts and Sciences Advising Center advisors have received information describing some of the special needs of mathematically-oriented students. Since the center advisors direct the students' progress for the first three semesters, we, and all other departments in the College of Arts and Sciences, need to keep an open and active line of communication with these advisors.

Materials were mailed to all math majors, prior to the spring 1974 preadvisement, stressing the importance of developing special areas of interest outside the major field and coordinating the choice of mathematics courses with these several areas. Sample programs were included for several areas. The advising "checklist" has been replaced with new planning forms which are designed to encourage creative, thoughtful planning sessions with students, and to provide for increased continuity in student-advisor contacts. The planning forms will be kept up-to-date from transcripts and will provide a running record of these contacts.

F. MAJOR STEPS TAKEN TO INCREASE AND UPGRADE MAJORS

"Suggested curricula" in applied mathematics is the subject of a brochure informing high school students of the importance of mathematics as a foundation for a career in many areas--from linguistics to systems engineering. This pamphlet has been distributed to all math majors, to the state's high school counselors, and in response to all inquiries from high school students.

G. PROFESSIONAL SERVICE

All members of the department are active in their profession in a variety of capacities, such as refereeing original research papers submitted to journals by mathematicians from all over the world, refereeing proposals to federal funding agencies, reviewing for the standard review journals in mathematics, serving as visiting lecturers in programs conducted by the various professional societies, serving on the governing boards of professional journals, serving as officers in professional societies, chairing national professional meetings, serving as referees, editorial advisors, and consulting editors for publishing houses, supervising national mathematics competitions, and serving on many departmental, college, and university committees. A list of the contributions of individual faculty consumes nearly five pages and so, is not attached to this report.

H. PROFESSIONAL MEETINGS ATTENDED

New Mexico State University is neither in a major population center nor on a heavily travelled cross-continental route, and so each faculty member is encouraged to attend at least one professional meeting annually. It is felt that this is necessary for the maintenance of professional competence in the department. This past year, the department has been able to provide at least partial support for every faculty member desiring to attend a professional meeting.

I. RESEARCH PAPERS PUBLISHED

- Arnold, David, "Grothendieck and Whitehead Groups of Torsion-Free Abelian Groups," Bulletin of the American Mathematical Society.
- Arnold, David, "A Class of Pure Subgroups of Completely Decomposable Abelian Groups," Proceedings of the American Mathematical Society.
- Bagby, Richard, "Translation-Dilation Invariant Estimates for Reisz Potentials," Indiana Journal of Mathematics.
- Berg, Gordon, "Metric Characterizations of Euclidean Spaces," Pacific Journal of Mathematics.
- Cheng, Henry, "A Constructive Riemann Mapping Theorem," Pacific Journal of Mathematics.
- Gaughan, Edward, College Algebra, Brooks/Cole Publishing Company.
- Johnson, Donald, "Functions with Pseudocompact Support," General Topology and Its Applications (with M. Mandelker).
- Knoebel, Arthur, "Products of Independent Algebras with Finitely Generated Identities," Algebra Universalis.
- Knoebel, Arthur, "A Simplification of the Functional Completeness Proofs of Quackenbush and Sierpiński," Algebra Universalis.

- Krueger, Warren, "Generalized Steenrod-Hopf Invariants for Stable Homotopy Theory," Proceedings of the American Mathematical Society.
- Liebert, Wolfgang, "The Jacobson Radical of Some Endomorphism Rings," Journal fur die Reine und Angewandte Mathematik.
- Mandelker, Mark (see Johnson, Donald).
- Randolph, Paul, "Optimal Stopping Rules for Sequencing," Operations Research.
- Randolph, Paul, "How to Beat Monte Carlo," Transactions of the Eighteenth Conference of Army Mathematicians.
- Randolph, Paul, "Multinomial Stopping Rules with Applications to Missile Range Scheduling," Transactions of the Eighteenth Conference on the Design of Experiments in Army Research, Development, and Testing.
- Randolph, Paul, "A Network Learning Model with GERT Analysis," Journal of Mathematical Psychology.
- Richman, Fred, "Detachable P-Groups and Quasi-Injectivity," Acta Mathematica (Hungary).
- Richman, Fred, "The Constructive Theory of Countable Abelian P-Groups," Pacific Journal of Mathematics.
- Richman, Fred, "Constructive Aspects of Noetherian Rings," Proceedings of the American Mathematical Society.
- Richman, Fred, Mathematics for the Liberal Arts Student, Second Edition (with C. Walker and R. Wisner), Brooks/Cole Publishing Company.
- Rogers, Gerald, "On Products of Powers of Generalized Dirichlet Components With an Application," Canadian Journal of Statistics (with D. Young).
- Swartz, Charles, "Fourier Transforms of Convolution Operators," Studia Mathematica.
- Swartz, Charles, "The Product of Vector-Valued Measures," Bulletin of the Australian Mathematical Society.
- Swartz, Charles, "Absolutely Summing and Dominated Operators on Spaces of Vector-Valued Continuous Functions," Transactions of the American Mathematical Society.
- Swartz, Charles, "An Operator Characterization of Vector Measures Which Have Radon-Nikodym Derivatives," Mathematische Annalen.
- Swartz, Charles, "Linear Operators on C^x ," Czechoslovak Mathematical Journal (with G. D. Alexander).
- Swartz, Charles, "Weakly Compact Operators from a B-Space Into the Space of Bochner Integrable Functions," Colloquium Mathematicum.
- Swartz, Charles, "Vector Measures and Nuclear Spaces," Revue de Mathématiques Pures et Appliquées.
- Thomas, John, "Computations of Fourier Integrals of Exponentials of Truncated Fourier Series," Journal of Computational Physics.
- Thomas, John, "The Homology of Uniform Spaces," Canadian Journal of Mathematics (with M. Bahauddin).
- Walker, Carol, "Local Quasi-Isomorphisms of Abelian Groups," Illinois Journal of Mathematics.

- Walker, Carol (see Richman, Fred).
- Walker, Elbert, "Ulm's Theorem for Totally Projective Groups," Proceedings of the American Mathematical Society.
- Walker, Elbert, "The Groups P_β ," Proceedings of the Rome Conference on Abelian Groups.
- Walker, Elbert, "An Algebraic Treatment of Algebraically Compact Groups," Rocky Mountain Journal (with M. Legg).
- Walker, Elbert, "Notes Based on Three Lectures at the University of Arizona," Proceedings of the Special Semester on Infinite Abelian Groups.
- Wisner, Robert (see Richman, Fred).
- Young, Dennis, "On the Max U-ration and Likelihood Ratio Tests of Equality of Several Covariance Matrices," Communications in Statistics (with K. C. S. Pillai).
- Young, Dennis, "Initial Attitude Differences Among Successful, Procrastinating and Withdrawn-from-course Students in a Personalized System of Statistics Instruction," Journal of Research in Mathematics Education (with P. L. Newman, S. E. Ball, C. C. Smith, and R. B. Purtle).
- Young, Dennis, "A Personalized System of Instruction in an Undergraduate Mathematics Service Sequence," American Mathematical Monthly (with H. E. McKean and F. L. Newman).
- Young, Dennis, "Testing and Estimation When a Normal Covariance Matrix Has Interclass Structure of Arbitrary Order," Communications in Statistics (with G. S. Rogers).
- Young, Dennis (see Rogers, Gerald).
- Zund, Joseph, "Sur le Spineur de Lanczos en Relativité Générale," Comptes Rendus, Hebdomadaires des Séances de l'Académie des Sciences, Séries A (Paris).
- Zund, Joseph, "Degenerate Gravitational Fields with Twisting Rays III," Lettere al Nuovo Cimento.
- Zund, Joseph, "A Note on the Born-Infeld Field Theory," Tensor.
- Zund, Joseph, "Electromagnetic Theory in General Relativity III: the Structure of Sources," Tensor.

J. RESEARCH PAPERS PRESENTED

- Arnold, David, "Algebraic K-Theory and Torsion Free Abelian Groups," Conference on Algebraic K-Theory (regional).
- Arnold, David, "Abelian Groups, A, Such That $\text{Hom}(A, -)$ Preserves Direct Sums of Copies of A," American Mathematical Society (national).
- Bagby, Richard, "Parabolic Potentials with Support on a Half-Space," American Mathematical Society (national).
- Bagby, Richard, "Another Look at Hardy's Inequality," Mathematics Association of America (regional).
- Boes, Eldon, "Gambling Systems and How they (Don't) Work," National Council of Teachers of Mathematics (regional).
- Boes, Eldon, "A Large Scale College-Level PSI Program in Mathematics," Colorado Council of Teachers of Mathematics (regional).

- Boes, Eldon, "A Proposal for a High School-Level Probability Course," Southeast Section, New Mexico Education Association (regional).
- Gaughan, Edward, "The Fine Art of Guessing," National Council of Teachers of Mathematics (national and regional meetings).
- Hosford, Philip, "Some Interesting Properties of Fibonacci Sequences," National Council of Teachers of Mathematics (regional).
- Julian, William, "Pulsar Electrodynamics II," American Astronomical Society (national).
- Julian, William, "Is the Pulsar Magnetosphere Problem Well-Posed?" American Mathematical Society (national).
- Knoebel, Arthur, "A Decomposition Theorem for Multi-Sorted Algebras," American Mathematical Society (regional).
- Knoebel, Arthur, "A Radical Table of Primes," Mathematical Association of America (regional).
- Kruse, Arthur, "Classes of Big Classes," American Mathematical Society (national).
- Kruse, Arthur, invited paper, "Special Session on Set Theory and the Axiom of Choice II," American Mathematical Society (national).
- Mandelker, Mark, invited address, "Round Sets," Conference on Rings of Continuous Functions (international).
- Mines, Ray, "Completions of Abelian Groups," American Mathematical Society, Special Sessions on Abelian Groups (national).
- Mines, Ray, "On a Kronecker Theorem and Factoring of Polynomials," Mathematical Association of America (regional).
- Randolph, Paul, "A Cotton-Pickin' Cotton Ginning Problem," 44th Annual Meeting of Operations Research Society of America (national) and Norsk Regnesentral, Oslo, Norway.
- Randolph, Paul, "How to Choose a Wife," New Mexico Council of Teachers of Mathematics (regional).
- Richman, Fred, "Constructive Techniques in Abelian Group Theory," American Mathematical Society (national).
- Richman, Fred, "A New Look at PID's," Mathematical Association of America (regional).
- Rogers, Gerald, "Powers Dirichlet Components," Institute of Mathematical Statistics (national).
- Rogers, Gerald, "Generalized Inverses," Mathematical Association of America (regional).
- Walker, Carol, invited address, "Local Quasi-Isomorphisms of Torsion Free Abelian Groups," American Mathematical Society, Special Session on Abelian Groups (national).
- Walker, Elbert, "Ulm's Theorem for T^* Modules," American Mathematical Society (national).
- Williams, Francis, "Multi-Index Products," California Algebraic and Geometric Topology (regional).
- Williams, Francis, "Homotopy Commutativity," California Algebraic and Geometric Topology (regional).

- Williams, Francis, "Higher Samuelson Products," London Topology Seminar (regional).
- Wisner, Robert, "Triangles with a Given Perimeter," National Council of Teachers of Mathematics (regional).
- Young, Dennis, "Testing Equality of Several Covariance Matrices," Conference on Multivariate Statistical Analysis.
- Young, Dennis, "Testing and Estimation when a Normal Covariance Matrix has Intraclass Structure of Arbitrary Order," Institute of Mathematical Statistics (national).
- Young, Dennis, "A Validity Test of a Computer Voting Model," Midwest Political Science Association Conference (regional) (with N. Schechter).

M. GRANTS AND PROPOSALS

Grants in Force

Elbert Walker.	\$22,000 (NSF)
David Arnold	5,300 (NSF)
Robert Wisner.	10,100 (NSF)

N. CRITICAL ANALYSIS

During the past year, the department has experienced three program reviews and has itself initiated a program of self-study. The latter resulted in a broadening of programs to better equip students to satisfy the current demands of society. The faculty is studying the feasibility of a series of interdisciplinary programs and has reached the stage of debating recommended curricula.

The department made strong efforts for better management and efficiency of the Mathematics Learning Center and had measurable success in this area. The completion rate has been improved and user complaints reduced. The faculty is now in the process of considering additional programs for the learning center to make more efficient use of the resources available there.

One of the primary goals of the department during the past decade has been to achieve excellence in mathematical research. In a recent study of "research production" of mathematics departments in the United States, the department ranked very near the top of those departments in institutions comparable to or better than NMSU. In spite of recent deliberate reduction in federal support for mathematics, the department feels that the interest of the university is best served by continued excellence in mathematics and so devotes a substantial portion of its efforts to the creation of new and original mathematics.

In addition to its research efforts, the faculty exhibits a strong dedication to teaching on all levels and to service to the university and state communities. Thirty-six out of an average of 64

lower-division courses taught in the department each semester are taught by faculty. In addition, six faculty spent at least half their teaching time in the learning center. During the past year, the department has contacted and attempted to accommodate the users of mathematics courses and to involve them in the determination of course content, level, and format. The department has inaugurated workshops for high school teachers and has repeatedly encouraged the administration to make this a universitywide program. In the latter, the department has been unsuccessful. The reduced department resources can no longer support the high school teacher workshop endeavor. Several department faculty members have visited many New Mexico high schools, encouraging students to attend New Mexico State University.

The department has available, through its faculty, wide consulting expertise in areas such as applied mathematics, probability and statistics. Several of the faculty in "pure mathematics" have extended their range of competence to include areas like computer science, numerical analysis, operations research, probability and statistics in order to meet the growing demand for courses in these areas of mathematics.

The academic community of the United States is in a period of reduced faculty mobility; and yet, this mobility contributes heavily to the dissemination of new ideas and the vitality of a university faculty. Perhaps it would be possible to inaugurate a program of faculty exchanges with other universities. The department has also annually appealed to the administration for a portion of sabbatical salary saving to facilitate a program of bringing mathematicians on sabbatical leaves from other universities to the NMSU campus. We would like to take this opportunity to renew that appeal, for it is our belief that the influx of new ideas would contribute heavily to the continued growth of our own faculty and students.

J. STATUS OF LRP 1973-77

1. Education, pp. 18-19, bb.
 - a. Item (1): Some seminars are in progress and efforts will continue.
 - b. Item (2): N/C.
 - c. Item (3): Attempted and failed.
 - d. Item (4): Accomplished and continuing.
 - e. Item (5): Not accomplished.
 - f. Item (6): Inoperative--no support.

g. Item (7): Accomplished for 1973-74.

h. Items (8), (9), (10), and (11): N/C.

2. Research and Creative Effort.

In its own long-range planning report, the department attempted to communicate a strong interest in and dedication to the creation of original mathematics and its commitment to scholarly endeavor. Unfortunately, and much to our sorrow, this commitment was not recorded in the Long-Range Planning Report published to the university. And so, we would like to reiterate here that this facet of our departmental function continues to be of prime importance.