Department of Mathematical Sciences

New Mexico State University

Annual Report 1966-67

ORGANIZATION

To save staff time, an attempt has been made this year to have certain things done by small working groups and committees which could present definite proposals for consideration at staff meetings. Staff meetings were held about every three weeks on an average. An overall review of the department's academic program has been in progress with several committees, some of which have representation from other departments, to consider different parts of the mathematics program (for example, service courses, statistics, etc.).

COLLOQUIA AND FACULTY SEMINARS

Weekly faculty-student seminars on algebraic topology, differential topology, functional analysis, group theory, and number theory were conducted during the academic year. Some other seminars were conducted on a less regular basis as interest in miscellaneous topics dictated a need.

The fourth annual Holiday Symposium in mathematics was held during the period of December 2S through December 31. The featured lecturer this year was Professor Saunders MacLane of the University of Chicago, whose topic was '1Closed Categories and Iterated Homotopies." Approximately 55 mathematicians attended. Many of these were from surrounding areas, but a number came from such places as Arkansas, Illinois, Oklahoma, Michigan, New York, Washington, and Canada.

The dedication of the new Mathematical Sciences building was held on December 27, with President Corbett presiding. Mr. D. W. Reeves, President of the NMSU Board of Regents, declared the building to be named Walden Hall in honor of Dr. Earl Walden, former Dean of the Graduate School. The dedication address was given by Mr. James E. Webb of the National Aeronautics and Space Administration: Dr. Ralph Grouch, former Department head, gave a brief history of the Department. As a separate part of the dedication program, panel discussions on doctoral programs in mathematics were held. Among the panel members were Professor MacLane, Drs. William Rosen and Ralph Krause of the National Science Foundation, Professor J. R. Blum of the University of New Mexico, and Professor Crouch now at the Drexel Institute of Technology.

The Department had 35 colloquium speakers during the year. They are listed below along with the title of their presentation. While all, through their accomplishments, are distinguished, we have starred those who, for one reason or another, might be regarded as especially "distinguished."

1. C. H. S. Bear, University of California, Santa Barbara, "An Integral Kernel for Abstract Harmonic Functions"

2. Harlley McKean, Purdue University, "The Mutant Survival Problem"

3. *Jerry Neyman, University of California, Berkeley "Some Current Research in Statistics"

4. Peter Grosse, Michigan State University, "Homomorphisms of Abelian Groups"

5. Harry H. Corson III, University of Washington, "A Certain Mathematical Theorem"

6. *J. H. Laning, Massachusetts Institute of Technology, "An Experimental List Processing Program and Project Applications"

7. *I. Satake, University of California, Berkeley, "Holomorphic Imbeddings of a Cartan Domain of Type IV into a Siegel Space"

8. Jean Benabou, University of Chicago, "A Certain Categorical Theorem"

9. Robert V. Moody, University of Saskatchewan, "Some Infinite Dimensional Analogs"

10. James Dugundji, University of Southern California, "Comparison of Homologies"

11. Robert Korfhage, Purdue University, "The Bandwidth of Graphs"

12. V. S. Varadarajan, University of California, Los Angeles, "On the Ring of Polynomials of a Semi-simple Lie Algebra"

13. Michael B. Freeman, Brandeis University "Uniform Approximation by Differentiable Functions"

14. Philip Nanzetta, Case Institute of Technology, "Maximal Lattice-Ordered Algebras of Continuous Functions"

15. Thomas H. Creese, University of Kansas, "Almost Proper Mappings"

16. Edward T. Kobayashi, Haverford College, "On the Integrability of a Certain G-Structure"

17. Jack Cohen, Courant Institute of Mathematics, New York University "Asymptotic Theory of the Heat Equation"

18. *Rimhak Ree, University of British Columbia, "Characters of Finite Chevalley Groups"

19. Robert B. Warfield, Jr., Harvard University, "Complete Abelian Groups and Injective Modules"

20. N. Wigley, University of Arizona, "Corner Behavior of Solutions of Elliptic Partial Differential Equations"

21. James F. Hurley, University of California, Riverside, "Scalar Replacement in Lie Algebras"

22. *Warren Ambrose, Massachusetts Institute of Technology, "Some Geometric Remarks on Partial Differential Equations"

23. R. S. Freeman, University of Maryland, "Existence and Regularity Theorems for Elliptic Boundary Value Problems"

24. Richard L. Faber, University of Pennsylvania, "Siegel's Mean Value Theorems and Homogeneous Spaces"

25. *R. Creighton Buck, University of Wisconsin, "Solutions of Functional Equations"

26. Murray Klamkin, Research Center, Ford Motor Company, "On Some Inverse Problems in Mechanics"

27. Ladnor D. Geissinger, Purdue University, "Maximal Henselian Fields"

28. Andre de Korvin, University of California, Los Angeles, "Expectations in Von Neumann Algebras"

29. Stephen Weingram, Purdue University, "The Characteristic Function of a Graded Linear Transformation"

30. Donald R. Chalice, Northwestern University, "Function Algebras and Supports of Measures"

31. Don Morrison, Sandia Corporation "A Library Automaton"

32. Bruce Wood, Lehigh University, "Generated Bernstein Polynomials"

33. Judah Rosenblatt, University of New Mexico, "Multistage Estimation"

34. *John C. Moore, Princeton University, "The Structure of Hopf Algebras"

35. *Merle M. Andrew, Director of Mathematical Sciences, Air Force Office of Scientific Research, "Some Remarks on AFOSR Support of Research in Mathematics"

UNDERGRADUATE SCHOLARSHIPS

Department of Mathematical Sciences Freshman Scholarships - 10 (Source: Departmental Funds)

Physical Science Laboratory Freshman Scholarships 1 (Source: Physical Science Laboratory)

GRANTS AND CONTRACTS IN FORCE DURING YEAR

National Science Foundation Departmental Development Grant $700,000

National Science Foundation Facilities Grant $209,750

E. A. Walker and C. L. Walker, National Science Foundation Research Grant $ 39,600

L. Solomon, National Science Foundation Research Grant $ 11,600

J. Loustaunau, Air Force Office of Scientific Research, Research Grant $ 8,106

R. J. Wisner, National Science Foundation, Holiday Mathematics Symposia $ 6,500

J. D. Thomas and E. Gaughan, National Science Foundation, Summer Institute for College Teachers $ 46,200

GRADUATE SCHOOL SUCCESS OF GRADUATES

We have instituted procedures this year which we hope will enable us to be better informed in the future. As it stands, we only have informa-tion about those majors who have remained at NMSU for graduate work. Karl Jerry Melender (B.S., June 1965) received his M.S. this June from us and has accepted a job at Los Alamos Scientific Laboratory. Michael Joel Carroll and Robert Hausser (both B.S., August 1965) are expected to complete their masters degrees during the summer of 1967. Carroll will remain at NMSU and work towards a Ph.D. Hausser has accepted a teaching position at State University College at Oneonta, New York.

IMPROVEMENTS

Instruction

The use of large lecture sections taught by senior faculty members in conjunction with small recitation sections taught by teaching assistants, was continued in most of our freshman and sophomore courses during the fall semester. However, in order to provide a basis for comparing the relative merits of large and small lecture sections, many of these (and in particular, the calculus sequence) were taught as small lecture sections by both faculty and teaching assistants during the spring semester. A questionnaire concerning this (and other matters) was given to the students during the final examination in such courses, and it would seem from the responses that the students preferred the small sections: 224 vs. 103 who preferred the large lecture sections with small recitation sections, and 45 who thought the two were equally effective. Our teach-ing assistants were almost unanimous in preferring the greater challenge of a regular lecture section over the recitation section and, in general, the faculty prefer the small classes. The large lecture sections with recitation sections will not provide an economic advantage until larger classrooms become available. However, for certain courses, we do not have enough teaching assistants with the proper background to handle all the small sections necessary, and so for these, large lecture sections must be used.

Departmental finals were used in the calculus sequence courses this spring. With the proper mixture of departmental uniformity and diversity based on the instructor's judgment, these departmental finals have definite advantages where we have a large number of sections of the same course.

Drs. Hussain and Newman (of the Psychology Department) cooperated in the teaching of Math 261 and Psy 260 this spring. Basically, the two groups of students were combined for two of the three lecture hours during which time material common to the two courses was presented. They were taught in separate sections for the remaining hour, at which time applications of statistics to the different fields was discussed.

Curriculum

Undergraduate

The number of "honors" courses the Department offered was increased this year to provide a greater challenge to outstanding undergraduates. It is felt that the Department shou1d do as much or more for the out-standing students by means of honor courses as it does for the poorly prepared students by means of remedial courses. Both types of students need and appreciate such attention.

A special section of the first semester calculus course was taught to a select group of students from the Las Cruces High Schools. This was very successful and will be continued.

The grouping of students in recitation sections by areas of application (so that some of the material can be adapted to the students' major field) has been discussed and will be tried experimentally next year.

Graduate

A fairly extensive revision of the statistics offerings (both graduate and undergraduate) has been made, and a number of new courses have been added to provide the basis for a complete graduate program in mathematical statistics.

Several new courses have been added to reflect staff and student interests.

Library

Undergraduate

The library holdings are adequate. Library acquisitions have been super-vised this year by Dr. Thomas, who has worked with an undergraduate assistant, to see that all publications of significance are ordered.

Graduate

An improvement of major importance is the establishment of the mathematics reading room. This was delayed by the failure of shelving and furniture to arrive on time, and in fact some items are eight months late and have still not arrived. The process of stocking it has begun and should have progressed by fall to the point where it will be a really useful research facility. The library staff has been most helpful in the ordering and cataloging of these materials.

Advisor-Advisee Relations

No major change in the method of advising undergraduate students has been made this year. However, a thorough revision of the program for graduate students has been made. The plans adopted will have the effect of starting the graduate student under essentially Departmental "regulations" (a Departmental advisory committee, Departmental examination committee, etc.); but as he gains the background to choose his major area of interest, Departmental control will relax so that towards the end, a student's thesis advisor will exercise almost complete control over his program.

STUDENT MAJORS

The freshman scholarship program has provided the Department with some very good students (nine of the ten were on the Dean's honor list this year). This program of support for undergraduates is being expanded and will provide support for outstanding students during all four of the undergraduate years, and some special privileges relative to the use of Departmental facilities will be granted to these students. It might be noted that since 1960, about 27% of the students graduating with a major in mathematics were graduated with honors.

An intensive effort will be made next year to recruit graduate students. The fact that we have a relatively small Department with close contact between faculty and students will be used to attract students from the super-universities (such as University of California at Berkeley) where students have little contact with the faculty. Other features such as strength of faculty, fine physical facilities, etc., will also be emphasized. It is necessary to keep in mind that the lead time on students as well as faculty is lengthening---recruiting efforts must begin in the fall, and we must begin making offers of assistantships by January. For the best students, the deadline is basically the first of April.

We would also suggest that the University be prepared to offer some fellowships before receiving definite notification from NDEA, NSF, etc., accepting the risk of having to provide the support itself if no outside support develops. This would allow fellowship offers to go out earlier.

PROFESSIONAL SERVICE

Dr. Thomas served as Director of the Southwestern Regional New Mexico Science Fair.

Dr. Wisner was elected President of the Southwestern Region of the Mathematical Association of America. He serves regularly as an editorial consultant for McGraw-Hill and John Wiley and Sons Publishing Companies and consulting editor for Wadsworth Publishing Co. and the Brooks/Cole Publishing Co. Dr. Wisner is a member of the Undergraduate Panel of the Committee on Support of Research in the Mathematical Sciences a committee of the National Academy of Sciences - National Research Council, which advises the administration, congress, and agencies of the Federal Government on how funds should be appropriated for proper support to the mathematics community. He is also on the Board of Directors, Center on Research in Curriculum in Science and Mathematics, and he served as a member of an Ad Hoc Committee of the U.S. Office of Education, Title III.

Drs. Loustaunau and Wisner made several trips to the University of Chihuahua to establish channels for cooperation between that university and New Mexico State University and to advise the members of the staff at Chihuahua on some alternate methods of handling the mathematics curriculum. In this connection, Dr. Wisner and Senor Luis Lopez of the University of Chihuahua went to the offices of the Ford Foundation in New York seeking funds for an extension of these efforts.

Dr. Randolph is an associate Editor of Operations Research, a publication of the Operations Research Society of America.

Several members of the Department write reviews of research papers for the Mathematical Review and Zentralblatt, some referee papers for professional journals, and some have refereed proposals submitted to the National Science Foundation. One served on a National Science Foundation panel which picked the recipients of NSF Graduate Fellowships.

MEETINGS ATTENDED BY FACULTY

Dr. J. Mack Adams, Fall Joint Computer Conference, (National).

Dr. John B. Giever, Annual Summer Meeting of MAA and AMS, (National); Annual Meeting of AMS, (National); Fall Joint Computer Conference, (National).

Dr. Philip L. Hosford, National Council of Teachers of Mathematics, (National).

Dr. Khateeb M. Hussain, Fall Joint Computer Conference, (National); American Economics Association, (National).

Dr. Donald G. Johnson, Annual Summer Meeting of MAA and AMS, (National); Annual Meeting of AMS, (National); Six Hundred Fortieth Meeting of 1tSociedad Matematica Mexicana and AMS,Tv (International).

Dr. Joseph Kist, Annual Meeting of AMS, (National).

Dr. Warren M. Krueger, Annual Meeting of AMS, (National).

Dr. Satindar Kumar, Institute of Mathematical Statistics, (National).

Dr. Wolfgang Liebert, Annual Meeting of AMS, (National); Meeting of AMS, (Regional); Colloquium on Abelian Groups, Montpellier, France, (International).

Dr. Joaquin Loustaunau, Annual Summer Meeting of MAA and AMS, (National); AFOSR 12th Science Seminar, (National).

Dr. Ray Mines, Second Annual Conference on Pure and Applied Mathematics, (State); Colloquium on Abelian Groups, Montpellier, France, (International).

Dr. Fred Richman, Colloquium on Abelian Groups, Montpellier, France, (International).

Dr. Gerald Rogers, Annual Meeting of American Statistical Association, (National); Southwest Section Meeting of MAA, (Regional).

Dr. Charles Swartz, Annual Meeting of AMS, (National); Southwest Section Meeting of MAA, (Regional).

Dr. Vidya S. Taneja, Second Annual Conference on Pure and Applied Mathematics, (State); Institute of Mathematical Statistics, (National).

Dr. John D. Thomas, Second Annual Conference on Pure and Applied Mathematics, (State).

Dr. Daya-Nand Verma, Annual Meeting of AMS, (National).

Dr. Carol L. Walker, Southwest Section Meeting of MAA, (Regional); Colloquium on Abelian Groups, Montpellier, France, (International).

Dr. Elbert A. Walker, Southwest Section Meeting of MAA, (Regional); Colloquium on Abelian Groups, Montpellier, France, (International).

Dr. Francis D. Williams, Annual Summer Meeting of MAA and AMS, (National).

Dr. Robert J. Wisner, Annual Summer Meeting of MAA and AMS, (National); Annual Meeting of AMS, (National); National Council of Teachers of Mathematics, (National); Tennessee High School Teachers Meeting, (State); Second Annual Conference on Pure and Applied Mathematics, (State); Southwest Section Meeting of MAA, (Regional); Annual Meeting of National Council of Teachers of Mathematics, (National).

RESEARCH PAPERS PUBLISHED BY FACULTY

Adams, J. Mack, "A Note on Homotopy Theory", The American Mathematical Monthly, June, 1967. (National)

Hosford, Philip L. and Cleek, Montein, To Be in.' Start With The First Day, Bronson Printing Co., Las Cruces, New Mexico, 1966, 18 pp. (State)

Johnson, D. G. and Mack, J. E., "The Dedekind Completion C(x)", Pacific Journal of Mathematics, Vol. 20, No. 2, 1967.

Kist, Joseph, "Some Applications of the Interior Mapping Principle" The American Mathematical Monthly.

Knoebel, R. Arthur, "Kth Order Automata", Notices, A.M,S., 14:2, February 1967, p. 287.

Liebert, Wolfgang, Charakterisierung der Endomorphismenring Endlicher Abelscher Gruppen't, Archiv der Mathematik, Vol. 18, 1967, pp. 128-135.(International)

C.Liebert, Wolfgang, "Die Minimalen Ideale der Endomorphismenringe Abelscher p-Gruppen", Mathematische Zeitschrift, Vol. 97, 1967, pp. 85-104. (International)

Loustaunau, Joaquin and Krishnamurthy, V., "On the State Diagram of a Linear Operator and Its Adjoint in Locally Convex Spaces, I", Mathematische Annalen, 164, 176-206, 1966. (International)

Taneja, Vidya S., "On Tests of Trend in a Weakly Stationary Time Series", Technical Report, Department of Statistics, University of Connecticut, Storrs, Connecticut, 1966. (Regional)

Walker, Carol, "Relative Homological Algebra and Abelian Groups", Illinois Journal of Mathematics, 10 (1966), pp. 186-209. (State)

Walker, Carol and Richman, Fred, "On a Certain Purification Problem for Primary Abelian Groups", Bulletin of Mathematical Society of France, 94 (1966), pp. 207-210. (International)

Walker, Elbert A. and Walker1 Carol L., "Quotient Categories of Modules", Proceedings of the Conference on Categorical Algebra, Springer-Verlag Berlin, 1966. (International)

Williams, Francis D., "Higher Homotopy Commutativity of h-Spaces", Abstract, cesA.M.S., August1 1966. (National)

Wisner, Robert J. and Richman, Fred and Walker, Carol, Mathematics for the Liberal Arts Student, Brooks/Cole Publishing Co., 1967. (National)

RESEARCH PAPERS PRESENTED AT MEETINGS BY FACULTY

Hosford, Philip, "Logic in the Schools", El Paso Council of Teachers of Mathematics Meeting, November 5, 1966. (City)

Hosford, Philip, "Multi-Text Approach in Arithmetic", NMEA Convention, October, 1966. (State)

Hosford, Philip, "Philosophy of the New Math", All Elementary Principals from Las Cruces City Schools Meeting, December 2, 1966. (City)

Liebert, Wolfgang, "Endomorphism Rings of Abelian p-Groups", Colloquium on Abelian Groups, Montpellier, France, June 4-11, 1967. (International)

Liebert, Wolfgang, "The Minimal Ideals of the Endomorphism Ring of an Abelian p-Group", American Mathematical Society Meeting, San Jose, California, April 22, 1967. (National)

Mines, Ray, "A Family of Functors Defined on Generalized Primary Groups", Colloquium on Abelian Groups, Montpellier, France, June 4-11, 1967. (International)

Mines, Ray, "Normal Numbers", 2nd Annual Conference on Pure and Applied Mathematics, NMIMT, Socorro, New Mexico, February 24-26. (State)

Randolph, Paul H., "On the Determination of Interceptor Radar Sites", Office of Aerospace Research, Holloman AF. B., New Mexico, August 15, 1966. (Regional)

Richman, Fred, "Simple Invariance of Rank 2 Torsion Free Groups1', Colloquium on Abelian Groups, Montpellier, France, June 4-11, 1967. (International).

Taneja, Vidya S., "Surveillance Models", 2nd Annual Conference on Pure and Applied Mathematics, NMIMT, Socorro, New Mexico, February 24-26. (State)

Thomas, John D., "The Think-A-Dot", 2nd Annual Conference on Pure and Applied Mathematics, NMIMT, Socorro, New Mexico, February 24-26. (Stat)

Walker, Carol L., " Distingui shed Classes of Groups", Colloquium on Abelian Groups, Montpellier, France, June 4-11, 1967. (International)

Walker, Elbert A., "An Extension of Ulm's Theorem", Colloquium on Abelian Groups, Montpellier, France, June 4-11, 1967. (International)

Williams, Francis D., "Higher Homotopy Commutativity"¶, A.M.S. Summer Meeting, August 1966. (National)

Wisner, Robert J., "How Many Primes are There?'1, 2nd Annual Conference on Pure and Applied Mathematics, NMIMT, Socorro, New Mexico, February 24-26. (State)

Wisner, Robert J., "Matrix Number Theory", "Unique Factorization", and "Where is Math Education Going¿`) Tennessee Math Teachers Association Meeting, October 7-11. (State)

RESEARCH PAPERS OF FORMER GRADUATE STUDENTS

Our records of the publications of former students are not complete.

Dickson, Spencer, "Noetherian Splitting Rings Are Artinian", The Journal of the London Mathematical Society, 42, 1967.

Dickson, Spencer, "Note on Hypernilpotent Radical Properties for Associative Rings", Canadian Journal of Mathematics, 14, 1967, 447-448.

Dickson, Spencer, "A Torsion Theory for Abelian Categoriest", Transactions of the American Mathematical Society, 121, 1966, 223-235.

Hall, Carl E., "Projective Topological Groups", Proceedings of American Mathematical Society, June 1967.

Lacey, H. Elton, (with Peter D. Morris), "Continuous Linear Operators on Spaces of Continuous Functions", Proceedings of the American Mathematical Society, 1966, 17, 848-853.

Mader, Adolf, "On the Normal Structure of the Automorphism Group and the Ideal Structure of the Endomorphism Ring of Abelian p-Groups", Publicationes Mathematicae, Debrecen 13, 123-137,1966.

Mader, Adolf, "A Note on Direct and Semi-direct Products of Groups", Mathematische Zeitschrift, 95, 272-275, 1967.

Mader, Adolf, (with D. L. Boyer), "A Presentation Theorem for Abelian Groups with No Elements of Infinite p-Height", Pacific Journal of Mathematics, 20, 31-33, 1967.

Mitchell, A. Richard and Mitchell, Roger W., "Some Structure Theorems for Infinite Abelian p-Groups", Journal of Algebra, Vol. 5, No. 3, March 1967.

Porter, Jack R., "A Noncompact, H-closed Spaces and Semi-regular Spaces", Technical Report, Oklahoma University Mathematics Depart-ment, Preprint No. 41, 1966, 41 pp.

Porter, Jack R., "A Note on Common Fixpoints for Commuting Functions", Technical Report, Oklahoma University Mathematics Department, Preprint No. 39, 1966, 4 pp.

Walker, Carol, "Relative Homological Algebra and Abelian Groups", Illinois Journal of Mathematics, 10, 1966, pp. 186-209.

Walker, Carol, (with Fred Richman), "On a Certain Purification Problem for Primary Abelian Groups", Bulletin of Mathematical Society of France, 94, 1966, pp. 207-210.

Walker, Carol, (with Fred Richman and Robert J. Wisner), Mathematics for the Liberal Arts Student, Brooks-Cole Publishing Co., 1967.

Walker, Carol, (with Elbert A. Walker), "Quotient Categories of Modules" ,Proceedings of the Conference on Categorical Algebra La Jolla. 1965, Springer-Verlag, Berlin 1966, pp. 404-420.

Whitley, Robert, "Projecting m Onto C_0 " American Mathematical Monthly, 73, l966, 285-286.

ACHIEVEMENT OF ALUMNI

We have almost no information on former students who received the bachelors or masters degrees, and even the following information for doctoral students is regrettably incomplete.

Dr. Ralph Ball is Chairman of the Department of Mathematics at the New Mexico Institute of Mining and Technology.

Dr. Spencer Dickson was an ONR Post-doctoral Research Associate at the University of Oregon this year.

Dr. Elton Lacey received a Post-doctoral Resident Research Associateship for the National Academy of Sciences; he will spend the year at the Manned Spacecraft Center in Houston, Texas.

IMPROVEMENT OF INSTRUCTIONAL EQUIPMENT

A major item of instructional equipment acquired this year is the new mathematical sciences building - Walden Hall. It contains 36 staff offices, 55 offices for teaching assistants, 6 classrooms (one containing 33 desk calculators for use in statistics and numerical analysis), 3 seminar rooms, a conference room, a staff reading room, and space for administration and storage. The building was built with the aid of an NSF matching funds grant. It is a significant improvement over the facilities previously available. The Staff Reading Room in Walden Hall, when adequately stocked with books, will itself represent a major item of instructional equipment since, in many respects, a library is the mathematicians laboratory. Many items of equipment, such as projectors in all the classrooms, etc., that were necessary to adequately furnish this building might have been individually mentioned in other years: This year they are a relatively small part of this $650,000 facility.

PROPOSALS RESULTING IN GRANTS

Dr. E. Walker, Dr. C. Walker, Dr. Richman, Dr. Mines, NSF Research Grant $49,700

Dr. Williams, NSF Research Grant $8,200

GRANT PROPOSALS PENDING

Dr. Bear, NSF Proposal for Faculty Research Grant $25,868

Dr. Tanaja, NSF Proposal for Faculty Research Grant $22,398

NSF Proposal for Holiday Mathematics Symposium $10,496

NSF Proposal for Summer Institute for College Teachers of Mathematics $55,160

ANALYSIS

An analysis of the Department for the past year must bear in mind the fact that it has received a National Science Foundation Departmental Development Grant and is committed to achieving certain goals that were set forth in the proposal which resulted in the grant. Basically, these goals were to make a significant increase in the size and quality of the mathematics staff, students, and program. Thus, in the following we will consider these items separately as well as facilities and supporting services.

We have certainly attracted an impressive list of new staff for next year:

Reinhold Baer, University of Frankfurt, Distinguished Professor

Herbert S. Bear, Jr., University of California, Santa Barbara, Professor

Otto H. Kegel, University of Tubingen, Visiting Professor

Edward I. Kobaycishi, Haverford College, Associate Professor

Harlley B. McKean, Purdue University, Director of Statistics Laboratory, Associate Professor

James J. Meaders, Los Alamos High School, Visiting Associate Professor

Robert V. Moody, University of Saskatchewan, Assistant Professor

Richard S. Pierce, University of Washington, Visiting Professor

Jutta Hausen, University of Frankfurt, Post-doctoral Fellow

Ulrich Schoenwaelder, University of Frankfurt, Post-doctoral Fellow

Robert B. Warfield, Jr., Harvard University, Post-doctoral Fellow

Of these, Professor Baer is certainly the most famous; he would be a welcome addition to the faculty of any university in the world, and he fully deserves the title extended to him. To have also added R. S. Pierce and 0. Kegel as Visiting Professors along with H., S. Bear, F. Kobayashi, etc., to the permanent staff in one year is a source of real satisfaction. And, of course, we take pride in having a fine young Ph.D. from Harvard accept a Post-doctoral Fellowship in the Department.

However, it will be noted that we have not been able to broaden the Department as much as we had hoped in

a number of areas of mathematics. Our greatest strength is in algebra, and to gain international recognition and convince NSF of our accomplishments, we must build on this strength. Nevertheless, we must make increasing efforts to attract more staff of equal quality in other areas of mathematics. This will not be easy, because we cannot expect to have an equivalent numerical strength in all areas of mathematics.

Although we had considerable success in our staff efforts, it might be noted that we lost some opportunities. This was primarily for two reasons. In some cases, it turned out that even with the NSF support, our salary schedule (largely on the full professor level) was not competitive with some of the better institutions in the country. In other cases, we did not make offers because, after the budget was fixed, we did not have as many positions available as had been anticipated--this hurt us badly in the attempts to broaden the Department, since many of the offers in areas of our present strength had been made last fall.

It must be carefully noted that the accomplishment outlined above is a definite testimonial to the dedication and high quality of the present staff, and it is vital that this be recognized. In particular, the Department will quickly disintegrate if we develop a bimodal salary scale in the Department.

With respect to students, we have been quite pleased with our efforts on the undergraduate level. Next year, we will have an amazingly fine group of 27 undergraduates supported by scholarships. However, on the graduate level, results have been disappointing. For one thing, the stipends we pay to teaching assistants are becoming less competitive; and because of new pay schedules, some students (in a sense, rightly, but still, unfortunately) actually received a cut in pay. Another item was the fact that personnel in both the Department and the graduate office were new; as a result, the handling of some of the paper work led to serious delays in making assistantship offers. In this regard, we would like to suggest that it would simplify things if all forms, transcripts, etc., for students applying for assistantships or fellowships, be sent (by the applicant) directly to the Department, which would in turn transmit the proper forms to the graduate office. This is consistent with the fact that the deadline for assistantship offers is April 15, whereas the deadline for admission to the Graduate School is the following September. Certainly the recruiting of graduate students is a major problem that must receive full attention this coming year.

In regard to facilities, we have mentioned earlier in this report that there is a need for larger lecture rooms in the University if large lecture--small recitation classes are to have any economic advantage over the small class arrangement. We have, with the new mathematical sciences building, excellent facilities. This building was briefly described earlier, and we need only mention here that it also contains a departmental headquarters complex consisting of a reception area, secretarial room, work room, three staff offices, and an office for an administrative assistant. The supporting services provided the staff are centered in this area.

The Department has reached a size (over thirty staff and fifty teaching assistants and fellowship holders) that requires a professional secretarial staff--the operation has become too complex to depend on part-time help or student wives who usually stay less than two years. Considerable attention has been given this year to the problem of providing the staff with efficient and high quality support. The administrative assistant and senior secretary have been in the Department for a year and are fully capable of running the expanded headquarters complex. We feel that smooth running rules and regulations are for the purpose of providing time to devote to the exceptional cases that we expect, and even hope will arise; they are not an ideal to be religiously pursued. Thus, an attempt has been made to develop tidy procedures as a guide to the office staff and not as a mold for faculty and students.

The work on the departmental program during the past year can best be summarized by regarding it as a period of critical questioning--a necessary preliminary to any extensive changes. First steps toward a full program in statistics have been made, and considerable thought has been given to providing a more extensive program in applied mathematics. Small committees have looked at different segments of our program. Some of these committees have members from other departments, so that we can get a broader view of the

University's needs. The results of this question period are largely undigested at the present, but we expect that concrete results will begin to emerge next fall.