VOLUME VII

COLLEGE OF ARTS AND SCIENCES

LONG RANGE PLANS

TABLE OF CONTENTS

COLLEGE OF ARTS AND SCIENCES

DEPARTMENT OF JOURNALISM

DEPARTMENT OF JOURNALISM
Five and Ten Year Projections
September, 1968

Historical Summary

A major in journalism was established in 1933 with journalism a wing of the English Department. It became a separate department in 1939 with Mr. Cecil Horne as the head. Mr. Horne retired in 1951 and was succeeded by Mr. Russell Heitman who served until 1954 when Dr. William E. Hall assumed the headship. The incumbent replaced Dr. Hall in September, 1956.

The Department graduated 81 bachelors between 1933 and 1939. Since 1939 380 have graduated from this Department. Mrs. Louise C. Allen was the one faculty member of longest service, serving the institution from 1926 until her retirement in 1957. She was on the faculty of the Department of Journalism from its inception until retirement. Between 1938 and 1956, a number of faculty served for periods of varying years. I know the names of some of these people but have no records that show when they served or specifically how many were involved. A number taught part-time while working in the Department of Public Information. My impression is that conditions were unstable in this Department from its inception well into the 1950's.

I am aware that Mrs. Allen wrote a number of published newspaper features and magazine articles. There is no list available of other members of the Department in the earlier day. See Exhibit A in the Appendix for a list of publications of current members of the faculty.

Budgets for 1958-1968

1958-59	$20,475
1959-60	$21,625
1960-61	$23,250
1961-62	$32,966
1962-63	$30,719
1963-64	$32,070
1964-65	$33,620
1965-66	$38,175
1966-67	$42,480
1967-68	$61,038

Enrollment Tabulation
1957-1968

Year	Fall Semester	Spring Semester
1957-58	129	132
1958-59	149	120
1959-60	161	135
1960-61	160	143
1961-62	140	145
1962-63	183	189
1963-64	194	160
1964-65	242	243
1965-66	274	318
1966-67	419	411
1967-68	472	473

Departmental Budget Tabulation

Undergraduate Enrollment: Spring, 1968 473 registrants

Graduate Enrollment: Spring, 1968 18 registrants

Two full-time professors at $15,000 and $14,000

One Associate Professor at $11,000

One Assistant Professor at $10,230

Two part-time instructors at $2,156 and $1,648

Total space available to the Department: 18,605 square feet in the two-story and full basement Journalism Building

Research Activities: Dr. Charles L. Allen is completing a current research project and is preparing to undertake two additional projects. Professor Ralph L. Sellmeyer is at work on two books. Professor Robert A. Rooker is currently investigating a research project, and the Departmental Chairman has outlined three articles for professional journals, all of which he plans to complete this summer.

Service Activities: The Department sponsors an annual high school "J" Day in the early fall, runs the country's only two-week photo workshop sponsored by The Newspaper Fund, Inc., operates five high school workshops in summer months in newspapers, yearbooks, and photography, and serves as the headquarters and sponsor of the Southwestern Council of Student Publications. Additionally, we participate actively in several regional and state press associations. The faculty give frequent talks before career day groups, high school Quill and Scroll banquets, etc.

Current Budget:

Faculty Salaries	$54,034
Secretary's Salary	$ 3,540
Student Assistants	$ 720
Travel	$ 500
Maintenance	$ 4,200

Future Goals and Objectives

Through the past five years, this Department's enrollment has approximately doubled in proportion to the institution's enrollment. We can find no evidence that such growth rate will continue through the next decade. Consequently, we are using Miss Clewell's projections even though we suspect that they will be conservation where journalism is concerned.

The figure for total registrants stood at 472 in the 1967 fall semester. We anticipate total registrants of 600 by 1972 and 764 by 1977. This would necessitate the addition of two more faculty members. One man should be a specialist in radio-television and photography areas in which this Department should make steady growth. The other man should be knowledgeable in the field of advertising, particularly where the media (daily and weekly newspapers and radio-television) are concerned. We are not graduating a fraction of the advertising students needed to fill openings in our section of the state. The same is true of radio and television.

Curriculum

The following are objectives of our curriculum:

1. To maintain what we believe is a high standard of teaching in virtually all of our classes.

2. To lower the student-teacher ratio in certain writing classes in order to maintain high quality.

3. To improve and formalize a superior counseling program within the department.

4. To improve course work in such specialities as the magazine and public relations.

5. To expand Journalism 3318, Writing for Radio and Television, to two semesters.

6. To implement a graduate program leading to the Master's Degree.

7. To add a two-week summer short course (for credit) for high school teachers.

8. To add a two-week summer short course (for credit) for junior college students and teachers.

Facilities

The following goals are for increasing our facilities:

1. To expand typographic and photographic lab facilities in the basement of the Journalism Building.

2. To expand motion picture camera work in training for television news and public affairs reporting.

3. To make further use of projectors and other audiovisual equipment as well as miniature tape recorders in radio-television courses.

4. To add a small two-story and full basement addition to the Journalism Building for a total of 4455 square feet of new space.

In-Depth Improvements

1. Seek to maintain current national accreditation by the American Council on Education for Journalism.

2. Vitalize Kappa Tau Alpha, national journalism honorary whose chapter is new to this campus, to encourage and recognize high scholarship among our majors.

3. Continue emphasis on broad content as opposed to sheer technique approach.

4. Greater use of the seminar approach in the teaching of upper division and graduate courses.

5. Employment of new faculty with the Ph.D. Degree.

6. Maximum faculty participation in regional and national meetings.

Research and Public Service Emphasis

1. Employment of senior faculty competent to direct and participate in research.

2. Broaden attempts to tie in communications emphasis in research being undertaken by other departments and agencies of this institution.

3. The possibility should exist for "piggy back" ties with engineering, agriculture, et. al.

4. Establish a communications research institute as a vehicle for commercial research (readership surveys, etc.) in this section of the state.

5. Exploit the remarkable research abilities and experience of Dr. Charles L. Allen for the remaining time that he will be on campus. Then replace him with a research-oriented individual who can guide and direct our current faculty as well as the upper-division and graduate students.

6. Lower faculty work loads to provide time for additional research and public service.

7. Aggressively seek college research funds as well as regional and national grants.

8. Continue our highly successful summer high school publications workshops and the Southwestern Council of Student Publications, a regional scholastic press association covering west Texas and eastern New Mexico.

Appendix A

Faculty Publications

Charles Laurel Allen

Books

1924	Uses of the Marks of Punctuation	Minneapolis Public Schools
1925	Illinois' Greatest Football Game	The Bookstore, U. of Ill.
1926	Coach's Handbook of Sports	Service Press, Urbana, Ill.
1927	Country Journalism	Thos. Nelson and Sons
1929	Journalist's Manual of Printing	Thos. Nelson and Sons
1933	Cost-Finding System	National Editorial Assn.
1939	Free Circulation Newspapers	Louisiana State U. Press
1940	Publication Laws of New Jersey	Rutgers U., N.J. Press Assn.
1946	The Chicago Daily News Almanac (Editor)	
	The Denver Post and Rocky Mountain Empire Yearbook (Editor)	
	The National Almanac (Editor)	
1954	A Television Bibliography	Chicago Television Council
1964	Digest of the Postal Laws and Regulations	School of Journ., OSU
1965	Public Notice	Associated Court and Commercial Newspapers of America

Articles

1925-54 Articles too numerous to name in Editor & Publisher, The Journalism Quarterly, National Publisher, Publisher's Auxiliary, Alpha Tau Omega Palm, magazines of state press associations, Columnist on "Better Business Methods," in Publisher's Auxiliary, 2 years.

Research Publications

Readership Studies: From 1930 to 1966, directed 78 assisted recall and recognition studies of newspaper reading. In 1966, 1967, and 1968 will direct studies on all of the Lee Group newspapers (Approximately 25).

Pantry Polls: From 1944 to 1947, directed the Chicago Sun-Times Pantry Poll. Three per year and a yearly summary were published.

Consumer Buying Habit Studies: For 7 years, directed the Appleton (Wis.) Post Crescent Consumer Buying Habit Study. All books have been published.

Wallace E. Garets

1962 Co-author, Modern Journalism, Pitman Publishing Corporation.
1962 Editor, The Journalism Educator; Associate Editor, 1962.
Hundreds of newspaper feature stories and scores of magazine articles for general and specialized publications.
Contributor to Editor & Publisher, Publisher's Auxiliary, The Roundtable, The Journalism Educator, and others.

Tanner Laine

Author of Campfire Stories (West Texas folklore) and of thousands of newspaper features.

Robert A. Rooker

"Constitutional Revision in Texas"--a three-part series. Published originally by The Associated Press--reprinted by the Texas League of Women Voters, 1961.

"Twinning--Its Future in U. S. Agriculture"--published by Associated Press National Newsfeatures, 1963.

"The High School Teacher's Role in Recruiting Future Journalists"--The Journalism Educator Quarterly, 1966; also printed in Quill and Scroll, 1967.

"High School Students and the Future Quality of Journalism"--Publishers' Auxiliary, 1966.

"Journalism Recruiting--Where Is It?"--published in The Texas Press Messenger magazine, 1967.

A Time of Change--Texas Technological College, 1960-1968, published by Tech Press, 1968.

Hyroglifics Magazine, Co-editor, published monthly by Rogers Litho Co., 1966-1968

Approximately 10,000 separate articles totaling approximately 2 million words for The Associated Press, 1956-58 and 1960, 1961, and 1962. A large percentage of these articles included extensive research for interpretive political stories.

Current projects not completed

"The Vanishing Male High School and College Journalist"--a study of the changing ratios of men and women journalism students and reasons for the changes.

To Play God, a novel, approximately 40,000 words written.

Counterplot, a novel, completed and currently at agent's office in New York.

"Last Flight of the Big Irons," a motion picture, original story. Script currently being prepared for Hollywood production. Story purchased by International Film Corporation.

Ralph L. Sellmeyer

High School Photography, a textbook, published by Taylor Publishing Co. Dallas, Texas, 1967.

"Totem Poles of Northwest Indians," Private Publication, January, 1967.

"High School Journalism Practices in Texas," February-March, 1965.

"Advertising Seminars--They Can Increase Your Lineage," June, 1966, Texas Press Messenger.

1963-67 South Plains Parade of Progress, magazine, editor, photographer.

1961-64 Texas Techsan, Texas Tech Ex-student magazine, managing editor.

1964 Anniversary Edition of Denver City Press, Denver City, Texas, Editor, Advertising Manager.

Publications currently being written:

Advertising and Business Procedures for School Publications, a textbook for high schools and colleges, author (co-authored by Dr. Billy I. Ross).

How to Set Up Your Darkroom, for high schools and small colleges, author, (co-authored by Darrel Thomas).

DEPARTMENT OF MATHEMATICS

Appendix A

Proposal

for

Division of Statistics

MATHEMATICS (Division of Statistics)

Professor Patrick L. Odell, Chairman, Department of Mathematics

_____, Administrative Professor
Division of Statistics

The Department of Mathematics participates with all the Schools of the University in offering a doctorate of philosophy degree with emphasis in the area of Statistics and provides consulting and software service to all the University faculty and research activities. A student interested in the Ph.D. with emphasis in Statistics or Mathematical Statistics should confer with the Head of the Department of Mathematics.

Statistics Faculty:

P. L. Odell, Professor of Mathematics and Statistics

T. L. Boullion, Assistant Professor of Matheamtics & Statistics

T. O. Lewis, Assistant Professor of Mathematics & Statistics

H. L. Gray, Associate Professor of Mathematics & Statistics

J. E. Osborn, Assistant Professor of Agricultural Economics and Statistics

H. Martz, Assistant Professor of Inductrial Engineering & Statistics

H. Y. Lee, Assistant Professor of Agricultural Economics & Statistics

C. G. Halcomb, Assistant Professor of Psychology & Statistics

F. D. Rigby, Professor of Mathematics and Statistics

Suggested List of Courses
for Ph.D. in Mathematics with
Emphasis in Statistics

Math. 4313	Probability
Math. 4314	Mathematical Statistics I
Math. 4315	Matheamtical Statistics II
Math. 4328	Statistical Methods I
Math. 4329	Statistical Methods II
Math. 5349	Non-Parameter Statistical Inference
Math. 5371	Design of Experiments
Math. 5372	Theory of Linear Statistical Models
Math. 5373	Stochastic Processes
Math. 5374	Advanced Mathematical Statistics I
Math. 5375	Advanced Mathematical Statistics II
Math. 5376	Advanced Probability I
Math. 5377	Advanced Probability II
Math. 53xx	Multivariate Analysis
Math. 53xx	Sampling
Math. 53xx	Advanced Methods
Math. 631	Masters Thesis
Math. 731	Research
Math. 831	Doctor's Dissertation

Since the statistician is generally a consultant to other scientists, the following courses are suggested as potential minors (18 semester hours) for a degree in mathematics with emphasis in Statistics. The minor should be selected from one of the following blocks:

Block 1:

IE 5311	Analysis Techniques for Management
IE 5312	Analysis Techniques for Management
IE 5316	Statistical Reliability Analysis

IE	5317	Advance Industrial Statistics
IE	5318	Selected Topics in Advanced Statistics
IE	5321,5322	Decision Theory and Management Science

Block 2:

Psy	5314	Tests and Measurements
Psy	5343	Seminar in Psychometries
Psy	5347	Advance Correlation Methods and Factor Analysis
Psy	5348	Advanced Statistical Methods and Experimental Design
Psy	5357	Seminar in Quantitative Learning Theory
Psy	5351	Advanced Experimental Psychology

Block 3:

AEco	439	Agriculture Price Analysis
AEco	4312	Mathematical Economics and Econometrics
AEco	520	Research Methodology in Agriculture Economics
Mgt	5315	Mathematical Programming for Business
Mgt	5316	Computer Models for Business Industry & Government
Mgt	5341	Management Decision Making

Block 4:

EE	4361	Introduction to Information Theory and Noise
EE	5312	Optimal & Adaptive Control Systems
EE	5315	Sampled Data and Digital Control Systems
EE	5325	Information Theory
EE	5327	Multistage Decision Process
EE	5328	Statistical Theory of Communication
EE	5361,5362	Reliability of Electronic Systems I, II

Block 5:

Math.	536,537	Modern Algebra I, II
Math.	5312,13	Functions of a Complex Variable I, II
Math.	5314,15	Functions of a Real Variable I, II
Math.	5316	Topology I

Math. 5318	Operational Calculus
Math. 5319	Fourier Analysis
Math. 53xx	Advanced Linear Algebra

Appendix B

Personnel

SCIENTIFIC PERSONNEL

NAME: Ali R. Amir-Moez BIRTHDATE: April 7, 1919

TITLE: Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B.A. University of Teheran, 1941
M.A. University of California at Los Angeles, 1951
Ph.D. University of California at Los Angeles, 1955

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:

American Mathematical Society
Mathematical Association of America
Society for Industrial & Applied Mathematics

EXPERIENCE:

Assistant Professor, University of Idaho, 1955-56
Assistant Professor, Queens College, 1956-60
Assistant Professor, Purdue University, 1960-61
Associate Professor, University of Florida, 1961-63
Professor, Clarkson College of Technology, 1964-65
Professor, Texas Technological College, 1965-present

PUBLICATION:

Synthetic Approach to the Theory of Envelope, American Mathematical Monthly, Vol. LXIV, No. 4, 1957

Singular Values of a Matrix, (Joint paper with A. Horn), American Mathematical Monthly, Vol. LXV, No. 10, 1958

Some Equalities in a Unitary Space Leading to Equalities Concerning Singular Values of Sets of Matrices, Mathematische Annalen, 135 Band 5, 1958

Quadrics in R_n, (Joint paper with A. L. Fass), American Mathematical Monthly, 1960

Generalized Frobenius Inner Products, (Joint paper with Chandler Davis), Mathematische Annalen, 1960

A Model of Quasi-Eucledean Space, (Joint paper with A. L. Fass), American Mathematical Monthly, 1961

Quadrice in a Unitary Space, L'Enseignement Mathematique, 1961

Properties of Certain Sets in Unitary Spaces, Montashefte fur Mathematik, 1963

Adjoint Geometry of Linear Transformation, Montashefte fur Mathematik, 1963

Les somets d'une surface, L'Enseignement Mathematique, 1964

Vertex Points of Functions, L'Enseignement Mathematique, 1964

Pythagorean Series, Mathematical Log, 1962

On Order of Points on a Straight Line, Mathematical Log, 1966

FORMER STUDENTS:

Texas Technological College

1. Hyde, Beverly M., M.S., 1965
2. Smyrl, Shannon, M.S., 1967
3. Keyton, Barbara, M.S., 1968
4. McMath, John S., M.S., 1968

SCIENTIFIC PERSONNEL

NAME: Ronald M. Anderson BIRTHDATE: November 4, 1935

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B.A. Luther College, Decorah, Iowa, 1957
M.S. Iowa State University, Ames, Iowa, 1959
Ph.D. Iowa State University, Ames, Iowa, 1962

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:

American Mathematical Society
Society for Industrial and Applied Mathematics

EXPERIENCE:

Graduate Assistant, Iowa State University, 1957-61
Instructor, Iowa State University, 1961-62
Industrial Mathematician, Collins Radio Company, 1962-65
Assistant Professor, Texas Technological College, 1965-66
Associate Professor, Texas Technological College, 1966-present

PUBLICATIONS:

Propagation Over Plane Earth Through an Exponential Atmosphere, Radio Science, Vol. 68 D. No. 11, 1964

The Relation Between $M_{3000}F2$, the h_mF2 and the Scale Height H for an -Chapman Electron Density Distribution, Journal of Atmospheric and Terrestrial Physics, 1965, Vol. 27, with R. P. Decker

Diffraction of Radio Waves in a Stratified Troposphere, Radio Science, with I. H. Gerks, Vol. 1, No. 8, 1966

Analysis of Warning Timer for Collision Adviodance Systems, to appear in IEEE Transactions co-authored with J. M. Holt, (1968)

A Numerical Integrator Method, to appear in Texas Journal of Science co-authored with John T. White

STUDENTS:

1. John C. Drummond, M.S., 1968

SCIENTIFIC PERSONNEL

NAME: Thomas A. Atchison BIRTHDATE: July 3, 1937

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B.A. University of Texas, 1959
M.A. University of Texas, 1960
Ph.D. University of Texas, 1963

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:

Mathematical Association of America
American Mathematical Society
Society for Industrial and Applied Mathematics

EXPERIENCE:

Instructor, Howard Payne College, Summer 1959
Special Instructor, University of Texas, 1959-63
Assistant Professor, Texas Technological College, 1963-65
Associate Professor, Texas Technological College, 1965-66
LTV, Group Supervisor of Systems, Simulation Group, 1966-67

PUBLICATIONS:

A Class of Riemann Surfaces, Proceedings, American Mathematical Society, Vol. 16, pp. 731-738, August 1965

Non-linear Transformations Related to the Evaluation of Improper Integrals-I, accepted SIAM Journal on Numerical Analysis with H. L. Gray, September 1967

Non-linear Transformations Related to the Evaluation of Improper Integrals-II, accepted SIAM Journal on Numerical Analysis with H. L. Gray, July 1968

Applications of the G and B Transformation to Laplace Transformations with H. L. Gray to appear Proceedings of ACM, 1968

Generalized G-Transformation , with H. L. Gray, Mathematics of Computation, July 1968

A Note on G-Transform, to appear Journal of Research, National Bureau of Standards, with H. L. Gray

FORMER STUDENTS:

Texas Technological College;

1. Amburgey, Jay K., M.S., 1965
2. Kendrick , Cagle, K., M.S., 1965
3. Thompson, Ray W., M.S. 1965
4. Haney, William P., M.S. 1965
5. Swanson, Michael N., M.S. 1965

SCIENTIFIC PERSONNEL

NAME: George Baldwin BIRTHDATE: November 18, 1926

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Eastern New Mexico University, 1948
M.S. Eastern New Mexico University, 1952
Ph.D. Oklahoma University, 1961

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Mathematics Association of America
American Mathematics Society

EXPERIENCE:
Assistant Professor of Mathematics, New Mexico State University, 1959-63
Associate Professor, Eastern New Mexico State, 1963-66
Consultant for Addison Wesley Company, 1964-present
Associate Professor of Mathematics, Texas Technological College, 1966- present

PUBLICATIONS:
Mathematics for the Elementary Teacher, G. Baldwin & R. Crouch, John Wiley and Sons, Inc., 1964

Preparatory Mathematics for the Elementary Teacher, G. Baldwin & R. Crouch, R. J. Wisner, John Wiley & Sons, Inc., 1965

Techniques of Teaching Modern Mathematics, G. Baldwin & R. Crouch , M. Zwing, John Wiley & Sons, Inc., 1967

SCIENTIFIC PERSONNEL

NAME: Thomas L. Boullion BIRTHDATE: November 4, 1940

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B. S. Louisiana State University, 1961
M. S. University of Southwestern Louisiana, 1963
Ph.D. University of Texas, 1966

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Statistical Association
American Mathematical Society
Institute of Mathematical Statistics
Society for Industrial and Applied Mathematics
Brometric Society
Mathematical Association of America

EXPERIENCE:
Research Scientist, Tracor, Inc., 1964-65
Consulting Mathematical Statistician, Texas Center for Research, 1965-66

PAPERS SUBMITTED:
Contributions to the Theory of Pseudo-Inverses, with P. L. Odell, submitted to SIAM Journal of Applied Mathematics

The Equivalence of Two Generalized Inverses, with P. L. Odell, submitted to SIAM Journal of Applied Mathematics

An Introduction to the Theory of Generalized Matrix Invertibility to be published by John Wiley & Sons, Inc. (1968)

PUBLICATIONS:
A Generalization of the Wiedandt Inequality, with P. L. Odell, to appear in Texas Journal of Science

A Note on The Scroggs-Odell Pseudo-Inverse, with P. L. Odell to appear in SIAM Journal of Mathematics

SCIENTIFIC PERSONNEL

NAME: Wayne T. Ford BIRTHDATE: February 9, 1931

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B.A. Oklahoma City University, 1952
M.A. University of Oklahoma, 1953
Ph.D. Rice University, 1964

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:

Society of Industrial and Applied Mathematics
American Mathematical Society
Mathematical Association of America
Association Computing Machinery
Society of Exploration Geophysics
Society of Signa Xi

EXPERIENCE:

Research Assistant, Texaco, 1957-63
Assistant Professor, Houston Baptist College, 1963-64
Associate Professor, Houston Baptist College, 1964-65
Consultant, Mandrel Industries, Inc., 1965-present
Consultant, Core Laboratories, Inc., 1963-present
Assistant Professor, University of Houston, 1965-67

PUBLICATIONS:

Mathematical Programming and Integro-Differential Equations, SIAM Journal Numerical Analysis, 1965, Vol. 2, pp. 171-202

Least Square Inverse Filtering, Geophysics, 1966, Vol.31, pp. 917-926

Mathematical Programming and Linear Operators in Frechet Spaces, SIAM Journal Numerical Analysis, 1966, pp. 367-371

Estimation of a Minimum-Phase Operator from a Portion of its Amplitude Spectrum, IEEE Trans. Geoscience Elect., 1967, Vol. 5, No. 1, pp. 1-2

The Z-Transformation of a Realizable Time Function, (to appear) IEEE Trans. Geoscience Elect., 1967

PAPER SUBMITTED:

On Minimal Fundamental Sequences in Separable Banach Space

SCIENTIFIC PERSONNEL

NAME: Henry L. Gray BIRTHDATE: May 18, 1936

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B.S. Texas Technological College, 1959
M.S. Texas Technological College, 1961
Ph.D. University of Texas, 1966

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:

Mathematical Association of America
American Statistical Association

EXPERIENCE:

Teaching Assistant, Texas Technological College, 1959-61
Research Engineer, North American Aviation, Summer 1961
Teaching Assistant, University of Texas, 1963-65
Engineer, Tracor Inc., Austin, Texas, 1963-65
Mathematics Consultant, Tracor Inc., 1965-66
Assistant Professor, Texas Technological College, 1965-66
Senior Scientist, Supervisor of Mathematical Research, LTV, Greenville, Texas 1966-67
Assistant Professor, Southern Methodist University, 1966-67
Associate Professor, Texas Technological College, 1967-present

PUBLICATION:

Applications of the H-R Transform, Estratlo dogli della sevela superiore di Pisa Science e Matemticke Ser. III, Vol. 18, 1964

On the Euler Transform, Abstract American Mathematical Notices, Vol. 72, 1965

A Confidence Interval for Availability, Technometrics, Vol. 9, No. 3, August 1967, pp. 465-471

Non-linear Transformations Related to the Evaluation of Improper Integrals-I, accepted SIAM Journal on Numerical Analysis, with T. A. Atchison, September 1967

Non-linear Transformations Related to the Evaluation of Improper Integrals-II, accepted SIAM Journal on Numerical Analysis, with T. A. Atchison

On Sums and Products of Uniform Variates, Biometrika, 1966, Vol. 53, 3 and 4, p. 615

A New Approximation Related to the Error Function, to appear in Mathematics of Computation, with W. R. Schucany

A Note on the G-Transform, to appear in Journal of National Bureau of Standards, with T. A. Atchison (1968)

On the Evaluation of Distribution Functions, with W. R. Schucany, to appear in Journal of American Statistical Association (1968)

On Least Favorable Density Function, with P. L. Odell, SIAM Review, October 1967

PAPERS SUBMITTED:

A Limiting Case of the G-Transform, submitted to SIAM Journal on Numerical Analysis

A New Approximation to Chi-Square Integral, to appear in Mathematics of Computation, with R. W. Thompson, G. V. McWilliams

On a Test of Equality of the Means of Two Independent Poisson Distributions, submitted to IEEE, with T. O. Lewis

On the Availability Ratio, submitted to IEEE, with W. R. Schucany

Applications of the G-Transformation to Laplace Transformations, to appear in ACM Proceeding, with T. A. Atchison

Iterated Non-linear Transformation, submitted to Mathematics of Computation, with T. A. Atchison

Generalized G-Transform, Mathematics of Computation, to appear July 1968, with T. A. Atchison

SCIENTIFIC PERSONNEL

NAME: Michael H. Hall BIRTHDATE: July 4, 1939

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Massachusetts Institute of Technology, 1962
M.S. University of Arizona, 1963
Ph.D. University of Arizona, 1966

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematical Association of America

EXPERIENCE:
Graduate Associate in teaching and research, University of Arizona, 1963-66
Assistant Professor in Residence, University of California at Los Angeles, 1966-67
Assistant Professor of Mathematics, Texas Technological College, 1967

SCIENTIFIC PERSONNEL

NAME: Shelby K. Hildebrand BIRTHDATE: June 2, 1931

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. North Texas State University, 1952
M.A. North Texas State University, 1957
Ph.D. Iowa State University, 1962

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Mathematical Association of America
American Mathematical Society

EXPERIENCE:
Graduate Assistant, Iowa State, 1957-60
Mathematician, Boeing Airplane Company, Summer 1959
Instructor, Iowa State, 1961-62
Assistant Professor and 2nd Semester Chairman, Department of Mathematics, Midwest University, 1962-63
Assistant Professor, Texas Technological College, 1963-65
Associate Professor, Texas Technological College, 1965-present.

PUBLICATIONS:
Connectivity Functions and Retracts, Fundementa Mathematicae, LVII (1965) pp. 237-245

A Connected Topology for the Unity Interval to appear in Fundementa Mathematicae, 1967

The Separation Acioms for Invertible Spaces, with R. L. Poe, to appear in Mathematics Monthly (1968)

Specific Invertible Spaces, with R. L. Poe to appear Texas Journal of Science, Vol. 20, No. 2,June 1968

An Interesting Metric Space with H. W. Milnes, to appear in Mathematics Magazine (1968)

PAPERS SUBMITTED:
A Simple and Interesting Topological Space with R. L. Poe, submitted to The Pentagon

An Example Related to Jacobi's Necessary Condition in the Calculus of Variation, with H. W. Milnes

FORMER STUDENTS:
M. P. Williams, M.A. 1965
J. A. Anderson, M.A. 1965
J. S. Burton, M.A. 1966
G. N. Adams, M.A. 1966
S. G. Crossley, M.A. 1966
D. L. Hodges, M.A. 1967
M. O. Smith, M.A. 1967

SCIENTIFIC PERSONNEL

NAME: George S. Innis BIRTHDATE: January 7,1937

TITLE: Co-Director of Computer Services &
Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B.A. University of Texas, 1958
M.A. University of Texas, 1961
Ph.D. Harvard University, 1963

MEMBERSHIPS IN TECHNICAL AND SCIENTIFIC SOCIETIES:

Mathematical Assocation of America
American Mathematical Society
Society for Industrial & Applied Mathematics
Sigma Xi
Association for Computing Machinery

PUBLICATIONS:

"Some Reproducing Kernels for the Unit Disk," Pacific Journal of Mathematics, Vol. 14, 1964, pp. 177-186

"The Computation of Far-Field Radiation Patterns from Measurements Made Near the Source," with C. W. Horton, The Journal of the Acoustical Society of America, Vol. 33, 1961, pp. 877-880

"The Determination of Far-Field Radiation Patterns from Near-Field Measurements," with C. W. Horton, U.S. N. Journal of Underwater Acoustics, Vol. 10, 1960, pp. 150-157

"The Uniformization of a Hyperbolic Riemann Surface," Proceedings of American Mathematical Society, Vol. 17, 1966, pp. 567-572

TECHNICAL REPORTS:

Shannon's Theorem, DRL-A-284, May 1967, 80 pages.

A Processing Technique for Symmetric Signals, DRL-A-269, December 1966, 22 pages.

Generation of a Stationary Gaussian Random Process with a Specified Power Spectral Density Function, with W. A. Matuska, DRL-A-258, July 1966, 68 pages.

Solution Forms for the Scalar Helmholtz Equation, DRL-A June 1961, 39 pages.

On the Determination of the Radiation Pattern of an Emitter from Near-Field Data, with C. W. Horton, DRL-A-177, Sept. 1960, 8 pages.

Near-Field and Far-Field Measurements with Source Level Determination for a Nine Element Array of TR-11 Transducers, with C. W. Horton, DRL-A-172, June 1960, 20 pages.

The Computation of Far-Field Radiation Patterns from Measurements Made Near the Source, with C. W. Horton, DRL-A-189, 1961.

Automatic Classification Using Active Surface Ship Sonars: A Synopsis, DRL-A-256, 1966, with D. G. Olson, S. P. Pitt, and C. S. Strandling.

PAPERS SUBMITTED:

"On Certain Binary Sequences," SIAM Journal on Numerical Analysis.

"On the Existence of Binary Sequences with Prescribed Properties," SIAM Review.

"On the Physical Interpretation of the Coefficients of a Fourier Series," IEEE Transactions on Information Theory.

"A Processing Technique for Symmetric Signals," IEEE Transactions on Information Theory.

SCIENTIFIC PERSONNEL

NAME: Truman O. Lewis BIRTHDATE: November 24, 1928

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B. S. Texas Technological College, 1956
M. S. Texas Technological College, 1960
Ph.D. University of Texas, 1966

EXPERIENCE:

Consultant for Texas Center for Research, Austin, Texas
Research Scientist, Tracor Inc., 1964-65
Research Scientist, Holloman Air Force Base, Summer 1958
Engineering Scientist, LTV, Dallas, 1956-57
Assistant Professor, Texas Technological College, 1966-68
Associate Professor, Texas Technological College, 1968-present

PUBLICATIONS:

Confidence Interval for the Availability Ratio, with H. L. Gray, Technometrics, August 1967, pp. 465-471

A Generalization of the Gauss-Markov Theorem, with P. L. Odell, Journal of the American Statistical Association, 1966, Vol. 61, pp. 1063-1066

Pseudo-inverses of Positive Semi-definite Matrices, with Thomas Newman, SIAM Journal of Applied Mathematics, June 1968, pp. 703-708

Recovery of Linear Transformations Using Co-linear Invariant Points and Pseudo-inverses, with H. W. Milnes, and G. L. Shurbet, to appear, Mathematics Magazine (1968)

On a Test for Equality of the Means of Two Independent Poisson Distributions, with H. L. Gray, IEEE

FORMER STUDENTS:

Texas Technological College:

1) Frawley, W. H., M.A. 1967
2) Ludeman, M. M., M.A. 1967
3) Poirot, J. L., M.A. 1967
4) Amburgey, J. K., Ph.D. 1968
5) Hergert, S., M.S. 1968

SCIENTIFIC PERSONNEL

NAME: John D. Miller BIRTHDATE: September 23, 1932

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B. S. Eastern Illinois State University, June 1956
M. S. Iowa State University, June 1958
Ph.D. Indiana University, June 1963

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:

American Mathematical Society

EXPERIENCE:

Graduate Assistant in Mathematics, Iowa State University, 1956-1958
Graduate Aasistant in Mathematics, Indiana University, 1958-1962
Lecturer in Mathematics, Indiana University, 1962-1963
Assistant Professor of Mathematics, University of Virginia, 1963-1968
Associate Professor of Mathematics, Texas Technological College, 1968-

PUBLICATIONS:

Minimal Sets of Modifications, Journal of Mathematics & Mechanics, Vol.12, pp. 751-770, September 1963

Obstruction of an h-Cobordism Being a Product, Math. Zeitschr Journal, Vol. 97, pp. 16-20, 1967

Involutions with Finitely Many Fixed Points, to appear, Canadian Journal of Mathematics, 1968

SCIENTIFIC PERSONNEL

NAME: Harold W. Milnes BIRTHDATE: June 9, 1925

TITLE: Professor of Mathematics
Texas Technlogical College
Lubbock, Texas

EDUCATION:
M.A. in Mathematics, Wayne State University, 1952
Ph.D. in Mathematics, Wayne State University, 1955

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Industrial Mathematical Society
American Mathematical Society
Society for Advancement of Science

EXPERIENCE:
Numerical Analyst, Computation Laboratory, Wayne State University, 1955-56
Senior Research Mathematician, General Motors, Research Laboratory, 1956-57
Research Scientist, General Motors Corp., Research Laboratory, 1957-60
Land-Air Corp., Pacific Missile Range, Point Mugu, California, 1962-63
Burroughs Corp., SPED Division, Detroit, Michigan, 1963-64
Boeing Corp., Commercial Airplane Division, Renton, Washington, 1964-65
Lockheed Electronics, Clear Creek, Texas 1965-66

PATENTS:
Electronic Binary Counter Device (U.S. Pat. granted)
Self-adaptive Control Mechanism (U.S. Pat. #422,784)

PUBLICATIONS:
Solution of Laplaces Equation by Boundary Contraction Over Regions of Irregular Shape, Numerische Mathematik, with T. Chow, 1959

Boundary Conditions for Numerical Solution of Homogenious Partial Differential Equations, Quarterly of Applied Mathematics, with T. Chow, 1960

Condition that all Roots of a Polynomial Lie in the Interval, 1-1, American Mathematical Monthly, 1964

Convergence of the Boundary Contraction Method, with T. Chow, Quarterly of Applied Mathematics, Vol. 20, No. 3 1962 pp. 209-230

Numerical Solution of a Class of Hyperbolic-Parabolic Partial Differential Equations by Boundary Contraction, with T. Chow, SIAM Journal, Vol. 10, No. 1, 1962, pp. 124-148

Numerical Solution of the Neumann and Mixed Boundary Value Problems by Boundary Contraction, with T. Chow, Journal of the Association of Computing Machinery, Vol. 8, No. 3, July 1961, pp. 336-338

Boundary Contraction Solution of Laplaces Differential Equation, with R. Potts, Journal of the Association of Computing Machinery, No. 6, 1959, pp. 226-235

Boundary Contraction Solution of Laplaces Differential Equation II, with T. Chow, Journal of the Association of Computing Machinery, Vol. 7, 1960, pp. 37-45

Numerical Solution of Partial Differential Equations by Boundary Contraction, with R. Potts, Quarterly of Applied Mathematics, 18, 1960, pp. 1-13

A Note on Bounded Continuous Matrix Products, Michigan Mathematical Journal, Vol. 6, 1959, pp. 335-338

Logical Programming and Algebraic Interpretation, Industrial Mathematics, Vol. 8, 1957, pp. 17-26

Energy Levels of an Electron in the Field of a Finite Dipole, with R. Wallis and R. Herman, Journal of Molecular Spectroscopy, 1958

Greens Function for Monatomic Simple Cubic Lattices, with A. Maradudin, E. Montroll, G. Weiss and R. Herman Memoires de l'Academie Rouale de Belgigue, 1960

A Modified Newton-Raphson Process for Approximating Multiple Roots of Polynomials, Industrial Mathematics, Vol. 9, No. 2, 1958, pp. 17-26

Convecity of Orlitz Spaces, Pacific Journal of Mathematics, Vol. 7, No. 3, 1957, pp. 1451-1483

Geometric Invariants of Discrete Dot Patterns, Industrial Mathematics, Vol. 13, No. 1, 1963, pp. 15-41

PAPERS SUBMITTED:

Concerning the Exceptional Case in Hessenberg's Method for Determining the Characteristic Polynomial of a Matrix, with T. Chow

Variational Approach to Smoothing Unequally Spaced Data Subject to Random Errors (accepted Industrial Mathematics)

An Example Related to Jacobi's Necessary Condition in the Calculus of Variations, with S. K. Hildebrand

An Interesting Metric Space, with S. K. Hildebrand, to appear, Mathematics Magazine, (1968)

Invariants Associated with Plane Curves, with G. L. Shurbet

Solution of Laplace's Equation by Boundary Contraction in an Irregular Annulus, with T. Chow

A Note Concerning the Properties of a Certain Class of Test Matrices, to appear, Mathematics of Computation (1968)

Note Concerning an Improved Givens' Method

Solution of Laplace Difference Equations by Block Iteration Over Regions Composed of Rectangles, with T. Chow

Recovery of Linear Transformations Using Co-linear Invariant Points and Pseudo-Inverses, with G. L. Shurbet and T. O. Lewis

Characteristic Vectors for Rectangular Matrices

Generalized Inverse of Rectangular Matrices with Preserves Characteristic Vectors

A Random Technique for Determining the Zeroes of a Function

Self-adaptive and Learning Machines

An Investigation of the Geomagnetic and Lunarmagnetic Fields

General Topics in the Calculus of Variations Related to Functional Analysis

FORMER STUDENTS:

Texas Technological College;

1) Dale Rhodes, M.S. 1968

2) Howard Lambert, Ph.D. 1968

SCIENTIFIC PERSONNEL

NAME: A. K. Mitra BIRTHDATE: January 1, 1936

TITLE: Assistant Professor (Visiting Professor)
Texas Technological College
Lubbock, Texas

EDUCATION:
M. S. Calcutta University, 1957
Ph.D. Marburg University (West Germany), 1963

EXPERIENCE:
Research Mathematician, Marburg University, 1963-1966
Research Mathematician, NASA Manned Spacecraft Center, Houston, Texas, Summer 1967

PUBLICATIONS:
Remarks on Position Operator in Irreducible Representation of Inhomogenious Lorentz Group, Nuovo Cimento, 30, 385, 1963, with W. Weidlich

On a Consequence of Bogoliubov's Functional Ansatz, to appear, Zeitschrift f. Naturforschung, (1968)

The Boltzman Landau Transport Equation I, The First Order Chapman-Enskog Approximation, to appear, Proceedings Cambridge Philosophical Society, (1968), with Sunanda Mitra

The Boltzman-Landau Transport Equation II, The Transport Coefficients, to appear, in Proceedings Cambridge Philosophical Society, (1968)

SCIENTIFIC PERSONNEL

NAME: Patrick L. Odell

TITLE: Professor & Chairman
Department of Mathematics
Texas Technological College
Lubbock, Texas

Associate Director of Texas Center for Research
Austin, Texas

EDUCATION:
B. S. University of Texas, May 1952
M. S. Oklahoma State University, August 1958
Ph.D. Oklahoma State University, June 1962

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Society for Industrial & Applied Mathematics
Operations Research Society of America
American Statistical Association
Sigma Xi
American Institute of Aeronautics & Astronautics
Texas Academy of Science
American Association for the Advancement of Science

EXPERIENCE:
Chief, Doppler Reduction Section, White Sands Missile Range, 1952-53
Meteorologist, U.S. Air Force, 1953-57
Research Scientist, Kaman Aircraft Nuclear Division, 1958-59
Mathematician, U.S. Naval Nuclear Ordinance Evaluation Unit, 1959-60
Consulting Mathematician & Statistician, U.S. Naval Weapons Evaluation Facility, 1960-62
Graduate Assistant, Oklahoma State University, 1957-58(Math.)
Graduate Assistant, Oklahoma State University, 1960-62(Stat.)
Consulting Mathematician, Statistician & Operations Analyst, Chance Vought Corp., Dallas, Texas, 1962-64
Consulting Mathematician, Statistician & Operations Analyst, Kaman Instruments, Austin, Texas, 1963-65
Research Scientist, Defense Research Laboratory, Austin, Texas, 1963-64
Consulting Mathematician, Brown Engineering Co., Huntsville, Alabama & Cocoa Beach, Florida, 1963-65
Assistant Professor, Department of Mathematics, University of Texas, 1962-66
Consulting Mathematical Statistician, LTV Ectro-Systems, Greenville, Texas, 1966-present
Professor, Dept. of Mathematics, Texas Technological College, 1966-present

HONORS: Who's Who in the South & Southwest
American Men of Science
Fellow of the Texas Academy of Science

CONTRACTS:

NSF Grant GR-2191, $4,800, 1963-64 to study OPTIMUM SEARCH PATHS.

NASA Grant GP-9-2619, NASA Manned Spacecraft Center, $33,000 dated April 14, 1964 through April 14, 1965 to study OPTIMUM METHODS FOR DETERMINING AND PREDICTING SPACE VEHICLE TRAJECTORIES (with B. D. Tapley).

NAS Grant 9-3848, NASA Manned Spacecraft Center, $11,800 dated January 1, 1965 through December 31, 1965 to study METHODS OF SOLUTION AND ERROR ANALYSIS IN NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (with D. L. Walston).

NASA Manned Spacecraft Center, $45,210 dated April 1965 through April 1966, to study OPTIMUM METHODS FOR PREDICTING SPACECRAFT VEHICLE TRAJECTORIES (continuation of NAS 9-2619) (with B. D. Tapley).

NASA Manned Spacecraft Center, $62,085 dated April 1966 through April 1967, to study OPTIMUM METHODS FOR PREDICTING SPACECRAFT VEHICLE TRAJECTORIES (continuation of NAS 9-2619) (with B. D. Tapley).

NASA 9-6963, NASA Manned Spacecraft Center, $30,000 dated May 1967 through April 1968, A STUDY OF SOPHISTICATED NUMERICAL METHODS FOR DETERMINING AND PREDICTING SPACECRAFT TRAJECTORIES (with B. D. Tapley).

NASA 9-6963, NASA Manned Spacecraft Center, $39,000, dated May 1968 through April 1968, A STUDY OF SOPHISTICATED NUMERICAL METHODS FOR DETERMINING AND PREDICTING SPACECRAFT TRAJECTORIES (continuation of NASA 9-6963) (with B. D. Tapley).

LTV Contract #8901, $5,000 dated August 1966 through December 1968, PROGRAM FOR TRAJECTORY OF RE-ENTRY BODY.

LTV Contact #CPL 01, $10,000 dated April 1967 through December 1967, ADAPTIVE FILTER THEORY.

PUBLICATIONS:

Monographs

A Method for Determinign Unrealiability Using Data from Life Tests, presented at the Sixteenth Annual Meeting of the Operations Research Society of America and published at Novord Report 6618, November 1959, co-authored with Dr. V. Seshardri.

A Method for Determining a Confidence Bound on Unreliability when Time to Failure is Normally Distributed, Navord Report 6623, December 1959, co-authored with Dr. V. Seshardri.

Tables and Graphs for Determining an Upper Confidence Bound on the Number of Defectives in a Finite Population, Novord Report 7123, July 1960.

An Emperical Study of Three Stochastic Approximation Techniques Applicable to Sensitivity Testing, Navweps Report 7838, July 1961.

Decision Criteria for Determinign Testing Policies, Navweps Report 7975, co-authored with G. Logan and W. Franck.

A Method for Obtaining Non-parametric Confidence Intervals in Up-and-Down Testing, Navweps Report 7938, 1963, co-authored with W. E. Franck, Jr.

"Contributions to the Theory of Numerical Simulations," Technical Report No. 12, Laboratories for Electronics and Related Science Research, the University of Texas, June 1966, 72 pgs., co-authored with David R. Falconer.

Books

An Introduction to the Thoery of Generalized Matrix Invertibility, Texas Center for Research, June 1966, 302 pgs. co-authored with T. L. Boullion. (To be published in book form by John Wiley & Sons, Inc., 1968).

A Theory of Linear Estimation, Texas Center for Research, April 1967, 157 pgs., co-authored with T. O. Lewis. (To be published in book form by Prentice-Hall, Inc., 1968).

Papers in Professional Journals

A Note Concerning a Generalization of the Gauss Markov Theorem, co-authored with H. P. Decell, Texas Journal of Science, March 1966, pp. 21-24.

An Alternate Definition of a Pseudo-Inverse of a Matrix, Journal of SIAM, co-authored with James Scroggs, Vol. 14, No. 4, June 1966, pp. 796-810.

A Numerical Procedure to Generate Sample Covariance Matrices, co-authored with A. H. Feiveson, Journal of the American Statistical Association, March 1966, pp. 199-203.

On Sums and Products of Rectangular Variates, Biometrika, Vol. 53, No. 3 and 4, pp. 616-617, December 1966, co-authored with H. L. Gray.

A Generalization of the Gauss-Markov Theorem, Journal of American Statistical Association, co-authored with T. O. Lewis, Vol. 61, pp. 1063-1066, December 1966.

On the Fixed Point Probability Vector of Regular or Ergodic Transition Matrices, Journal of American Statistical Association, co-authored with H. P. Decell, Vol. 62, pp. 600-603, June 1967.

On Computing a Fixed Point Probability Vector of Regular or Ergodic Transition Matrices, co-authored with H. P. Decell, Journal of the Association of Computing Machinery, October 1967, Vol. 14, No. 4, pp. 765-768.

On Least Favorable Density Functions, co-authored with H. L. Gray, SIAM Review, Vol. 9, No. 4, pp. 715-720, October 1967.

A Characterization for Generalized Inverses of Matrices, SIAM Review, April 1968, co-authored with Gerald L. Morris, Vol. 10, No. 2, pp. 208-211.

Common Solutions for n-Matrix Equations with Applications, co-authored with G. L. Morris, Journal of Association Computing Machinery, April 1968, Vol. 15, No. 2, pp. 272-274.

A Generalization of the Weilandt Inequality, to appear, Texas Journal of Science, December 1968, co-authored with T. L. Boullion.

A Note on the Scroggs-Odell Pseudo-Inverse, to appear, SIAM Journal of Applied Mathematics, co-authored with T. L. Boullion (1969).

BOOKS REVIEWED:

How to Gamble if You Must: Inequalities for Stochastic Processes. By L. E. Dubins and L. J. Savage. McGraw-Hill Book Company TECHNOMETRICS, November 1966.

Digital Computer User's Handbook, Edited by M. Klerer and G. A. Korn, McGraw-Hill, Inc., to appear, TECHNOMETRICS, November 1968.

FORMER STUDENTS:

The University of Texas:

1) Beer, D., M.A. 1963
2) Miller, J., M.A. 1964
3) Nadar, W., M.A. 1965
4) Hib-s, E., M.A. 1965
5) McElhone, D., M.A. 1965
6) Falconer, D., Ph.D. 1966
7) Tatikonda, L., Ph.D. 1966
8) Lewis, T., Ph.D. 1966
9) Boullion, T., Ph.D. 1966
10) Hadlock, F., Ph.D. 1966
11) Wallace, D., M.A. 1966
12) Smith, R., M.A. 1966

13) Barton, C. P., M.A. 1966
14) Pope, T., M.A. 1966
15) Ahlers, C., M.A. 1966
16) Moore, K., M.A. 1966
17) Johnston, D., M.A. 1966
18) Meicler, M., Ph.D. 1966

Texas Technological College:
1) Morris, G., Ph.D. 1967
2) Sommers, J., M.S. 1967

SCIENTIFIC PERSONNEL

NAME: Robert L. Poe

TITLE: Associate Professor of Mathematics &
Associate Department Chairman
Department of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B. S. Black Hills Teacher's College, 1951
M. S. Oklahoma State University, 1957
Ed.D. Oklahoma State University, 1963

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematical Association of America
Society of Industrial & Applied Mathematics
Kappa Mu Epsilon
Texas Academy of Science

EXPERIENCE:
Five years' high school teaching experience, 1951-56
Assistant Professor, Central State College, Oklahoma, 1957-58
Instructor, University of Tulsa, 1958-59
Teaching Assistant, Oklahoma State University, 1959-62
Associate Professor, Kansas State Teacher's College, 1962-66
Mathematician, Standard of New Jersey Research Laboratory, Summers of 1956 and 1957
Associate Professor & Associate Chairman of Department of Mathematics, Texas Technological College, 1966-present

PUBLICATIONS:
A College Program in Mathematics for Elementrary School Teachers, American Mathematical Monthly, Vol. 71, 1964

Ullabian Arithmetic, Bulletin of Kansas Association of Teachers of Mathematics, Vol. 40, 1965

One Approach to Modernizing the Mathematics Curriculum in the Elementrary School, co-authored with L. Asher, L. R. Capps, F. Colthorp, M. Girunder, A. Muller, M. Norton and P. L. Urban, published by Kansas State Department of Public Instruction, 1966

Blondes, Brunettes and Conclusions, Bulletin of the Kansas Association of Teachers of Mathematics, Vol. 40, No. 4, April 1966

Only the Baboons are in the Intersection, Bulletin of the Kansas Association of Teachers of Mathematics, Vol. 41, No. 3, February 1967

The Separation Axioms for Invertible Spaces, co-authored with S. K. Hildebrand, American Mathematical Monthly, Vol. 75, No. 4, 1968

Specific Invertible Spaces, co-authored with S. K. Hildebrand, Texas Journal of Science, Vol. 20, No. 2, 1968

A Simple and Interesting Topological Space, co-authored with S. K. Hildebrand, to appear, The Pentagon.

A Report on the CUPM Recommendation in the State of Texas, co-authored with P. E. Thompson, to appear, American Mathematical Monthly.

PAPERS SUBMITTED & IN PROGRESS:

Strong Continua, co-authored with Mary J. Hildebrand, to be revised.

Strong Continua with Contigous Points.

Aspects of Homogenuity in Invertible Spaces, with C. Perry.

BOOK REVIEWS PUBLISHED:

Ordinary Differential Equations, Philip Hartman, John Wiley & Sons, Inc., New York, 1964, printed in The Pentagon, Vol. XXV, No. 2, Spring 1966.

Functions, Limits & Continuity, Paulo Rinenboim, John Wiley & Sons, Inc., New York, 1964, Spring 1967, The Pentagon.

FORMER STUDENTS:

1) Roy C. Miller, M.A.
2) Raymond Bartle, M.A.
3) Gary Biher, M.A.
4) W. J. M. Thomas, M.A.
5) Diane Stephenson, M. A.
6) Gary Morfitt, M.A.
7) Marvin Mentzer, M. A.
8) Mary Hildebrand, M.A.
9) Charles Perry, M.A.
10) Paul E. Thompson, Ed. D.

SCIENTIFIC PERSONNEL

NAME: J. Dalton Tarwater BIRTHDATE: September 30, 1937

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B. S. Texas Technological College, 1959
M. A. University of New Mexico, 1961
Ph.D. University of New Mexico, 1965

MEMBERSHIP IN TECHNICAL & SCIENTIFIC SOCIETIES:
Phi Kappa Phi
Kappa Mu Epsilon
Phi Sigma Tau
Mathematical Association of America
American Mathematical Society

PUBLICATIONS:
Galois Theory of Abelian Groups, Math. Zeit., 1967

Galois Cohomology of Abelian Groups, Pacific Journal of Mathematics, 1968

SCIENTIFIC PERSONNEL

NAME: F. E. Tidmore BIRTHDATE: September 1, 1940

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Hardin-Simmons University, 1962
M.S. Oklahoma State University, 1963
Ph.D. Oklahoma State University, 1967

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematical Association of America

EXPERIENCE:
Assistant Professor, Baylor University, 1963-65

SCIENTIFIC PERSONNEL

NAME: Derald D. Walling BIRTHDATE: February 14,1937

TITLE: Associate Professor of Mathematics
Department of Mathematics
Texas Technological College

EDUCATION:
B.S. Iowa State College, 1958
M.S. Iowa State University, 1961
Ph.D. Iowa State University, 1963
Ph.D. Thesis Title: Numerical Methods for Non-Linear Least Squares Curve Fitting Problems

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematics Association of America
Society for Industrial and Applied Mathematics

EXPERIENCE:
Graduate Assistant, Iowa State University, 1958-62
Mathematician, Chamberlain Corporation, Waterloo, Iowa, 1959
Mathematician, U.S.A.E.C., Ames Lab., Ames, Iowa, 1962-63
Assistant Professor of Mathematics, University of Arizona, 1963-66
Associate Professor of Mathematics, Texas Technological College, 1966-present
Consultant, Texas Center for Research, Austin, Texas, September, 1966-December, 1966

PUBLICATIONS:
A Note on the Bordering Method of Inverting a Matrix (with T.R. Rogge), American Mathematical Monthly, Vol. 73, No. 8, October, 1966

Quadrature Formulas Using Tschebyscheff Zeros (with Mohindar Cheema), Proceedings of the National Institute of Sciences of India, Vol. 33,A, No. 3 and 4, 1967

Least Squares, The Pentagon, Vol. 26, No. 2, Spring 1967

On Least Absolute Value, The Pentagon, Vol. 27, No. 1, Fall, 1967.

Non-Linear Least Squares Curve Fitting When Some Parameters are Linear, Tehas Journal of Science Vol. 20, No. 2, June, 1968

RESEARCH CONTRACTS:
NASA Grant - $11,380, On Interval Arithmetic, August, 1967-68

SCIENTIFIC PERSONNEL

NAME: James H. Wells BIRTHDATE: June 20, 1932

TITLE: Visiting Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:

B.S. Texas Technological College (Mathematics) 1952
M.A. Texas Technological College (Mathematics) 1954
Ph.D. University of Texas (Mathematics) 1958

MEMBERSHIP IN TECHNICAL AND SPECIFIC SOCIETIES:

American Mathematics Association
Pi Mu Epsilon
Sigma Xi

PUBLICATIONS:

Concerning the Hausdorff Inclusion Problem, Duke Math. Journal, 26 (1959), 629-646

Hausdorff Transforms of Bounded Sequences, Proc. American Math. Soc., 11 (1960), 84-86

A Note On the Primes in a Banach Algebra of Measures, Pac. Journal Math., 12(1962), 1139-1143

Restrictions of Fourier-Stieltjes Transforms, Proc. American Math. Soc. 15(1964), 243-246.

Bounded Continuous Vector-Valued Functions on a Locally Compact Space, Michigan Math. Jour., 12 (1965), 119-126

Invariant Subspaces (with C. N. Kellogg) Illinois Jour. Math., 10 (1966), 508-516

Bounded Analytic Functions and Absolutely Continuous Measures (with G. Piranian and A. Shields), 18 (1967) 818-826.

On an Interpolation Problem For Certain Subalgebras of H^∞ (with A. Heard), to appear in the Pacific Jour. of Math.

SCIENTIFIC PERSONNEL

NAME: John T. White BIRTHDATE: August 23, 1931

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. University of Texas, 1952
M.A. University of Texas, 1953
Ph.D. University of Texas, 1962

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Mathematics Association of America
American Mathematical Society

EXPERIENCE:
Teaching Fellow, University of Texas, 1952-53
Special Agent, U.S. Army, 1954-56
Technical Engineer, General Electric Co. Summers, 1956, 1957, 1958
Research Member, Sandia Corp., Summer, 1959
Special Instructor, University of Texas, Academic years 1956-63
Assistant Professor, University of Kansas, 1962-63
Associate Professor, Texas Technological College, 1965-present

PUBLICATIONS:
A Representation Theorem for the Laplace Transform, Texas Journal of Science, Vol. 19, No.2, June 1967

A Numerical Integrator Method, with R.M. Anderson, to appear in Texas Journal of Science.

BOOK REVIEWS:
Zentialblatt fur Mathematik of Zemanian, A.H., "Inversion formulas for the distributional Laplace Transformations". SIAM Journal for Applied Mathematics, Vol. 14, pp. 195-206, 1966.

Zentialblatt fur Mathematik of Zemanian, A.H., "The distributional Laplace and Mellin Transformations", SIAM Journal for Applied Mathematics, Vol. 14, pp. 41-59 (1966)

FORMER STUDENTS:

University of Kansas

1. Prott, Joan, M.A. 1964
2. St. Mary, Donald F., M.A.,1964
3. Calkins, Glenn R., M.A., 1964
4. Mura, John A., M.A., 1965
5. Olson, Christopher E., M.A., 1965
6. Hsu, T., M.A., 1968
7. Dawes, J. M.A., 1968

A Brief Plan for Development of the Department of Mathematics Texas Technological College[1]

1. Introduction

In order to develop a plan, one must define the goals of the department. Realistically, one should develop several plans in order to incorporate the unpredictable behavior of the Texas legislature which can, but not necessarily, preceed reasonable predictable behavior of the Administration. Obviously, one wants the Department of Mathematics to be excellent and if not excellent now, to become excellent with as great a speed as possible. The latter aim is indeed important since slowness of change may be the real obstacle to excellence. In this statement two items are tactically implied: 1) the faculty knows what an excellent department is and can recognize one when established, 2) the administration will provide the freedom and funding so that this thrust to excellence is economically and administratively feasible.

1.1. Definition of an Excellent Department

An excellent department of mathematics in a state university is composed of a faculty

---

[1]This proposal is based on the assumption that the Department of Mathematics does not receive the NSF Developmental Grant now pending.

a. whose minimal credentials include the doctoral degree
b. pursues academic endeavors which result in research papers of such quality to appear in refereed learned journals in the field
c. whose first duty is to the teaching function and to the student
d. whose duty to the roll of service to other disciplines; such as engineering, business, education, etc., is enthusiastic and sincere
e. whose consulting duties to the faculties of other departments are carried out effectively, or
f. whose standards are high and maintained to assure a "proper" balance between quality and quantity.

Such a faculty will be able to carry out the specific mission of the department outlined as follows:

1) Sustain excellent undergraduate program
2) Develop and sustain excellent graduate program through doctorate level
3) Provide service courses for
   a) Engineering
   b) Social Science

c) Business

d) Physical sciences

4) Provide consulting service to all faculty and staff of Texas Technological College

a) Research activity

b) Proposal writing

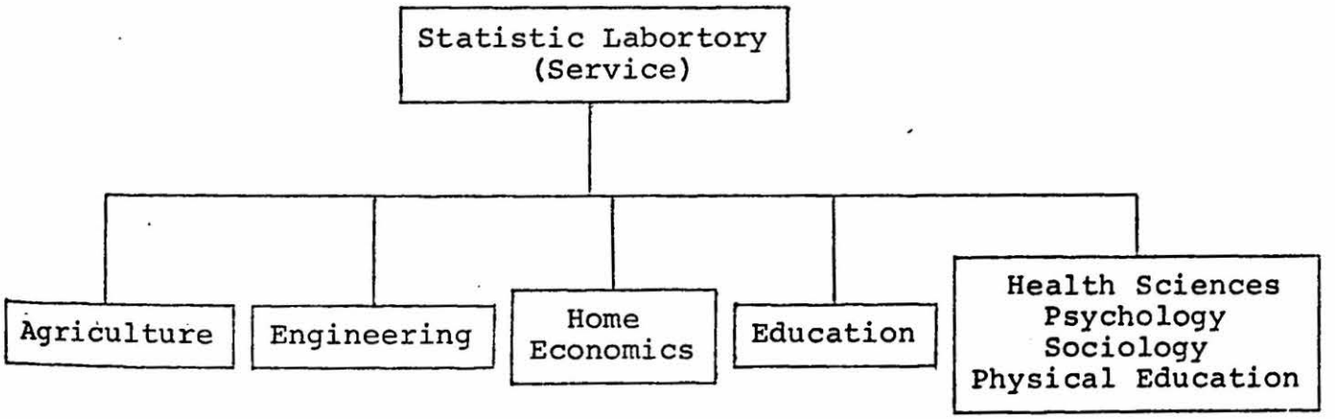
5) Develop an active laison with state and regional industry

6) Develop an active laison with elementary and secondary schools in state

7) Develop an active laison with junior college and four-year colleges in Texas and Southwest

8) To search diligently for research and scholarship funds outside the state of Texas funds

9) Development of a statistical laboratory



10) Support a university effort to develop a computer science program.

2. Specific and Immediate Aims

2.1. Faculty

Briefly, our aim is to hire 40 professors with doctorates, no full-time instructors, and 100- 4/10 instructors or teaching assistants by 1970-71 academic year and maintain this level with additional staff being joint appointments with industrial engineering, electrical engineering, education, statistics, agriculture, business and computer science

Year	No. Professors	Full-Time Instructors	T.A.'s	Joint Professors with Other Departments
1968-69	40	8	70	0
1969-70	40	6 1/2	85	2
1970-71	40	4	100	10
1978-79	60	0	125	20

The cost in 1970 is estimated per year.

100 T.A.'s at 3600 = 360,000
40 Prof. at 21,400= 856,000
$1,216,000

We note that our salary budget for 1968-69 is 712,760 plus approximately 80,000 for summer or a total of 793,000 per year. Hence, with increases of 200,000 a year for two years, we can make the aim easily; however, with a nominal 100,000 increase per year the same result will be obtained in 1972-73. It is strongly recommended that we budget a 12-month budget instead

THE MATHEMATICAL SCIENCES

Topology	Algebra	Analysis	PDE & DE Transform Theory	Prob. & Math. Stat.	Numer. Analysis
Miller, Ph.D	Tarwater, Ph.D	Milnes, Ph.D	Anderson, Ph.D	Odell, Ph.D	Walling, Ph.D
Bennett, Ph.D	Waid, Ph.D	Ford, Ph.D	Mitra, Ph.D	Boullion, Ph.D	Moreland, Ph.D
Hildebrand, Ph.D	Newman, Ph.D	Innis, Ph.D	White, Ph.D	Lewis, Ph.D	Achison, Ph.D
Hall, Ph.D	Amir-Moez, Ph.D	Tidemore, Ph.D	(1969-70)	Gray, Ph.D	(1968-69)
		Baldwin, Ph.D	(1969-70)		
		Wells, Ph.D (visiting)			

MATHEMATICS SUPPORT FOR OTHER SCHOOLS

Math. Ed.	Liberal Arts Math.	Engr. Math.	Business Math.	Statistics Laboratory
Poe, Ed.D	Smith, MS	Ault, MS	*McGothlin, MS	Duane Anderson, Ph.D.
Thompson, Ed.D	Strandtman, MS	*Hazlewood, Ph.D	Riggs, Ph.D	(1968-69)
Heineman, MS	Powers, MS	Rigby, Ph.D	*Scott, MS	(1968-69)
Kennedy, MS		*Parker, MS	Morton, MS	(1968-69)
Shipley, MS		Roberts, MS	*Willingham, MS	
		Shurbet, MS		

*retires 1969

of a nine-month budget in order that advantages in recruiting and planning can be achieved at the departmental level.

By 1978, one can expect the number of faculty to rise to 50-60 and number of teaching assistants to 120-150.

Intense recruiting for senior faculty will be, of course, continued. However, one cannot answer adequately the question, "Why would an established mathematician wish to come to Texas Technological College at Lubbock, Texas?" Realistically, our policy is to recruit young men with predicated potential and screen severely. This is a policy recommended by the consultants hired to review the Department.

2.2. The Computer Science Minor

The amount of requests received by potential mathematics students requesting computer science minors leads us to request and support a Department of Computer Science. The Department of Mathematics is confused by the so-called EA&D Department and believes that if this is essentially the Computer Science Department at Texas Technological College that it is not sufficient. We are pledging joint appointments of two or three mathematics professors to a Department of Computer Science as well as ten teaching assistants to teach three hours in the Department of Computer Science to help achieve this aim.

2.3 The Statistics Laboratory

The Department of Mathematics has committed itself to develop a Statistical Laboratory composed of a faculty of a hard core of three professors with doctorates in Statistics, four professors half-time in Department of Mathematics, two part-time in Computer Science Department, two part-time from Industrial Engineering, two part-time from Psychology and two part-time from Agriculture to maintain a Statistical Laboratory for the total University. These professors will be expected to perform

a) teaching

b) consulting and

c) research

in the field of Statistics. The proposal is contained in Appendix A. This will be achieved in 1968-69 academic year.

2.4 Journal

A journal sponsored by the Department of Mathematics will begin in 1969. Thie first issue is scheduled in June 1969.

3. Method for Achieving Aim

Since we feel that those whose work and efforts will result in the aims of the Department being achieved are the ones who should determine the policy and reap the rewards, the Department

chairman has selected the following general policies which will be adhered to:

1. All raises will be based on merit and only if directed in writing by the Administration will "cost of living" raises be given.
2. No one will be recommended for promotion to assistant professor without the doctorate degree, to associate professor without three papers in refereed journals, to full professor without 15 papers in refereed journals and three doctoral students directed.
3. Only "good teachers" will be considered for promotion. A proper balance of research and teaching is desired.
4. Only active professors will be granted summer contracts except those few associate and full professors whose long service merits this privilege, and were not recruited by the present chairman.
5. Summer contracts will be used to stimulate development of excellence in Department.
6. Tenure will be recommended for those who qualify for associate professor.

4. History and Projections

Budget Summary

	Academic Year 1963-64	Summer 1964	Academic Year 1964-65	Summer 1965	Academic Year 1965-66	Summer 1966
Salaries	$317,160	$37,336	$336,590	$43,377	$407,255	$35,181
ME	4,900		4,900		4,382	
Travel	1,500		1,800		2,500	
Clerical Help	4,440		4,440		6,540	
Student Help	5,500		5,500		3,200	
Total	$333,500	$37,336	$353,230	$43,377	$423,877	$35,181

	Academic Year 1966-67	Summer 1967	Academic Year 1967-68	Summer 1968	Academic Year 1968-69	Summer 1969
Salaries	$488,220	$51,556	$630,248	$75,338	$712,760	$95,000
ME	6,470		9,600		9,600	
Travel	3,600		4,000		4,000	
Clerical Help	6,540		10,800		11,240	
Student Help	3,200		3,800		3,800	
Total	$508,030	$51,556	$658,448	$75,338	$741,400	$95,000

	Academic Year 1969-70	Summer 1970	Academic Year 1970-71	Summer 1971	Academic Year 1978-79	Summer 1979
Salaries	$800,000	$120,000	$920,000	$130,000	$1,500,000	$200,000
ME	15,000		20,000		30,000	
Travel	7,500		8,000		20,000	
Clerical Help	16,000		16,000		30,000	
Student Help	4,500		5,500		10,000	
Total	$843,000	$120,000	$969,500	$130,000	$1,590,000	$200,000

	1963-64		1964-65		1965-66	
	Ph.D. In Math.	Without Ph.D. In Math.	Ph.D. In Math.	Without Ph.D. In Math.	Ph.D. In Math.	Without Ph.D. In Math.
Professors	4	2	5	3	6	3
Associate Professors	1	4	0	4	5	4
Assistant Professors	2	10	4	9	4	8
Total	7	16	9	16	15	15

	1966-67		1967-68		1968-69	
	Ph.D. In Math.	Without Ph.D. In Math.	Ph.D. In Math.	Without Ph.D. In Math.	Ph.D. In Math.	Without Ph.D. In Math.
Professors	7	3	6	2	6	2
Associate Professors	5	5	8	5	12	3
Assistant Professors	2	10	6	10	9	6
Total	14	18	21	17	27	11

	1969-70		1970-71		1978-79	
	Ph.D. In Math.	Without Ph.D. In Math.	Ph.D. In Math.	Without Ph.D. In Math.	Ph.D. In Math.	Without Ph.D. In Math.
Professors	6	1	8	0	10	0
Associate Professors	15	2	15	2	20	0
Assistant Professors	13	3	16	3	30	0
Total	34	6	40	5	60	0

Department of Mathematics

Tenure	1963-64		1964-65		1965-66	
	Tenure	Non-Tenure	Tenure	Non-Tenure	Tenure	Non-Tenure
Professors	6	0	5	3	6	3
Associate Professors	3	2	3	1	3	6
Assistant Professors	8	4	9	4	8	4
Instructors	0	10	1	9	3	8
Part-time Instructors	0	5	0	5	0	5
Teaching Assistants	0	22	0	21	0	27
Total	17	43	18	43	20	53

	1966-67		1967-68		1968-69	
	Tenure	Non-Tenure	Tenure	Non-Tenure	Tenure	Non-Tenure
Professors	8	2	5	3	7	0
Associate Professors	4	6	7	6	12	3
Assistant Professors	8	4	8	8	7	8
Instructors	4	8	4	5	3	0
Part-time Instructors	0	5	0	3	0	36
Teaching Assistants	0	28	0	51	0	24
Total	24	53	24	76	27	81

	1963-64 Min.	1963-64 Max.	1963-64 Aver.	1964-65 Min.	1964-65 Max.	1964-65 Aver.
Professors	$10,500	$12,300	$11,125	$10,000	$12,750	$11,531
Associate Professors	9,000	10,000	9,260	9,500	10,000	9,900
Assistant Professors	6,600	8,500	7,525	7,000	9,300	8,023
Instructors	5,700	6,400	6,120	6,000	6,800	6,377
T.A.'s	2,000	2,000	2,000	2,000	2,200	2,021

	1965-66 Min.	1965-66 Max.	1965-66 Aver.	1966-67 Min.	1966-67 Max.	1966-67 Aver.
Professors	$11,025	$14,910	$12,950	$11,025	$17,000	$14,336
Associate Professors	11,025	11,550	11,340	11,000	12,000	11,857
Assistant Professors	7,875	11,025	8,819	7,875	10,500	8,929
Instructors	6,000	7,350	6,737	6,615	7,500	7,099
T.A.'s	2,000	2,200	2,021	2,000	2,200	2,021

	1967-68 Min.	1967-68 Max.	1967-68 Aver.	1968-69 Min.	1968-69 Max.	1968-69 Aver.
Professors	$13,184	$18,000	$15,450	$13,184	$20,000	$16,500
Associate Professors	11,356	16,500	13,782	12,500	17,750	15,000
Assistant Professors	8,111	13,000	10,337	8,544	14,300	11,000
Instructors	7,000	7,570	7,188	7,200	8,000	7,600
T.A.'s	2,400	2,800	2,477	2,400	2,800	2,600

	1969-70 Min.	1969-70 Max.	1969-70 Aver.	1970-71 Min.	1970-71 Max.	1970-71 Aver.
Professors	$15,000	$25,000	$18,000	$15,000	$28,000	$19,000
Associate Professors	12,000	20,000	18,000	12,000	20,000	18,000
Assistant Professors	11,000	15,000	13,500	11,000	15,000	13,500
Instructors	7,000	8,000	7,500	7,000	8,000	7,500
T.A.'s	3,600	3,600	3,600	3,600	3,600	3,600

	1978-79 Min.	1978-79 Max.	1978-79 Aver.
Professors	$15,000	$32,000	$20,000
Associate Professors	14,000	20,000	16,000
Assistant Professors	12,000	16,000	14,000
Instructors	No Instructors		
T.A.'s	4,000	4,000	4,000

Semester Hours Taught: Mathematics

	1963	1964	1965	1966	1967
Lower	12,636	14,655	17,430	17,505	19,285
Upper	3,294	3,321	3,045	2,994	2,301
Graduate	234	371	331	405	824
Total	16,164	18,293	20,806	20,904	22,410

	1968	1969	1970	1978
Lower	20,000	21,000	22,000	30,000
Upper	2,500	2,500	2,500	3,500
Graduate	1,000	1,300	1,300	2,000
Total	23,500	24,800	25,800	35,500

Total Registrations: Mathematics

	1963	1964	1965	1966	1967
Lower	4,212	4,885	5,810	5,599	5,797
Upper	1,098	1,107	1,015	998	767
Graduate	90	115	121	137	289
Total	5,310	6,107	6,946	6,734	6,853

	1968	1969	1970	1978
Lower	6,000	6,500	7,000	10,000
Upper	800	800	850	1,000
Graduate	300	300	325	500
Total	7,100	7,600	8,175	11,500

Enrollment by Majors: Mathematics

	1963		1964		1965	
	Un	Grad	Un	Grad	Un	Grad
Mathematics	397	41	420	57	385	60

	1966		1967		1968	
	Un	Grad	Un	Grad	Un	Grad
Mathematics	417	53	418	80	444	100

	1969		1970		1978	
	Un	Grad	Un	Grad	Un	Grad
Mathematics	450	100	500	100	600	150

Graduates (degrees awarded): Mathematics 18

1963			1964		
Bachelor	Master	Doctorate	Bachelor	Master	Doctorate
88	10	0	83	12	0

1965			1966		
Bachelor	Master	Doctorate	Bachelor	Master	Doctorate
94	18	0	79	17	0

1967			1968		
Bachelor	Master	Doctorate	Bachelor	Master	Doctorate
62	12	1	50	10	3

1969			1970		
Bachelor	Master	Doctorate	Bachelor	Master	Doctorate
50	10	5	60	15	5

1971			1978		
Bachelor	Master	Doctorate	Bachelor	Master	Doctorate
70	20	7	100	30	10

Research Monies: Mathematics 19

Year	State	Federal	Private	Total
1963-64				
1964-65	$ 3,166			$ 3,166
1965-66	4,174	$ 3,600		7,774
1966-67	1,500			1,500
1967-68	9,762	11,380		21,142
1968-69	12,000	33,000	0	55,000
1969-70	30,000	50,000	0	80,000
1970-71	30,000	60,000	0	90,000
1978-79	50,000	100,000	0	150,000

DEPARTMENTAL DEVELOPMENT PROPOSAL

Submitted to the

National Science Foundation

by

Texas Technological College

Department of Mathematics

Lubbock, Texas

December 15, 1967

Patrick L. Odell
Chairman
Department of Mathematics

806 742-2231
Telephone Number

Grover E. Murray
President
Texas Technological College

806 742-2121
Telephone Number

I. THE INSTITUTION

1.1. Purpose. Texas Technological College is one of the principal members of the institutions of higher learning of the State of Texas. Along with The University of Texas at Austin, Texas A & M University and The University of Houston, Texas Technological College is charged by the State Coordinating Board on Higher Education to provide an excellent undergraduate training and graduate training through the doctorate level. The College[1] provides educational opportunities for the youth of the state continuing education for its citizens. The purpose of the College is to provide the undergraduate, the graduate, the pre-professional, and the professional training necessary to meet the academic, cultural, and professional demands of its students and of the State of Texas for their individual and collective development and progress.

1.2. Size and Growth. The College first opened its doors to students in the fall of 1925 with an enrollment of 910. The student body in the fall of 1967 numbered 18,646 students. The student population is predicted to exceed 30,000 by 1975. Table 1.2.1 gives the growth of the College with respect to student enrollment.

---

[1] The use of the word College is indeed a misnomer. A Committee has been appointed by the Chairman of the Board of Directors to study a proposed name change which will include the title University.

Table 1.2. Student Enrollment (*predicted)

Year	1963	1964	1965	1966	1967	1968*	1969*	1970*
Number	12,036	13,827	16,305	17,768	18,646	19,391	20,631	21,986

It is important to note that Texas Technological College is larger than Oklahoma State University, University of Oklahoma, New Mexico University, New Mexico State University, and every college or university in Texas except the University of Texas and University of Houston. All these institutions are more than 300 miles from Texas Technological College (See Map 1.2.1).

The geographical location plus the fact that there are over one and one half million people in the West Texas area, emphasizes the importance of the development of Texas Technological College as a center of excellence in undergraduate and graduate education. We note that New Mexico with its one million people is served by two universities; Oklahoma with its two and one half million people is allotting less than one and one half million people per university while Texas with its ten million people is served by four centers for graduate study.

In 1967 there are over 180 buildings housing the operation of Texas Technological College and its eight schools: Agriculture, Arts and Sciences, Business Administration, Education, Home Economics, Engineering, Law, and the Graduate School. With 1,839 acres in one continous tract, the Texas Technological College campus is one of the largest in America.

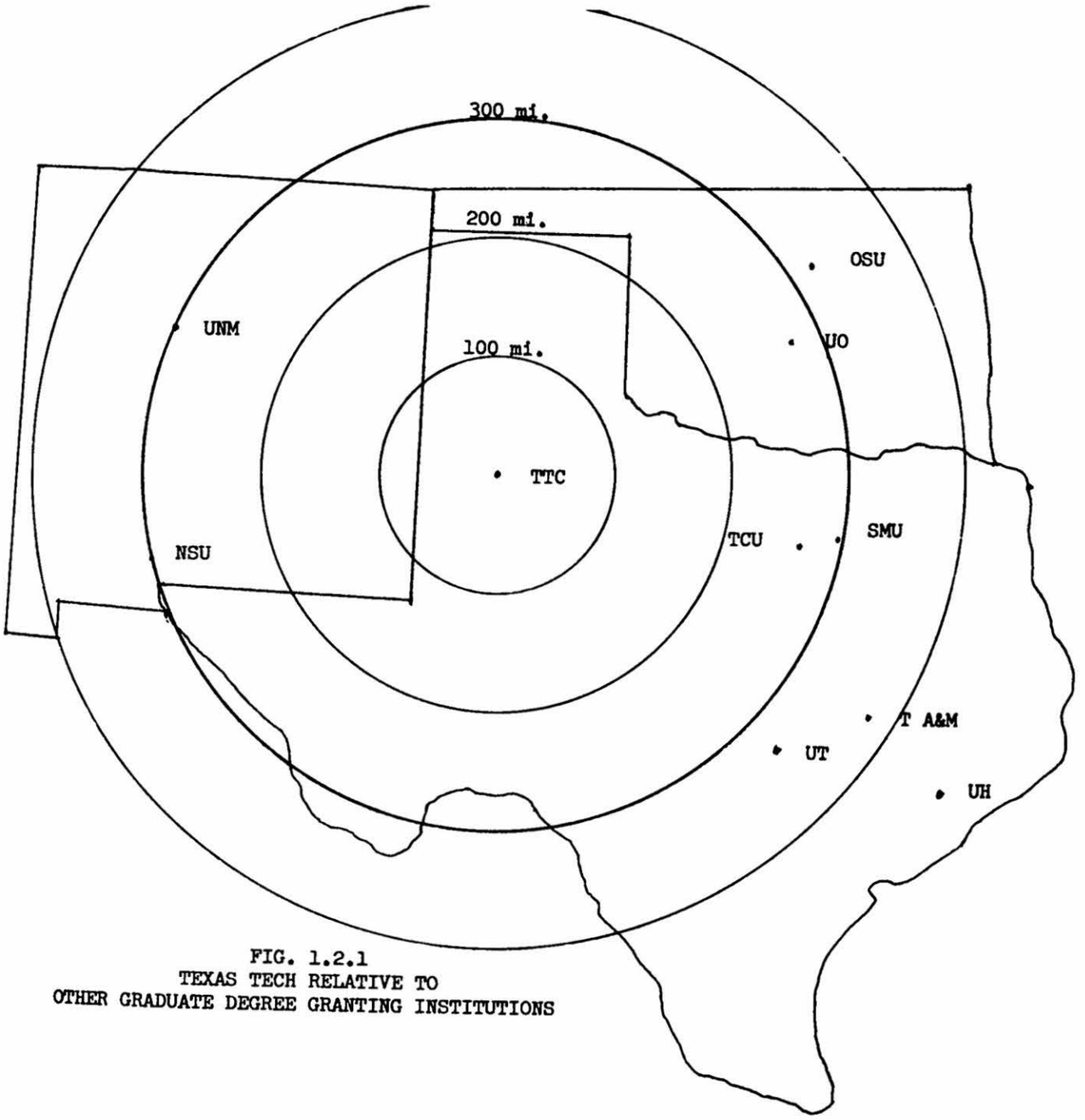


FIG. 1.2.1
TEXAS TECH RELATIVE TO
OTHER GRADUATE DEGREE GRANTING INSTITUTIONS

1.3. Institutional Statement of Role and Scope. On August 22, 1964, the governing board of the College adopted the following statement of purpose: "Basing its decision on current trends, geographical considerations, and a philosophy of higher education, the Board of Directors hereby declares that this institution can and will best serve the future as a multi-purpose state university of the first class--a center of learning--which provides and will continue to provide the opportunity for a liberal education and professional training for all students at the undergraduate and graduate levels."

In the Legislative Act which created this institution the College was authorized to give "complete courses" in all areas of knowledge and "any and all...degrees given by colleges of the first class."

Since change is the most significant feature of western civilization and since the rate of change in our times and in our locale is in excess of national rates, Texas Technological College feels it is in a position to adapt its existing programs and to develop new ones--in the liberal arts and in the professional and technological fields--to meet the requirements of the times.

1.4. Institutional Planning. There are at least two departments in every university which must be good before the University as a whole can be considered good. These departments are the departments of English and Mathematics. It is perhaps trite to say that good mathematics instruction is basic to an

excellent undergraduate and graduate science and engineering programs, yet one feels obligated here to restate this axiom.

The Executive Vice President with approval of the University President has submitted to the Board of Directors of TTC a master plan for development in which the scientific divisions of the university have been given a special priority for development. The departments selected for development in the early phases of the plan are: 1. Mathematics, 2. Physics, and 3. Electrical Engineering. The plan for excellence then calls for this cell of excellence to expand as swiftly as is economically possible into all scientific areas of specialty now at the University.

The Executive Vice President with advice of the Vice President for Academic Affairs, the Deans, and heads of the departments and with the approval of the President has formulated the master plan for consideration and approval by the Board of Directors.

1.5. International Center for Arid and Semi-Arid Land Studies (ICASALS)

The Coordinating Board for the Texas College and University System has encouraged each state-supported institution of higher education to develop a special role and scope which will not duplicate the special emphasis of any other institution. During the summer of 1966, the Board of Directors of Texas Technological College unanimously adopted as a unique mission for this institution the study of arid and semi-arid lands in all their

broad and various aspects. To implement this program the board officially established, in August 1966, the International Center for Arid and Semi-Arid Land Studies (ICASALS).

This new enterprise is an integral part of Texas Technological College. Its foundation consists of the entire undergraduate and graduate academic structure as well as the various research activities of the faculty and staff.

ICASALS has as its goal the development of a world-wide center of knowledge pertaining to the arid and semi-arid regions which make up about half of the exposed surface of the earth. The range of subject matter is extremely broad, embracing not only agriculture, science, engineering, and various technologies but also cultural and artistic topics concerning man's responses to his environment.

The entire faculty is involved in long-range planning for the Center. Eventually it will include research projects in virtually all disciplines and the concentration of additional scholars of international reputation on the campus. A library and documentation center is envisioned which will feature holdings of all types of recorded knowledge, including books, periodicals, manuscripts, photographs, tapes, and computerized information. Plans have been made for a new ICASALS Institute and Museum to be devoted to continuing education as well as to dynamic displays and exhibits.

It is expected that Texas Technological College will be known in the future not only as a univeristy of the first

class but as the home of an international endeavor designed to enrich the knowledge and lives of people all over the world.

1.6. The Computer Center. The Computer Center serves the entire academic community, providing computer time on both digital and analog computers. Current facilities include an IBM 7040/1401 system, an IBM 1620, a CDC G-15, and EAI TR-48, and an IBM 1231 Optical Scanner. Computer time is made available to the academic community for educational purposes and unsponsored research, upon acceptance of a valid usage request. The Center provides operators for its digital equipment and programming consultants to assist users in problem definition, programming, and the use of programming packages.

The Center maintains an extensive library of generalized routines for use in statistical analysis, mathematics, operations research, etc. The use of FORTRAN IV is encouraged, but the Center will process any standard programming language such as SIMSCRIPT, COBOL, MAD, and ALGOL.

Many academic departments offer computer programming as primary subject matter or as ancillary to the prime subject. A 2-hour course in computer programming is offered each semester and in both summer terms. In addition, the Computer Center offers frequent non-credit, cost-free seminars in FORTRAN IV and the use of generalized routines.

The following is a list of electronic data processing equipment at the Texas Technological College Computer Center. With the exception of the Control Data Corporation 1604 computer, all equipment is operational and in use at this time.

COMPUTERS

IBM 7040 (32K)

12 - IBM 729 magnetic tape units
1 - 1402 card reader-punch
1 - 1403 printer

IBM 1401 (8K)

4 - IBM 7330 magnetic tape units
1 - 1402 card reader-punch
1 - 1403 printer
1 - 1231 optical page reader

IBM 1620 (20k)

1 - 1622 card reader-punch

CDC 1604 (32k)

8 - magnetic tape units

PERIPHERAL EQUIPMENT

12 - IBM 026 keypunches
1 - IBM 082 card sorter

II. THE DEPARTMENT OF MATHEMATICS

2.1. Present Activites and Philosophy

It is important to note that the 1967-68 faculty will be a new faculty and is overall a young faculty. In March 1967 a qualifying examination for the doctorate degree was given to thirteen students implying that within the next two years that we expect to produce 10-13 doctoral graduates, three in mathematical statistics, one in matrix algebra, one in topology, three in differential equations, and the remaining in abstract or classical analysis.

In recruiting graduate students we have obtained for the larger part students already having masters degrees which may reflect in a decrease in number of masters degrees awarded in the next few years and a striking increase in doctoral degrees granted. We have recruited 47 teaching assistants for 67-68 year.

In summary the faculty who are taking or will take an active part in graduate upper level undergraduate instruction are listed here to facilitate the realization of a real change in faculty staffing.

1. Professor Ali Amir-Moez (Ph.D.) U.C.L.A. 1955
   Linear Algebra
2. Professor Harold W. Milnes (Ph.D.) Wayne State
   University 1956 - Functional Analysis

3. Professor Patrick L. Odell (Ph.D.) Oklahoma State University 1962 - Mathematical Statistics and Matrix Theory

4. Associate Professor Ronald Anderson (Ph.D.) Iowa State University 1962 - Differential Equations

5. Associate Professor George Baldwin (Ph.D.) Oklahoma University 1960 - Topology & Analysis

6. Associate Professor Shelby Hildebrand (Ph.D.) Iowa State University 1962 - Topology

7. Associate Professor W. T. Ford (Ph.D.) Rice University 1963 - Approximation Theory

8. Associate Professor Robert L. Poe (Ed.D.) Oklahoma State University 1963 - Mathematics Education

9. Associate Professor Derald D. Walling (Ph.D.) Iowa State University 1963 - Numerical Analysis

10. Associate Professor John T. White (BA) University of Texas 1952 (Ph.D.) 1962 , Analysis

11. Assistant Professor Michael Hall (Ph.D.) University of Arizona 1966 - Algebraic Topology - Post Doctorate (Assistant Professor in Residence) U.C.L.A. 1966-67

12. Assistant Professor Thomas Newman (Ph.D.) University of Texas 1966 - Algebra

13. Assistant Professor A. K. Mitra (Ph.D.) Marburg University 1963 - Applied Mathematics

14. Assistant Professor Thomas Boullion (Ph.D.) University of Texas 1966 - Mathematical Statistics and Matrix Theory

15. Assistant Professor Freddie E. Tidmore (Ph.D.) Oklahoma State University, January 1968 - Functional Analysis

16. Assistant Professor Truman O. Lewis (Ph.D.) University of Texas 1966 - Mathematical Statistics

17. Associate Professor H. L. Gray (Ph.D.) University of Texas 1966 - Applied Mathematics

18. Associate Professor George Innis (Ph.D.) University of Texas 1962 - Post Doctorate, Harvard 1962-63 - Complex Analysis and Harmonic Analysis

19. Associate Professor Atchison (Ph.D.) University of Texas 1963 - Complex Analysis

20. Assistant Professor John Duke (Ph.D.) University of Colorado (January 1968) - Abstract Algebra

21. Assistant Professor Carter Waid (Ph.D.) Louisiana State University 1967 - Abstract Algebra

Only Dr. Shelby Hildebrand has been here longer than three years.

It is important to note the faculty for the most part is professionally young; hence, one cannot expect a lengthy publication record. It is suggested that a measure of potential research abilities would be the number of publications per year or the number of papers submitted and accepted for publication.

Tenured members of the staff who are primarily concerned with undergraduate teaching of service courses are listed here.

1. Professor Emmett A. Hazlewood (Ph.D.) Cornell University - 1936 Physics

2. Professor E. Richard Heineman (MS) University of Wisconsin 1926

3. Professor Fred Rigby* (Ph.D.) University of Iowa 1940

4. Professor Charles L. Riggs (Ph.D.) University of Kentucky 1949

5. Associate Professor John Ault (MS) Ohio State University 1935

6. Associate Professor Earl Gilmore (Ph.D.) University of California (Berkeley) 1951 - Chemistry

7. Associate Professor Robert M. Parker (MS) Texas Technological College 1933

8. Associate Professor Horace Woodward (MA) Texas Technological College 1937

---

* Dean of Graduate School

9. Assistant Professor L. E. McGlothlin (MA) University of Texas 1939

10. Assistant Professor Elwyn W. Morton (MA) University of Texas 1955

11. Assistant Professor Virginia Roberts (MA) Texas Technological College 1945

12. Assistant Professor Lynn Shurbet (MA) Texas Technological College 1957

13. Assistant Professor M. Ruth Strandtmann (MA) Texas Technological College 1952

14. Assistant Professor Carl H. Willingham (MA) Texas Technological College 1952

15. Professor Gordon Fuller (Ph.D.) University of Michigan 1933

16. Assistant Professor Burnett T. Smith (BS) Texas Technological College 1942 - (M.Ed.) 1948

Most of these faculty members were essentially the faculty of the department of mathematics prior to the awarding a graduate responsibility at a doctorate level in mathematics to Texas Technological College. At least four of these members will retire immediately following the 1970-71 session. Most are considered good teachers of freshmen or engineering mathematics hence, supplementing and supporting well the younger faculty.

2.2. The Graduate Curriculum

It is required of all students working toward the doctorate to complete successfully a core of four six semester hours courses in:

A) Real Analysis

B) Complex Analysis

C) Abstract Algebra

D) Topology

Prerequisites for these courses are six hours of advanced calculus, three hours of undergraduate complex variable, three hours of modern algebra, and three hours of topology, respectively. The students are required to pass a twelve hour comprehensive examination over these four topics; preferably during the early weeks of their second year of study.

Most students (except for some whose emphasis is mathematical statistics) are required to take a six hour sequence in functional analysis. The students in mathematical statistics are urged to take this same sequence. These latter students are required to master six semester hours of advanced probability and measure theory.

Students whose major emphasis is distribution theory, analysis, or differential equations would pursue a sequence of courses as follows:

1. (a) (b) (c) and (d), above.
2. 6 hours of Functional Analysis.
3. 6 hours of Ordinary Differential Equations.
4. 6 hours of Partial Differential Equations.
5. 12 hours of seminar in advanced topics in analysis, distribution theory or differential equation.
6. 6 hours of algebraic topology.
7. Graduate mathematics electives to a total of 72-78 hour.
8. Research and dissertation work then follows.

We believe that our mathematical statistics offering is indeed strong and compares favorably with the established statistics curriculum in the midwest and southwest. The following outline indicates the course work for a doctoral candidate in mathematical statistics. It is assumed that each student has completed six semester hours of senior mathematical statistics, and then he must take

1. (a) (b) (c) and (d) above
2. 3 hours of Theory and Methods in Experimental Design
3. 3 hours of Theory of Linear Statistical Models
4. 6 hours of Advanced Mathematical Statistics which includes multivariate analysis and foundations of testing hypothesis
5. 3 hours of Stochastic Processes
6. 6 hours of Advanced Probability Theory and Measure Theory
7. Each student is urged to take six hours of Functional Analysis and three hours of Fourier Analysis
8. Graduate mathematics electives to a total of 72-78 hours
9. Research and Dissertation work then follows.

The usual reading knowledge of two foreign languages has been modified so that one language can be waived if a block of computer science knowledge is attained. This is especially important to those students whose interests lie in numerical analysis, statistics and differential equations. Those students whose emphases lie in more abstract areas are required to complete the requirement of two languages selected from French, German, and Russian.

At the present we have two doctoral students interested in abstract algebra and one in topology. Their course work requirements are essentially the same as those required for analysis except the differential equations requirements are replaced with 6 hours of dimension theory and 6 to 12 hours of seminar in advanced topics in topology.

Informally, we have partitioned the department into research areas in an effort to strengthen and promote our research potential. Each group has been given the responsibility to develop the curriculum in each area to a depth that will assure that our graduates will be of a caliber that will compare favorably with other large state universities. Each of these groups is led by an experienced mathematician who is supported by at least two young capable mathematicians, except Group 6 - Mathematics Education. The following breakdown is included.

Group 1 Mathematical Statistics

Professor Patrick L. Odell, Ph. D.

Associate Professor Henry L. Gray, Ph. D.

Assistant Professor Thomas Boullion, Ph. D.

Assistant Professor Truman O. Lewis, Ph. D.

Group 2 Analysis

Associate Professor Wayne T. Ford, Ph. D.

Associate Professor Thomas Atchison, Ph. D.

Associate Professor George Innis, Ph. D.

Associate Professor John T. White, Ph. D.

Assistant Professor Fred E. Tidmore, Ph. D.
(January 1968)

Group 3 Applied Mathematics (PE, PDE, Mathematical Physics)

Professor Harold Milnes, Ph.D.

Associate Professor Ronald Anderson, Ph.D.

Associate Professor Henry L. Gray, Ph.D.

Associate Professor Derald Walling, Ph.D.

Assistant Professor A. K. Mitra, Ph.D.

Group 4 Topology

Associate Professor Shelby K. Hildebrand, Ph.D.

Associate Professor George L. Baldwin, Ph.D.

Assistant Professor Michael Hall, Ph.D.

Group 5 Algebra

Professor Ali Amir-Moez, Ph.D.

Assistant Professor John Duke, Ph.D. (January 1968)

Assistant Professor Thomas Newman, Ph.D.

Assistant Professor Carter Waid, Ph.D.

Group 6 Mathematics Education

Associate Professor Robert L. Poe, Ed.D.

Group 7 Numerical Analysis

Professor Harold Milnes, Ph.D.

Professor Patrick L. Odell, Ph.D.

Associate Professor Derald Walling, Ph.D.

Associate Professor Wayne T. Ford, Ph.D.

Associate Professor Thomas Atchison, Ph.D.

It is important to note that Group 7 is reasonably a strong group since each of these professors know the computer

well and have done research in numerical analysis during their years as industrial mathematicians. Our topologists are professionally young and in a couple of years should be better known since their publications are beginning to appear in the journals.

A major weakness of the department is the lack of research funds to support graduate students during the last year of their doctoral studies and staff during summer months. A number of research proposals have been written in an effort to obtain these funds and are being processed now by various funding agencies.

2.3. Courses, Requirements, and Facilities

The department's general range of course offerings available to students seeking the doctorate is indicated by the list of courses now being offered:

Advanced Calculus

Numerical Mathematical Analysis

Probability

Mathematical Statistics

Actuarial Statistics

Matrix Theory

Mathematical Programming

Introduction to Difference Equations

Selected Topics

Vector Analysis

Tensor Analysis

Graduate Seminar

Advanced Problems

Theory of Numbers

Modern Algebra

Foundations of Mathematics

Theory of Functions of a Complex Variable

Functions of a Real Variable

Topology

Operational Calculus

Fourier Analysis

Methods of Applied Mathematics

Theory of Ordinary Differential Equations

Partial Differential Equations

Advanced Numerical Analysis

Advanced Topics in Analysis

Functional Analysis

Advanced Mathematics for Teachers

Advanced Topics in Algebra

Advanced Topics in Geometry

Advanced Topics in Topology

Design of Experiments

Theory of Linear Statistical Models

Stochastic Processes

Advanced Mathematical Statistics

Advanced Probability Theory

Measure Theory

Courses to be added:

6 hours Algebraic Topology

3 hours Dimension Theory

6 hours Ring Theory

6 hours Group Theory

3 hours Differential Manifolds

6 hours Numerical Analysis

6 hours Riemann Surfaces

3 hours Topics in Numerical Analysis

6 hours Mathematics of Continuous Media

6 hours General Function Theory.

The department's general and special doctoral degree requirements including fields of study required and fields of specialization available are indicated by the following discussion:

Those who seek the Ph.D. degree in mathematics are required to complete a minimum of 72 hours of course work in mathematics which is exclusive or research, Master's thesis, and dissertation. Of this 72 hours, there must be 6 hours of real variables, 6 hours of algebra - all of which must be taken in graduate level courses. A maximum of 15 hours of the 72 required hours may be taken at, and only at the senior level. Students are normally expected to complete a thesis type Master's degree before beginning work on the doctoral, but the department graduate committee, by unanimous consent, may permit the student to bypass this requirement. Minor variations in these general requirements operate for transfer students, students with non-thesis type Master's degrees, and students seeking the doctorate without a Master's.

The student, with the noted exception, is required to demonstrate a reading proficiency in two of the following languages: French, German, Russian.

The doctoral candidate takes a preliminary examination during his first semester in the program. The results of this examination are used for advisory purposes only.

The candidate is required to take a qualifying examination after he has completed approximately three-fourths of his course work requirement in mathematics courses. The nature of the examination is determined by the student's advisory committee. The majority decision of the student's departmental advisory committee is required in order for the student to receive a "pass" on this examination.

Each candidate is required to complete original research, as judged by his advisory committee, and to submit an acceptable dissertation to the departmental graduate faculty.

The fields of specialization available for doctoral students are (1) point set topology (2) abstract algebra (3) analysis (4) differential equations (5) probability (6) mathematical statistics and (7) numerical analysis. Sufficient staff is now available so that the additional fields of algebraic topology and mathematics education will represent fields of specialization for the doctoral student in the near future. A doctorate of education degree program in mathematics and education is being formulated.

The general and special facilities available to students seeking the doctorate, including library holdings are:

The department of mathematics has worked diligently the past two years to acquire the mathematics publications necessary for a good research. During the past year the university

has spent approximately $30,000 on this project. Our current book holdings are good and are being improved at a rapid rate. Approximatley 282 mathematics journals are now on subscription; however, only the major American journals have reasonable back runs. The library under the active guidance of the mathematics department is currently ordering back issues of the major journals. It is expected that $30,000 to $35,000 will be spent on improving the holdings on the mathematics library this next year. In addition, the library is one of two regional depositories in the state of Texas for the United States Government Documents. The library has study carrells and microfilm readers available; also Xerox machines are on the floor for immediate use by the students.

III. PROPOSED PROGRAM FOR MATHEMATICS

In considering plans for the development of the Department of Mathematics, it is necessary to keep in mind the dual role of mathematics illustrated by the title of a book by E. T. Bell: Mathematics - Queen and Servant of the Sciences. As the Queen of the Sciences, one recalls the recent statement of Juan Dieudonne that, "Even if mathematics were to be forcibly separated from all other channels of human endeavor, there would remain food for centuries of thought in the big problems we still have to solve within our own sciences."[1] On the other hand, a servant is too often considered a dull-witted person, so the development of the service areas of mathematics must be pursued with imagination and vigor.

At TTC we feel that a balance has been obtained to some extent, despite acknowledged weaknesses. The research interests of the majority of the staff lie in applied mathematics; just as the University has picked science and technology for leading institutional component of excellence, the Departmental strength in mathematics has been led by the field of applied mathematics[2], and we expect this trend to continue. Nevertheless, the Department has moved rapidly in providing service courses

---

[1] American Mathematical Monthly, vol. 71 (1964), P. 248

[2] Differential Equations, Partial Differential Equations, Approximation Theory, Numerical Analysis and Mathematical Statistics.

specifically designed for such areas as business and social science students, teacher education majors, engineering students, and students in the College of Arts and Sciences. The principal weaknesses lie in algebra and topology. We have hired an able young man in algebraic topology and two in abstract algebra, and the Department is seeking mathematicians who are active in the other areas; we need at least two men in foundations and algebraic topology.

To overcome these weaknesses, the Department will thus need to add four more staff members in foundations or topology, abstract analysis. Projected to three years hence, this means our present[3] staff of 22 will swell to 30. This is consistent with the existing plans for Departmental improvement and with the expected student increase in mathematics enrollments.

However, to achieve the explicit goals set forth in our accelerated drive to a position of excellence over the next three years, more in the way of personnel and facilities need to be secured.

The policy of the Department in recruiting mathematicians has been to seek young, promising people. This policy has proved efficacious. However, a dramatic step to excellence would be more likely if these younger people could benefit from the presence of somewhat older, more experienced research mathematicians. In short, we feel the need of more first-caliber

[3] The words "present staff" will be used to describe qualified mathematics professors, ie, those who can teach both undergraduate and graduate courses in at least one area of modern mathematics and are qualified to do research in that area.

full professors - some as permanent additions to the staff, some as visiting scholars - in order to accelerate the process of mathematics faculty development which has been planned. Should we be honored with a Departmental Science Development grant, we would hasten the development of the mathematics faculty by the addition of such people, along with supporting faculty and with post-doctoral research fellows, in steps which begin large and taper off over the next three years. Such a program realistically anticipates that regular faculty and graduate student recruiting would become easier, simply through the reputation these senior scholars would help to establish for TTC.

The Department of Mathematics has carefully planned a program of faculty development which would, by national standards, make TTC a first-rate center of mathematical research and teaching.

Without a Departmental Development grant, our growth over the next three years - consistent with our present program of the academic improvement - can be predicted to be:

	1967-68	1968-69	1969-70	1970-71
Professors	6(2)[1]	6(2)	8(2)	8(0)[2]
Associate Professors	8(5)	8(5)	8(5)	8(2)[2]
Assistant Professors	6(10)	8(10)	10(10)	12(8)[2]

An acceleration of this pace toward excellence would reasonably involve a growth structure as follows:

---

[1] The notation $n_1(n_2)$ denotes the number n_1 of professors with Ph.D. in mathematics and n_2 denotes those without. The total is n_1 and n_2 in each category.

[2] Reduction in n_2 due to retirement and assumes no attrition due to other causes.

	1967-68	1968-69	1969-70	1970-71
Visiting Professors	0(0)	2(0)	2(0)	0(0)
Professors	6(2)	6(2)	6(2)	10(0)
Associate Professors	8(5)	8(5)	8(5)	8(2)
Assistant Professors	6(10)	8(10)	10(10)	12(8)
Post-Doctoral Fellows	0(0)	3(0)	3(0)	3(0)

This profile of faculty development contains the features which are so important to induce a higher order of magnitude of research and active mathematical intercourse in several fields of study. The eventual figures of two Professorships or Visiting Professorships and three Post-Doctoral Fellowships or two Research Chairs constitute a permanent feature in an envisioned program whereby rotation of the youthful and the mature would negate the disadvantages of isolation in the Southwest.

Thus, the first three years of this plan involve a request for funds wherein the NSF is asked to support the salaries of faculty members who would be added in the accelerated program over and above those to be added under present plans. Comparison of the two preceding tables yields the extra growth figures:

	1967-68	1968-69	1969-70	1970-71
Visiting Professors or Professors	0	2	2	0
	0	0	0	2
Associate Professors	0	0	0	0
Assistant Professors	0	0	0	0
Post-Doctoral Fellows	0	3	3	3

at an expected total of $240,000 in a program of faculty growth

In particular, an enlargement of supporting personnel in terms of graduate assistants will be needed. Our present plans over the next three years are herewith compared to the proposed plans under the Departmental Science Development Program (DSDP):

	1967-68	1968-69	1969-70	1970-71
Present plans	47	55	75	100
Proposed DSDP		70	80	100

The difference for the three years, which is therefore a part of the budget in this proposal, entails funds to support graduate assistants as follows:

	1968-69	1969-70	1970-71
Graduate Assistants	$54,000	$54,000	$54,000

at a cost of $168,000 in an overall three year expansion program.

An additional student personnel program will need to keep pace with any enlargement of faculty personnel. This involves the positions of Research Fellows, a fellowship program inaugurated by TTC in 1967 to support worthy advanced graduate students, somewhat as a reward for their efforts, while working on research for their doctoral theses. In line with the table above, present-versus-proposed plans go as follows:

	1967-68	1968-69	1969-70	1970-71
Present plans	2	3	6	10
Proposed DSDP		10	10	10

The final figures of 4 and 10-14 are consistent with expected annual mathematics Ph.D. production by the year 1969-70 without and with the growth which would accrue with the development program, respectively. For this expansion, a three-year expenditure of $162,000 is requested as part of a three-year program involving $108,000 in extra funds.

An excellent research library is a necessary ancillary to an active mathematics scholar. The Department is proud of the progress it has made in building its mathematics library during the past few years. The budget[1] of $30,000 annually, in recent years has through the judgment of our staff, provided us with a reasonably good selection of journals, as can be seen in Appendix A; we also have a fairly good selection of books. A major effort is needed, though, if we are to hope to fulfill the needs of the senior people we seek under the proposed Departmental Science Development Program. Proposed expenditures are:

	1967-68	1968-69	1969-70	1970-71
Proposed DSDP		$5,000	$5,000	$5,000

Thus, the proposed budget contains a request for the three years of $15,000 additional during a three year expenditure. The major emphasis here is, as with the expanding research interest of faculty, placed upon the beginning years of the proposed program. Our needs are simple to state: we need many more books and we need multiple copies of the more widely-

[1] This amount is what has been spent on mathematics books and journals (truly a "catch up" budget). This money came from a library budget which partially fulfills our requests.

used ones, this in addition to the requirements for a completion of our research journal holdings. Also, due to the applied emphasis in the department, we will need to purchase books and journals in fields relating to mathematics. Some of these areas have minimal holdings in our library, and a development of interdisciplinary programs is not possible unless the library is developed on a much broader basis. Once a research library in mathematics is established, its sustention is relatively inexpensive.

The present policy of the University is to support travel to professional meetings for the purpose of presenting a paper, participating in a symposium, actively working on a research or educational panel, presiding at a business meeting, recruiting new faculty, attending conferences to work on common research, and the like. The cost of this from year to year varies widely, but amounts to about $200 per active staff member per year. An expansion of activity as is envisioned in this proposal makes it reasonable to propose more leeway; in fact, we propose an allowance of three trips per year at an average of $200 per trip for each faculty member and Post-Doctoral Fellow, in order that no one be deprived of opportunities to attend important meetings or symposia and to allow for personal meetings with colleagues in other institutions to work on joint research projects. Previous tables on full-time staff may be consulted to see that this table reflects the above view:

	1967-68	1968-69	1969-70	1970-71
Present Plans	$4,000	$ 5,000	$ 6,000	$ 7,000
Proposed DSDP		15,000	16,000	17,000

The budget will, then show a request for $30,000 to support travel for three years; and this is a part of projected three year expansion program involving $47,000 in new funds. It should be noted that at 1970-71 we will still need funds to meet our projected needs.

The educational isolation of the Southwest makes programs for outside inspiration an absolute necessity in any plans for improvement.

The Department of Mathematics is already proposing an annual Symposium in Industrial and Applied Mathematics for which several visitors will be induced to drop by each year to participate. But a detour to Lubbock via Dallas or Albuquerque is hardly equivalent to the ease with which visitors can stop by at, say, the University of Chicago, and so visitors must fairly be given travel reimbursement plus honoraria for visits to the campus. A program of activity, quality, and variability suited to the needs of a rapid faculty development program leads to estimates as follows:

	1968-69	1969-70	1970-71
Proposed DSDP	$5,000	$5,000	$5,000

The yearly totals $15,000 for the next three years over present activity.

Secretarial assistance, always a problem, would need to be settled once and for all in the faculty expansion being proposed.

No decent educational budget can allow for money to be wasted through the inefficient use of professorial time, and to burden a well-paid scholar with matters which could be handled by a good office staff is clearly foolish. Roughly one full-time secretary is needed for each eight active staff members. The Department needs an Assistant to the Chairman if the faculty is to undertake the proposed growth. Such a person should be reasonably versed in mathematics and the problems of teaching, and he should have some experience in administration and office management. Now we have that person. The following table displays our considered needs for service in the Departmental Office:

	1967-68	1968-69	1969-70	1970-71
Present plans	3	3	3	4
Proposed DSDP		4	4	5

The difference between present and proposed plans for the three years is $13,500.

Increased office staff and faculty size will entail increases in costs of office supplies and equipment. Fearful of being prolix, we have ommitted the details; but careful computations based on experience show a need for in additional funds for the three years.

The total request for expansion in mathematics office operation is, then, $15,000[1] to cover the three years. We repeat that this is the cost of expansion and does not include maintenance of present faculty and facilities.

---

[1] Secretary at $4,500 per annum

Before ending this section with some summary tables and charts which exhibit expected costs and growth for mathematics under the proposed TTC Departmental Science Development Program, we emphasize again that the key to excellence in mathematics rests with faculty development as described herein. It is hoped that the proposal contains the information needed for the Foundation to feel confident that the TTC Department of Mathematics can and will carry out the faculty development program with the same degree of success as is mirrored in the history of this Department. We are confident that our faculty development ambitions are entirely realizable. The figures shown for proposed staff are securely grounded on two considerations: need and availability.

On the one hand, the Department needs, for recognized excellence by national standards, the growth and balance displayed in the second table of this section. To serve the other disciplines in the University with the adequacy desired by the members of the Department, at the same time undertaking a rapid acceleration in research and teaching within mathematics itself, calls for such a staff. A realization of the envisioned plans would help TTC build in three years a truly excellent mathematics program which would otherwise take an estimated 5 to 10 years. Advancement in mathematics is necessary for our overall plans of excellence in science and eventually in all fields. This is a fundamental step in the educational chain reaction toward excellence which TTC is seeking.

On the other hand, the personnel we propose to hire are available. A careful survey of our present faculty has revealed that even more mathematicians than required for the projected growth are known to be available. If necessary, we could list the names of professors of the quality we seek who will be approached by us should our requests be granted; and they will be approached with confidence resulting from the knowledge we have that they are in some cases anxious to work with certain TTC staff members, in some cases desiring to be a part of a new and exciting educational environment, in some cases fearful of surging administrative detail in their present jobs, in some cases wishing to live in the Southwest, and other reasons. At any given point in our drive to excellence, we will be careful to hire opportunistically from those available the ones of greatest quality as reflected in their research, professional, and teaching activities.

And finally, to indicate the desire for excellence in mathematics the TTC pledges $40,000 per year for research money to be divided into 8 summer research grants at approximately $5,000 each to develop and/or maintain the research capability and/or potential of the young, newly recruited faculty. With the guidance of the proposed visiting professors we feel that this new faculty will develop into excellent research mathematicians as well as fine teachers of mathematics.

We note that the department on the last few years (excluding the sharp increase in 1967-68) has had a growth in budget of approximately $70,000 per year. Hence by the end of the three years of development plus the increase in the fourth year the $210,000 for salaries will be available to sustain the program. The added research money ($40,000) should be increased by the end of the third year. Indeed TTC will have ample finance to sustain the proposed drive toward excellence.

IV. THE AID REQUESTED

4.1. The Fiscal Base of the Plan and Budget Requested

The amounts requested each year in this proposal are summarized in the following table:

Table 1.

Salaries	1968-69 NSF	1968-69 TTC	1969-70 NSF	1969-70 TTC	1970-71 NSF	1970-71 TTC	1971-72 TTC
2 Professors (9 months)	$50,000	-0-	$50,000	-0-	$50,000	-0-	$50,000
3 Post Doctoral Fellows (9 months)	30,000	-0-	30,000	-0-	30,000	-0-	30,000
20 TA's	36,000	36,000	36,000	36,000	36,000	36,000	72,000
10 Research Fellowships	36,000	-0-	36,000	-0-	36,000	-0-	36,000
1 Technical Typist	4,500	-0-	4,500	-0-	4,500	-0-	4,500
Research 8 Reseasrch Stepends (Faculty)	-0-	40,000	-0-	40,000	-0-	40,000	40,000
Travel	10,000	-0-	10,000	-0-	10,000	-0-	10,000
Symposium	5,000	-0-	5,000	-0-	5,000	-0-	5,000
Library	5,000	-0-	5,000	-0-	5,000	-0-	5,000
OASI	5,276	-0-	5,532	-0-	5,532	-0-	
Totals	$181,776	$76,000	$182,032	$76,000	$182,032	$76,000	

Grand Totals (3 years)		
	NSF Contribution	$545,840
	TTC Contribution	228,000
	Total	$773,840

Appendix A

PERSONNEL

SCIENTIFIC PERSONNEL

NAME: Ali R. Amir-Moez BIRTHDATE: April 7, 1919

TITLE: Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. University of Teheran, 1941
M.A. University of California at Los Angeles, 1951
Ph.D. University of California at Los Angeles, 1955

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematical Association of America
Society for Industrial and Applied Mathematics

EXPERIENCE:
Assistant Professor, University of Idaho, 1955-56
Assistant Professor, Queens College, 1956-60
Assistant Professor, Purdue University, 1960-61
Associate Professor, University of Florida, 1961-63
Professor, Clarkson College of Technology, 1964-65
Professor, Texas Technological College, 1965-present

PUBLICATION:

Synthetic Approach to the Theory of Envelope, American Mathematical Monthly, Vol. LXIV, No. 4, 1957

Singular Values of a Matrix, (Joint paper with A. Horn), American Mathematical Monthly, Vol. LXV, No. 10, 1958

Some Equalities in a Unitary Space Leading to Equalities Concerning Singular Values of Sets of Matrices, Mathematische Annalen, 135 Band 5, 1958

Quadrics in R_n, (joint paper with A. L. Fass), American Mathematical Monthly, 1960

Generalized Frobenius Inner Products, (joint paper with Chandler Davis), Mathematische Annalen, 1960

A Model of Quasi-Eucledean Space, (joint paper with A. L. Fass), American Mathematical Monthly, 1961

Quadrice in a Unitary Space, L'Enseignement Mathematique, 1961

Properties of Certain Sets in Unitary Spaces, Montashefte fur Mathematik, 1963

Adjoint Geometry of Linear Transformation, Montashefte fur Mathematik, 1963

Les somets d'une surface, L'Engseignment Mathematique, 1964

Vertex Points of Functions, L'Enseignment Mathematique, 1964

Pythagorean Series, Mathematical Log, 1962

On Order of Points on a Straight Line, Mathematical Log 1966

FORMER STUDENTS:
Texas Technological College

1. Hyde, Beverly M., M. S., 1965
2. Smyrl, Shannon, M. S., 1967

SCIENTIFIC PERSONNEL

NAME: Harold W. Milnes BIRTHDATE: June 9, 1925

TITLE: Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
M.A. in Mathematics, Wayne State University
Ph.D. in Mathematics, Wayne State University
Title of Dissertation: "Convexity of Orlitz Spaces"

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Industrial Mathematical Society
American Mathematical Society
Society for Advancement of Science

EXPERIENCE:
Numerical Analyst, Computation Laboratory, Wayne State University, 1955-56

Senior Research Mathematician, General Motors, Research Laboratory, 1956-57

Research Scientist, General Motors Corporation, Research Laboratory, 1957-60

Land-Air Corporation, Pacific Missile Range, Point Mugu, California, 1962-63

Burroughs Corporation, S.P.E.D. Division, Detroit, Michigan, 1963-64

Boeing Corporation, Commercial Airplane Division, Renton, Washington, 1964-65

Lockheed Electronics, Clear Creek, Texas, 1965-66

PATENTS:
Electronic Binary Counter Device (U.S. Pat. granted)
Self-Adaptive Control Mechanism (U.S. Pat:#422,784)

PUBLICATIONS:
Solution of Laplaces Equation by Boundary Contraction Over Regions of Irregular Shape. Numerische Mathematik, with T. Chow, 1959

Boundary Conditions for Numerical Solution of Homogenious Partial Differential Equations, Quarterly of Applied Mathematics, with T. Chow, 1960

Condition that all Roots of a Polynomial Lie in the Interval - 1,1, American Mathematical Monthly, 1964

Convergence of the Boundary Contraction Method, with T. Chow, Quarterly of Applied Mathematics, Vol. 20, No. 3, 1962, pp. 209-230

Numerical Solution of a Class of Hyperbolic-Parabolic Partial Differential Equations by Boundary Contraction, with T. Chow, SIAM Journal, Vol. 10, No. 1, 1962, pp. 124-148

Numerical Solution of the Neumann and Mixed Boundary-Value Problems by Boundary Contraction, with T. Chow, Journal of the Association of Computing Machinery, Vol. 8, No. 3, July 1961, pp. 336-338

Boundary Contraction Solution of Laplaces Differential Equation, with R. Potts, Journal of the Association of Computing Machinery, No. 6, 1959, pp. 226-235

Boundary Contraction Solution of Laplaces Differential Equation II, with T. Chow, Journal of the Association of Computing Machinery, Vol. 7, 1960, pp. 37-45

Numerical Solution of Partial Differential Equations by Boundary Contraction, with R. Potts, Quarterly of Applied Mathematics, 18, 1960, pp. 1-13

A Note on Bounded Continuous Matrix Products, Michigan Mathematical Journal, Vol. 6, 1959, pp. 335-338

Logical Programming and Algebraic Interpretation, Industrial Mathematics, Vol. 8, 1957, pp. 17-26

Energy Levels of an Electron in the Field of a Finite Dipole, with R. Wallis and R. Herman, Journal of Molecular Spectroscopy, 1958

Greens Function for Monatomic Simple Cubic Lattices with A. Maradudin, E. Montroll, G. Weiss and R. Herman, Memoires de l'Academie Rouale de Belgique, 1960

A Modified Newton-Raphson Process for Approximating Multiple Roots of Polynomials, Industrial Mathematics, Vol. 9, No. 2, 1958, pp. 17-26

Convexity of Orlitz Spaces, Pacific Journal of Mathematics, Vol. 7, No. 3, 1957, pp. 1451-1483

Geometric Invariants of Discrete Dot Patterns, Industrial Mathematics

PAPERS SUBMITTED:

Concerning the Exceptional Case in Hessenberg's Method for Determining the Characteristic Polynomial of a Matrix, with T. Chow

Variational Approach to Smoothing Unequally Spaced Data Subject to Random Errors (accepted Industrial Mathematics)

An Example Related to Jacobi's Necessary Condition in the Calculus of Variations, with S. K. Hildebrand

An Interesting Metric Space, with S. K. Hildebrand

Invariants Associated with Plane Curves, with G. L. Shurbet

Solution of Laplace's Equation by Boundary Contraction in an Irregular Annulus, with T. Chow

A Note Concerning the Properties of a Certain Class of Test Matrices

Note Concerning an Improved Givens' Method

Solution of Laplace Difference Equations by Block Iteration over Regions Composed of Rectangles, with T. Chow

Recovery of Linear Transformations Using Collinear Invariant Points and Pseudo-Inverses, with G. L. Shurbet and T. O. Lewis

Characteristic Vectors for Rectangular Matrices

PAPERS IN FINAL STAGES OF PREPARATION:

Generalized Inverse of Rectangular Matrices with Preserves Characteristic Vectors

A Random Technique for Determining the Zeroes of a Function

Self-Adaptive and Learning Machines

RESEARCH CURRENTLY IN PROGRESS:

An Investigation of the Geomagnetic and Lunarmagnetic Fields

General Topics in the Calculus of Variations Related to Functional Analysis

SCIENTIFIC PERSONNEL

NAME: Patrick L. Odell BIRTHDATE: November 29, 1930

TITLE: Professor and Chairman of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. University of Texas (Mathematics) May 1952
M.S. Oklahoma State University (Mathematics) August 1958
Ph.D. Oklahoma State University (Mathematical Statistics) June 1962
Title of Dissertation: Stochastic Approximation and Non-Parametric Interval Estimation in Sensitivity Testing Which Involves Quantal Response Data

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Society for Industrial and Applied Mathematics
Operations Research Society of America
American Statistical Association
Sigma Xi
American Institute of Aeronautics and Astronautics
Texas Academy of Science

EXPERIENCE:
Chief, Doppler Reduction Section, White Sands Missile Range, 1952-53

Meteorologist, US Air Force, 1953-57 (Captain, USAF Res.)

Research Scientist, Kaman Aircraft Nuclear Division, 1958-59

Mathematician, US Naval Nuclear Ordnance Evaluation Unit, 1959-60

Consulting Mathematician and Statistician, US Naval Weapons Evaluation Facility, 1960-62

Graduate Assistant in Mathematics, Oklahoma State University, 1957-58

Graduate Assistant in Statistics, Oklahoma State University, 1960-62

Consulting Mathematician, Statistician and Operation Analyst, Chance Vought Corporation, Dallas, Texas, 1962-64

Consulting Mathematician, Statistician and Operations Analyst, Kaman Instruments, Austin, Texas, 1963-65

Research Scientist, Defense Research Laboratory, Austin, Texas, 1963-64

Consulting Mathematician, Brown Engineering Co., Huntsville, Alabama and Cocoa Beach, Florida, 1963-65

Assistant Professor, Department of Mathematics, The University of Texas, 1962-66

Consulting Mathematical Statistician, LTV-Electro-Systems, Greenville, Texas. April, 1966-present

PUBLICATIONS:

Books

An Introduction to the Theory of Generalized Matrix Invertibility, Texas Center for Research, June 1966, 302 pgs., co-authored with T. L. Boullion. (To be published in book form by John Wiley and Sons, 1968).

A Theory of Linear Estimation, Texas Center for Research, April 1967, 157 pgs., co-authored with T. O. Lewis. (To be published in book form by Prentice-Hall, Inc., 1968).

Papers in Professional Journals

A Note Concerning a Generalization of the Gauss Markov Theorem, co-authored with H. P. Decell, Texas Journal of Science, March 1966, pp. 21-24.

An Alternate Definition of a Pseudo-Inverse of a Matrix, Journal of SIAM, co-authored with James Scroggs, Vol. 14, No. 4, June 1966, pp. 796-810.

A Numerical Procedure to Generate Sample Covariance Matrices, co-authored with A. H. Feiveson, Journal of the American Statistical Association, March 1966, pp. 199-203.

On Sums and Produces to Rectangular Variates, Biometrika, Vol. 53, No. 3 and 4, pp. 616-617, December 1966, co-authored with H. L. Gray.

A Generalization of the Gauss-Markov Theorem, Journal of American Statistical Association, co-authored with T. O. Lewis, Vol. 61, pp. 1063-1066, December 1966.

On the Fixed Point Probability Vector of Regular or Ergodic Transition Matrices, Journal of American Statistical Association, co-authored with H. P. Decell, Vol. 62, pp. 600-603, June 1967.

On Computing a Fixed Point Probability Vector of Regular or Ergodic Transition Matrices, co-authored with H. P. Decell to appear in Journal of the Association of Computing Machinery, (October, 1967). Vol. 14, No. 4, pp. 765-768.

On Least Favorable Density Functions, co-authored with H. L. Gray to appear in SIAM Review, Vol. 9, No. 4, pp. 715-720, Oct. 1967.

A Characterization for Generalized Inverses of Matrices, to appear in SIAM Review, April 1968, co-authored with Gerald L. Morris.

Common Solutions for n-Matrix Equations with Applications, co-authored with G. L. Morris to appear in Journal of Association Computing Machinery (1968).

FORMER STUDENTS:

The University of Texas

1. Beer, D., MA, 1963
2. Miller, J., MA, 1964
3. Nadar, W., MA, 1965
4. Hibbs, E., MA, 1965
5. McElhone, D., MA, 1965
6. Falconer, D., PhD, 1966
7. Tatikonda, L., PhD, 1966
8. Lewis, T., PhD, 1966
9. Boullion, T., PhD, 1966
10. Hadlock, F., PhD, 1966
11. Wallace, D., MA, 1966
12. Smith, R., MA, 1966
13. Barton, C. P., MA, 1966
14. Pope, T., MA, 1966
15. Ahlers, C., MA, 1966
16. Moore, K., MA, 1966
17. Johnston, D., MA, 1966
18. Meicler, M., PhD, 1966

Texas Technological College

19. Morris, G., PhD, 1967
20. Summers, J., MS, 1967

SCIENTIFIC PERSONNEL

NAME: Ronald M. Anderson BIRTHDATE: November 4, 1935

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. Luther College, Decorah, Iowa, 1957
M.S. Iowa State University, Ames, Iowa, 1959
Ph.D. Iowa State University, Ames, Iowa, 1962

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Society for Industrial and Applied Mathematics

EXPERIENCE:
Graduate Assistant, Iowa State University, 1957-61
Instructor, Iowa State University, 1961-62
Industrial Mathematician, Collins Radio Company, 1962-65
Assistant Professor, Texas Technological College, 1965-66
Associate Professor, Texas Technological College, 1966-present

PUBLICATIONS:
Propagation Over Plane Earth Through an Exponential Atmosphere, Radio Science, Vol. 68 D. No. 11, 1964

The Relation Between $M_{3000}F2$, the h_mF2 and the Scale Height H for an -Chapman Electron Density Distribution, Journal of Atmospheric and Terrestrial Physics, 1965, Vol. 27, with R. P. Decker

Diffraction of Radio Waves in a Stratified Troposphere, Radio Science, with I. H. Gerks, Vol. 1, No. 8, 1966

Analysis of Warning Timer for Collision Advoidance Systems, to appear in IEEE Transactions co-authored with J. M. Holt, (1968)

PAPERS SUBMITTED:
A Numerical Integrator Method, submitted for publication in Texas Journal of Science co-authored with John T. White

SCIENTIFIC PERSONNEL

NAME: Thomas A. Atchison BIRTHDATE: July 3, 1937

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. University of Texas, 1959
M.A. University of Texas, 1960
Ph.D. University of Texas, 1963

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Mathematical Association of America
American Mathematical Society
Society for Industrial and Applied Mathematics

EXPERIENCE:
Instructor, Howard Payne College, Summer, 1959
Special Instructor, University of Texas, 1959-1963
Assistant Professor, Texas Technological College, 1963-65
Associate Professor, Texas Technological College, 1965-66
LTV, Group supervisor of Systems, Simulation Group, 1966-67

PUBLICATIONS:
A Class of Riemann Surfaces, Proceedings, American Mathematical Society, Vol. 16, pp. 731-738, August 1965

Non-linear Transformations Related to the Evaluation of Improper Integrals-I, accepted SIAM Journal on Numerical Analysis with H. L. Gray, September 1967

Non-linear Transformations Related to the Evaluation of Improper Integrals-II, accepted SIAM Journal on Numerical Analysis with H. L. Gray

The Uniformization of a Class of Doubly Connected Riemann Surfaced, Tentatively accepted Pacific Journal of Mathematics (being revised)

PAPERS SUBMITTED:
Applications of the G Transformation to Laplace Transformations with H. L. Gray, SIAM Journal on Numerical Analysis

Non-linear Transformations Associated with the Convergence of Infinite Products with G. V. McWilliams and R. W. Thompson, Mathematics of Computation

Iterated Non-Linear Transformations, with H. L. Gray, Mathematics of Computation

Generalized G-Transformation, with H. L. Gray, Mathematics of Computation (accepted)

FORMER STUDENTS:

Texas Technological College

1. Amburgey, Jay K., MS, 1965
2. Kendrick, Cagle K., MS, 1965
3. Thompson, Ray W., MS, 1965
4. Haney, William P., MS, 1965
5. Swanson, Michael N., MS, 1965

SCIENTIFIC PERSONNEL

NAME: Wayne T. Ford BIRTHDATE: February 9, 1931

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. Oklahoma City University, 1952
M.A. University of Oklahoma, 1953
Ph.D. Rice University, 1964

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Society of Industrial and Applied Mathematics
American Mathematical Society
Mathematical Association of America
Association Computing Machinery
Society of Exploration Geophysics
Society of Sigma Xi

EXPERIENCE:
Research Assistant, Texaco, 1957-63
Assistant Professor, Houston Baptist College, 1963-64
Associate Professor, Houston Baptist College, 1964-65
Consultant, Mandrel Industries, Inc., 1965-present
Consultant, Core Laboratories, Inc., 1963-present
Assistant Professor, University of Houston, 1965-67

PUBLICATIONS:
Mathematical Programming and Integro-Differential Equations, SIAM Journal Numerical Analysis, 1965, Vol. 2, pp. 171-202

Least Square Inverse Filtering, Geophysics, 1966, Vol. 31, pp. 917-926

Mathematical Programming and Linear Operators in Frechet Spaces, SIAM Journal Numerical Analysis, 1966, pp. 367-371

Mathematical Programming and Integro-Differential Equations, II. Variable Coefficients, SIAM Journal Numerical Analysis , 1966, pp. 383-389

Estimation of a Minimum-Phase Operator from a Portion of its Amplitude Spectrum, IEEE Trans. Geoscience Elect., 1967, Vol. 5, No. 1, pp. 1-2

The Z-transformation of a Realizable Time Function, (to appear) IEEE Trans. Geoscience Elect., 1967

PAPER SUBMITTED:
On Minimal Fundamental Sequences in Separable Banach Space

SCIENTIFIC PERSONNEL

NAME: George Baldwin BIRTHDATE: November 18, 1926

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Eastern New Mexico University
M.S. Eastern New Mexico University
Ph.D. Oklahoma University
Title of Dissertation: "Some Properties of Distribution Nets, and Topological Groups"

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Mathematics Association of America
American Mathematics Society

EXPERIENCE:
Assistant Professor of Mathematics, New Mexico State University, 1959-63

Associate Professor, Eastern New Mexico State, 1963-66

Consultant for Addison Wesley Company, 1964-present

PUBLICATIONS:
G. Baldwin & R. Crouch, Mathematics for the Elementary Teacher, John Wiley and Sons, 1964

G. Baldwin, R. Crouch, R. J. Wisner, Preparatory Mathematics for the Elementary Teacher, John Wiley and Sons, 1965

G. Baldwin, R. Crouch, M. Zwing, Techniques of Teaching Modern Math., John Wiley and Sons, (exp. 1967).

SCIENTIFIC PERSONNEL

NAME: Henry L. Gray BIRTHDATE: May 18, 1936

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Texas Technological College, 1959
M.S. Texas Technological College, 1961
Ph.D. University of Texas, 1966

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIEITES:
Mathematical Association of America
American Statistical Association

EXPERIENCE:
Teaching Assistant, Texas Technological College, 1959-61
Research Engineer, North American Aviation, Summer, 1961
Teaching Assistant, University of Texas, 1963-65
Engineer, Tracor, Inc., Austin, Texas, 1963-65
Mathematics Consultant, Tracor, Inc., 1965-66
Assistant Professor, Texas Technological College, 1965-66
Senior Scientist, Supervisor of Mathematical Research, LTV, Greenville, 1966-67
Assistant Professor, SMU, 1966-67

PUBLICATIONS:
Applications of the H-R Transform, Estratlo dogli della sevela superiore di Pisa Science e Matemticke Ser. III, Vol. 18, 1964

On the Euler Transform, Abst. American Mathematical Monthly, Vol. 72, 1965

A Confidence Interval for Availability, Technometrics, Vol. 9, No. 3, August, 1967, pp. 465-471

Non-Linear Transformations Related to the Evaluation of Improper Integrals-I, accepted SIAM Journal on Numerical Analysis, with T. A. Atchison, September 1967

Non-Linear Transformations Related to the Evaluation of Improper Integrals-II, accepted SIAM Journal on Numerical Analysis, with T. A. Atchison

On Sums and Products of Uniform Variates, Biometrika 1966, Vol. 53, 3 and 4, p. 615

A New Approximation Related to the Error Function, to appear in Mathematics of Computation, with W. R. Schucany

A New Rational Function Approximation to Mill's Ratio with W. R. Schucany, to appear in Journal of American Statistical Association

On Least Favorable Density Function, with P. L. Odell, to appear in SIAM Review, October, 1967

PAPERS SUBMITTED:

A Limiting Case of the G-Transform, submitted to SIAM Journal on Numerical Analysis

A New Approximation to Chi-Square Integral, submitted to Biometrika, with R. W. Thompson, G. V. McWilliams

On a Test of Equality of the Means of Two Independent Poisson Distributions, submitted to IEEE, with T. O. Lewis

On the Availability Ratio, submitted to IEEE, with W. R. Schucany

Applications of the G-Transformation to Laplace Transformations, submitted to SIAM Journal of Numerical Analysis, with T. A. Atchison

Iterated Non-Linear Transformation, submitted to Mathematics of Computation, with T. A. Atchison

SCIENTIFIC PERSONNEL

NAME: Shelby K. Hildebrand BIRTHDATE: June 2, 1931

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. North Texas State University, 1952
M.A. North Texas State University, 1957
Ph.D. Iowa State University, 1962

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Mathematical Association of America
American Mathematical Society

EXPERIENCE:
Graduate Assistant, Iowa State, 1957-60
Mathematician, Boeing Airplane Company, Summer 1959
Instructor, Iowa State, 1961-62
Assistant Professor and 2nd Semester Chairman, Department of Mathematics, Midwest University, 1962-63
Assistant Professor, Texas Technological College, 1963-65
Associate Professor, Texas Technological College, 1965-present

PUBLICATIONS:
Connectivity Functions and Retracts, Fundamenta Mathematicae, LVII (1965) pp. 237-245

A Connected Topology for the Unity Interval to appear in Fundamenta Mathematicae, 1967

The Separation Axioms for Invertible Spaces, with R. L. Poe to appear in Mathematics Monthly, (1967)

PAPERS SUBMITTED:
A Space of Connectivity Functions

An Interesting Metric Space with H. W. Milnes

Specific Invertible Spaces with R. L. Poe

A Simple and Interesting Topological Space with R. L. Poe

An Example Related to Jacobi's Necessary Condition in the Calculus of Variation with H. W. Milnes

SCIENTIFIC PERSONNEL

NAME: Derald D. Walling BIRTHDATE: February 14, 1937

TITLE: Associate Professor of Mathematics
Department of Mathematics
Texas Technological College

EDUCATION:
B.S. Iowa State College, 1958
M.S. Iowa State University, 1961
Ph.D. Iowa State University, 1963
Ph.D. Thesis Title: Numerical Methods for Non-Linear Least Squares Curve Fitting Problems

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematics Association of America
Society for Industrial and Applied Mathematics

EXPERIENCE:
Graduate Assistant, Iowa State University, 1958-62
Mathematician, Chamberlain Corporation, Waterloo, Iowa, 1959
Mathematician, U.S.A.E.C., Ames Lab., Ames, Iowa, 1962-63
Assistant Professor of Mathematics, University of Arizona, 1963-66
Associate Professor of Mathematics, Texas Technological College, 1966-present
Consultant, Texas Center for Research, Austin, Texas, September 1966 - December 1966

PUBLICATIONS:
A Note on the Bordering Method of Inverting a Matrix (with T. R. Rogge), American Mathematical Monthly, Vol. 73, No. 8, October 1966

Quadrature Formulas Using Tschebyscheff Zeros (with Mohindar Cheema), accepted for publication in the Proceedings of the National Institute of Sciences of India

Least Squares, The Pentagon, Vol. 26, No. 2, Spring 1967

SCIENTIFIC PERSONNEL

NAME: George S. Innis BIRTHDATE: January 7, 1937

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. University of Texas, 1958
M.A. University of Texas, 1961
Ph.D. University of Texas, 1962
Ph.D. Thesis title: "On the Problem of Type and the Uniformizing Function for Certain Riemann Surfaces."
Post-doctoral fellowship, Harvard University, 1962-63

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Sigma Xi
American Mathematical Society
Mathematical Association of America
Society for Industrial and Applied Mathematics

EXPERIENCE:
Teaching Assistant, University of Texas, 1958-62
Research Scientist, Defense Research Laboratory, University of Texas, 1957-62
Assistant Professor, Rice University, Mathematics Department, 1963-64
Assistant Professor, University of Texas, Mathematics Department, 1964-66
Special Research Associate, Defense Research Laboratory, University of Texas, 1964-67
Staff member, Los Alamos Scientific Laboratory, 1967- (summer)

PUBLICATIONS: (partial list)
Shannon's Theorem, DRL-A-284, May 1967, 84 pages

A Processing Technique for Symmetric Signals, DRL-A-269, December 1966, 22 pages

Generation of a Stationary Gaussian Random Process with a Specified Power Spectral Density Function, with W. A. Matuska, DRL-A-258, July 1966, 68 pages

Some Reproducing Kernels for the Unit Disk, Pacific Journal of Mathematics, Vol. 14, 1964, pp. 177-186

The Computation of Far-Field Radiation Patterns from Measurements Made near the Source, with C. W. Horton, The Journal of the Acoustical Society of America, Vol. 33 1961, pp. 877-880

Solution Forms for the Scalar Helmholtz Equation, DRL-A-?, June 1961, 39 pages

The Determination of Farfield Radiation Patterns from Nearfield Measurements, with C. W. Horton, U.S.N. Journal of Underwater Acoustics, Vol. 10, 1960, pp. 150-157

On the Determination of the Radiation Pattern of an Emitter from Near-Field Data, with C. W. Horton, DRL-A-177, September 1960, 8 pages

Near-Field and Far-Field Measurements with Source Level Determination for a Nine Element Array of TR-11 Transducers, with C. W. Horton, DRL-A-172, June 1960, 20 pages

SCIENTIFIC PERSONNEL

NAME: Robert L. Poe BIRTHDATE: April 8, 1930

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Black Hills Teacher's College, 1951
M.S. Oklahoma State University, 1957
Ed.D. Oklahoma State University, 1963

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematical Association of America
SIAM
KME
NCTM

EXPERIENCE:
Assistant Professor, Central State College, Oklahoma, 1957-58
Instructor, University of Tulsa, 1958-59
Teaching Assistant, Oklahoma State University, 1959-62
Associate Professor, Kansas State Teachers College, 1962-66
Consultant, Elementary School Mathematics Curriculum, Kansas State, Department of Public Instructions, 1965-66
Associate Professor and Assistant Department Chairman, Texas Technological College, 1966-67

PUBLICATIONS:
A College Program in Mathematics for Elementary School Teachers, American Mathematical Monthly, Vol. 71, 1964

Ullabian Arithmetic, Bulletin of Kansas Association of Teachers of Mathematics, Vol. 40, 1965

One Approach to Modernizing the Mathematics Curriculum in the Elementary School, Co-authored with L. Asher, L. R. Capps, F. Colthorp, M. Girunder, A. Muller, M. Norton, and P. J. Urban, Published by Kansas State Department of Public Instruction, 1966

Blondes, Brunettes, and Conclusions, Bull. of the Kansas Association of Teachers of Mathematics, Vol. 40, No. 4, April, 1966

Only the Baboons are in the Intersection, Bull. of the Kansas Association of Teachers of Mathematics, Vol. 41, No. 3, Feb. 1967

Specific Invertible Spaces with S. K. Hildebrand, to appear in Mathematics Monthly in 1967

PAPERS SUBMITTED:

A Simple and Interesting Topological Space with S. K. Hildebrand

The Separation Axioms for Invertible Spaces with S. K. Hildebrand

Strong Continua with Mary J. Hildebrand

BOOKS REVIEWED:

Ordinary Differential Equations, Philip Hartman, John Wiley and Sons, Inc., New York, 1964, printed in the Pentagon, Vol. XXV, No. 2, Spring 1966

Functions, Limits, and Continuity, Paulo Rinenboim, John Wiley and Sons, In., New York, 1964; Spring 1967, Pentagon

FORMER STUDENTS:

Kansas State Teachers College

1. Miller, R.C., MS, 1963
2. Bartle, R., MS, 1964
3. Bitler, G., MS, 1965
4. Thomas, W.J.M., MS, 1965
5. Morfitt, G., MS, 1966
6. Mentzer, M., MS, 1966

Texas Technological College

7. Hildebrand, Mary, M.S., 1967

SCIENTIFIC PERSONNEL

NAME: John T. White BIRTHDATE: August 23, 1931

TITLE: Associate Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. University of Texas, 1952
M.A. University of Texas, 1953
Ph.D. University of Texas, 1962

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Mathematics Association of America
American Mathematical Society

EXPERIENCE:
Teaching Fellow, University of Texas, 1952-53
Special Agent, U.S. Army, 1954-56
Technical Engineer, General Electric Co. Summers 1956,57,58
Research Member, Sandia Corp, Summer 1959
Special Instructor, University of Texas, Academic years, 1956-63
Assistant Professor, University of Kansas, 1962-63
Associate Professor, Texas Technological College, 1965-present

PUBLICATIONS:
A Representation Theorem for the Laplace Transform, Texas Journal of Science, Vol. 19, No. 2, June 1967

PAPER SUBMITTED:
A Numerical Integrator Method, with R. M. Anderson, submitted to the Proceeding of the IEEE, 1967

BOOK REVIEWS:
Zentialblatt fur Mathematik of Zemanian, A. H., "Inversion formulas for the distributional Laplace Transformations". SIAM Journal for Applied Mathematics, Vol. 14, pp. 195-206, (1966)

Zentialblatt fur Mathematik of Zemanian, A. H., "The distributional Laplace and Mellin Transformations", SIAM Journal for Applied Mathematics, Vol. 14, pp. 41-59 (1966)

FORMER STUDENTS
University of Kansas

1. Prott, Joan, MA, 1964
2. St. Mary, Donald F., MA, 1964
3. Calkins, Glenn R., MA, 1964
4. Mura, John A., MA, 1965
5. Olson, Christopher E., MA, 1965

SCIENTIFIC PERSONNEL

NAME: Thomas L. Boullion BIRTHDATE: November 4, 1940

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Louisiana State University, 1961
M.S. University of Southwestern Louisiana, 1963
Ph.D. University of Texas, 1966

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Statistical Association
American Mathematical Society
Institute of Mathematical Statistics
Society for Industrial and Applied Mathematics
Brometric Society
Mathematical Association of America

EXPERIENCE:
Research Scientist, Tracor, Inc., 1964-65
Consulting Mathematical Statistician, Texas Center for Research, 1965-66

PAPERS SUBMITTED:
Contributions to the Theory of Pseudo-Inverses, with P. L. Odell, submitted

The Equivalence of Two Generalized Inverses, with P. L. Odell, submitted

An Introduction to the Theory of Generalized Matrix Invertibility to be published by John Wiley and Sons in book form

A Generalization of the Wiedandt Inequality, with P. L. Odell, submitted

A General Method for Summing Power Series, with L. E. Batson

SCIENTIFIC PERSONNEL

NAME: Michael Henry Hall BIRTHDATE: July 4, 1939

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Massachusetts Institution of Technology, 1962
M.S. University Arizona, 1963
Ph.D. University of Arizona, 1966

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematical Association of America

EXPERICENCE:
Graduate Associate in Teaching and Research, University of Arizona, 1963-66

Assistant Professor in residence, UCLA, 1966-67

SCIENTIFIC PERSONNEL

NAME: F. E. Tidmore BIRTHDATE: September 1, 1940

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Hardin-Simmons University, 1962
M.S. Oklahoma State University, 1963
Ph.D. Oklahoma State University, 1967

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
American Mathematical Society
Mathematical Association of America

EXPERIENCE:
Assistant Professor, Baylor University, 1963-65

SCIENTIFIC PERSONNEL

NAME: Truman O. Lewis BIRTHDATE: November 24, 1928

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Texas Technological College, 1956
M.S. Texas Technological College, 1960
Ph.D. Texas University, 1966

EXPERIENCE:
Consultant for Texas Center for Research, Austin, Texas
Research Scientist, Tracor, Inc., 1964-65
Research Scientist, Holloman Air Force Base, Summer 1958
Engineering Scientist, LTV, Dallas, 1956-57
Assistant Professor, Texas Technological College, 1966-present

PUBLICATIONS:
Confidence Interval for the Availability Ratio, with H. L. Gray, Technometrics, August 1967, pp. 465-471

A Generalization of the Gauss-Markov Theorem, with P. L. Odell, Journal of the American Statistical Association, 1966, Vol. 61, pp. 1063-1066

PAPERS SUBMITTED:
Pseudo-inverses of Positive Semi-definite Matrices with Thomas Newman, SIAM Journal

Recovery of Linear Transformations Using Collinear Invariant Points and Pseudo-inverses, with H. W. Milnes and G. L. Shurbet, Mathematics Magazine

On a Test for Equality of the Means of Two Independent Poisson Distributions, with H. L. Gray, IEEE

FORMER STUDENTS
Texas Technological College

1. Frawley, W. H., MA, 1967
2. Ludeman, M. M., MA, 1967
3. Poirot, J. L., MA, 1967

SCIENTIFIC PERSONNEL

NAME: Thomas G. Newman BIRTHDATE: July 19, 1940

TITLE: Assistant Professor of Mathematics
Texas Technological College
Lubbock, Texas

EDUCATION:
B.A. Howard Payne College
M.A. University of Texas
Ph.D. University of Texas

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:
Mathematical Association of America
American Mathematical Society
Society for Industrial and Applied Mathematics

EXPERIENCE:
Instructor, Howard Payne College, Summer, 1962
Teaching Assistant, University of Texas, 1962-64 and summer 1966
Assistant Professor, SMU, 1966-67

PAPERS SUBMITTED:
A Characterization of l_p Norms on E_n, submitted to Mathematics Monthly

Pseudo-inverses of Positive Semi-definite Matrices, with T. O. Lewis, submitted to SIAM Journal

BOOK REVIEW:
Mathematical Methods for Digital Computers, Ralston and Wilf., Journal of American Statistical Association (August 14, 1967)

SCIENTIFIC PERSONNEL

NAME: A. K. Mitra BIRTHDATE: January 1, 1936

TITLE: Assistant Professor (Visiting Professor)
Texas Technological College
Lubbock, Texas

EDUCATION:
M.S. Calcutta University, 1957
Ph.D. Marburg University, (West Germany), 1963

MEMBERSHIP IN TECHNICAL AND SCIENTIFIC SOCIETIES:

EXPERIENCE:
Research Mathematician, Marburg University, 1963-1966
Research Mathematician, NASA-Manned Spacecraft Center, Houston, Texas (Summer 1967)

PUBLICATIONS:
Remarks on Position Operator in Irreducible Representation, Nuova Cimento 30, 385, 1963, with W. Weidlich

On a Convergence of Bogoliubous' Functional, Ansat Z Zeitschrift F. Naturforschung (1968)

ADMINISTRATIVE PERSONNEL

NAME: Dr Grover E. Murray BIRTHDATE: October 26, 1916

TITLE: President and Professor of Geosciences
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. University of North Carolina, 1937
M.S. Louisiana State University, 1939
Ph.D. Louisiana State University, 1942

President of Texas Technological College and Professor of Geosciences since September 1, 1966, Dr. Murray formerly was Vice President of Academic Affairs for the Louisiana State University System. A recognized authority in the field of geology with an international reputation, Dr. Murray is Chairman of the U. S. National Committee on Geology and is a member of the Board of Directors of the American Society for Oceanography. He is the only man to serve as president of both the American Association of Petroleum Geologist (1964-65) and the Society of Economic Paleontologists and Mineralogists (1963-64).

Dr. Murray's varied professional background includes the following: Teaching Fellow, Louisiana State University, (1937-1938); Louisiana Geological Survey (Research Fellow), (1938-1941); Magnolia Petroleum Company, (1941-1948); Louisiana Geological Survey, Director of Research, (1948-1949); Professor Stratigraphic Geology, Louisiana State University, (1948-1955); Chairman of Department of Geology, Louisiana State University, (1950-1953); Consulting Geologist (Part Time), (1949-1966); (Summers) Professor, University of Texas, (1949-1951); Technical Adviser, Arkansas Fuel Oil Corporation, (1951-1960); Consultant, Houston Oil Company of Texas, (1953-1954); Boyd Professor of Geology, Louisiana State University and A & M College, (1955-1966); Vice President and Dean of Academic Affairs, Louisiana State University and A & M College, (1963-1965); Vice President for Academic Affairs (Louisiana State University System), (1965-1966); Consultant, Venezuelan Ministry of Mines and Hydrocarbons; Advisory Committee, International Center for Medical Research & Training (Costa Rica).

His publications include Structural Geology; Micropaleontology; Stratigraphy and Regional Geology of Coastal Province; Geomorphology; Geophysics; Surface Geology; Petroleum Geology; Mexico; Australia; South America.

Dr. Murray's national professional affiliations include a wide range of responsibilities and key positions with the Geological Society of America of which he is a Fellow. Other posts within the GSA include: Representative, American Commission of Stratigraphic Nomenclature, (1951-1954); Chairman, Symposium on Sedimentary Volumes, (1952); Chairman, Program Committee, New Orleans Meeting, (1955); Program Committee, (1955-1958); Chairman, Southeastern Section, (1959-1960); Council, (1961-1964); Chairman, Committee on Nominations, (1963-1964); Associate Editor, (1963-); Chairman Committee on Honors and Awards, (1964); Chairman, Committee on Penrose Medal, (1964); Chairman, Annual Meeting, (1967).

In the Society of Economic Paleontologists and Mineralogists, he has held the following posts: Committee on Members and Papers (1948-1950); Nominating Committee, (1948-1950); Editor, Journal of Research Committee, (Vice Chairman, 1957; Chairman, 1958), (1957-1960); Member, Gulf Coastal Section: (Vice-president, 1959), (1957-1960); Representative to Paleontological Society Council, (1954-1955); President, (1963-1964); Past-President and member of National Council, (1964-1965); Representative to American Geological Institute's House of Society Representatives, (1964-1968).

Offices in the American Association of Petroleum Geologists include: Distinguished Lecture Committee, (1944-1945); Geologic Names and Correlations Committee; Chairman, 1952-1954, (1946-1955); Distinguished Lecturer, (1954); Emblem Committee, (1955); Tectonic Map Committee, (1955-1960); Representative on American Commission of Stratigraphic Nomenclature; Chairman of Representatives, 1968, 1962, (1957-1962); Editor of AAPG Bulletin, (1959-1962); Business Committee, (1959-1962); Committee on Salt Dome Volume, (1959-1961); Associate Editor, (1963-1964); Voluntary Research Fund Campaign Committee, (1963-1965); President, (1964-1965); Past-President and Member, National Executive Committee, (1965-1966); Representative to American Geological Institute's House of Society Representatives, (1965-1968); Chairman, Nominating Committee, (1966-1967); Vice Chairman, Academic Advisory Committee, (1966-1967); Member, Executive Advisory Committee, (1966-1967) Member, Medal Award Committee, (1966-1969).

Other national professional affiliations include the American Commission on Stratigraphic Nomenclature in which he served as Commissioner from Geological Society of America, (1951-1954); Commissioner from American Association of Petroleum Geologists, (1957-1963); Vice Chairman and Secretary, (1960-1962). Dr. Murray also belongs to Sigma Xi, Sigma Gamma Epsilon, Omicron Delta Kappa, Paleontological Society and the Paleontological Research Institute.

His international affiliations include the Sociedad Mexicana

de Geologia, Norsk Geologisk Forening, Asociacion Mexicana de Geologos Petroleros, International Commission on Stratigraphy, Australian Petroleum Exploration Association. He was official delegate of the State of Louisiana; and official delegate of the Louisiana State University at the XX International Geological Congress, Mexico City, August-September 1956. Dr. Murray represented the Louisiana State University, The American Association of Petroleum Geologists, and the Society of Economic Paleontolotists and Mineralogists at the XXI International Geological Congress, Copenhagen, August-September, 1960. He was the official U. S. delegate; head delegate from the A.A.P.G., official delegate of the State of Louisiana; and official delegate of the Louisiana State University at the XXII International Geological Congress, New Delhi, December 1964.

He currently is a member and Chairman of the U. S. National Committee on Geology, is a member of the National Panel of Arbitrators of the American Arbitration Association, is on the Board of Directors of the Public Affairs Research Institute of Louisiana and serves on the board of the Organization for Tropical Studies, Inc. Dr. Murray currently is President of the Gulf Universities Research Corporation and is a member of the Board of Directors of the American Society for Oceanography.

He is listed in World Who's Who In Science; American Men Of Science; Who's Who In America; Who's Who In The South And Southwest; and Directory Of Certified Petroleum Geologists of the A.A.P.G.; In American Science and Contemporary Authors.

ADMINISTRATIVE PERSONNEL

NAME: Dr. S. M. Kennedy

TITLE: Vice President for Academic Affairs and
Professor of Government
Texas Technological College
Lubbock, Texas

EDUCATION:
B. A. Texas Technological College, 1943
M. A. Texas Technological College, 1946
Ph.D. University of Colorado, 1952

Dr. S. M. Kennedy was promoted to the post of Vice President for Academic Affairs at Texas Technological College effective January 1, 1967, following five years service at the University as Dean of the School of Arts and Sciences.

Kennedy became Assistant Professor in 1949, Associate Professor in 1953, and Professor in 1957. Kennedy's administrative career began in 1952 when he served as Acting Assistant Dean of Arts and Sciences for one year. In 1955, he became Assistant Dean of Arts and Sciences until 1959 when he became Acting Dean of the School of Arts and Sciences. In February of 1961, he was named Dean.

He belongs to the American Political Science Association, Southwestern Political Science Association, Southwestern Social Science Association, International Studies Association, Pi Sigma Alpha, Reserve Officer's Association, Delta Sigma Pi, After Dinner Forum, Military Government Association, Questers, Tuberculosis Association, Chamber of Commerce, American Association of University Professors and the Board of Development of Lubbock Christian College. He is currently Chairman of the State Legislative Committee of the Texas Tuberculosis Association.

He is listed in Who's Who in America, Who's Who in the Southwest and Men of Science.

Dr. Kennedy has been a member of the Southern Association of Academic Deans, the Conference of Academic Deans and Vice Presidents of the Association of Texas Colleges of which he is Chairman for 1966-67, Council of Colleges of Arts and Sciences. In February of 1961 he attended the Institute for College Administrators under the auspices of the Graduate School of Business Administration at Harvard. He has served on several acacreditation teams for the Southern Association and for the Association of Texas Colleges.

ADMINISTRATIVE PERSONNEL

NAME: John Ross Bradford

TITLE: Dean of Engineering and Professor of Chemical Engineering
Texas Technological College
Lubbock, Texas

EDUCATION:
B.S. Texas Technological College, 1942
M.S. Texas Technological College, 1948
Ph.D. Case Institute of Technology, 1953

Dean of Engineering at Texas Technological College since 1955, Dr. Bradford is a Registered Professional Engineer in Texas and Ohio, and is listed in American Men of Science; Who's Who in Engineering; and Who's Who in America.

He has been a Consultant in industrial applications of radioactive materials for several major corporations; has studied at Oak Ridge; and has taught several of the Nuclear Engineering courses at Texas Tech. He is the author of many publications, particularly upon the subject of applications of radioisotopes.

Dean Bradford has been active in The American Society for Testing Materials, serving as National Secretary of the E-10 Committee on Radioisotopes and Radiation Effects. Among the many professional and honorary organizations to which he belongs are The American Association of Consulting Chemists and Chemical Engineers, The American Society for Engineering Education, Sigma Xi, Tau Beta Pi, Phi Kappa Phi and Alpha Chi Sigma.

He has served on the Education Committee of the Texas Society of Professional Engineers; as a member of the Industrial Development Committee of the Lubbock Chamber of Commerce (being instrumental in bringing a Guidance and Control Division plant of Litton Industries, Inc., to Lubbock); is Director of the Institute of Science and Engineering of Texas Technological College (an organization for the support of research in the sciences and engineering); is Consultant to Litton Industries, of Beverly Hills, California; directed research projects in Nuclear and Chemical Engineering Graduate Program; was 1965 Engineer of the Year, South Plains Chapter, Texas Society of Professional Engineers; served, during September of 1965, as member of a twenty-one man team comprized of deans and professors, requested by the Swedish government to study and evaluate Swedish industry and education, most particularly engineering education; and is a member of the Evaluation Board for the National Science Foundation, Science Faculty Fellowship Awards, for 1966.

PUBLICATIONS:

Over-all Plate Efficiency of Commercial Hydrocarbon Fractionating Columns as a Function of Viscosity, Trans. A.I.Ch.E. Vol. 39, No. 3, June 25, 1943 and PETROLEUM REFINER, October, 1943

Vapor-Liquid Equilibrium Constants for Benzene, Toluene, and Methylcyclohexane, Ind. and Eng. Chem. 36, 1144 (1944)

Radioisotopes in Industry, Reinhold Publishing Company, New York, 1953

Chart of the Isotopes, Harshaw Chemical Company, Cleveland, Ohio, 1953

Lithographic Press Ink Distribution Studies by Radiotracer Techniques, Proceedings of the Sixth Annual Conference, Technical Association of the Graphic Arts

Radiotracer Studies of Analytical Methods for Styrenated Oil Acids and Esters, Analytical Chemistry, Vol. 28, Page 906, May, 1956

Use of Radioisotopes in Industry, Proceedings of Third Annual Conference on Automatic Control, University of Oklahoma Press, April, 1958

A Scientific Versus Practical Approach to Engineering Education, Proceedings of the Eleventh Annual College-Industry Division of American Society for Engineering Education, University of Houston, January, 1959

ADMINISTRATIVE PERSONNEL

NAME: Lorrin G. Kennamer, Jr. BIRTHDATE: December 20, 1924

TITLE: Dean of Arts and Sciences and Professor of Geography
Texas Technological College
Lubbock, Texas

EDUCATION:
A.B. East Kentucky College, 1948
M.S. University of Tennessee, 1949
Ph.D. George Peabody College for Teachers

Dr. Lorrin G. Kennamer, Jr. has been named Dean of the School of Arts and Sciences, effective September 1, 1967, to fill a vacancy created last December when Dr. S. M. Kennedy was elevated to the post of Vice President for Academic Affairs at Texas Tech.

He joined the faculty of East Texas State in 1952 as an instructor and had risen to chairman of that institution's Department of Geography and Geology when he left to go to the University of Texas, where he has served as Associate Dean of Arts and Sciences and Chairman of the Department of Geography.

University teaching experience also includes summers as visiting professor at the University of Vermont and Michigan State University.

Memberships and posts held in professional organizations include Chairman of the Resource-Use, Education Advisory Committee for Texas, board member of the Texas Council for Social Studies, board of the Texas Council for Geography Teachers and Associate Editor of the "Journal of Geography."

Dr. Kennamer, also has served as Second Vice President, Secretary and board member of the Texas Academy of Science, member of the Executive Council of the Association of American Geographers, Board of Examiners of Texas Teacher Education, President of the Southwestern Social Science Association, and consultant to the Houston Independent School District and to the Texas Education Agency.

Membership in professional and honorary societies also includes the National Council of Geography Education, the American Geography Society, Sigma Xi, Pi Gamma Mu, Phi Delta Kappa and Phi Kappa Phi.

PUBLICATIONS:

Books and Chapters of Books:

Co-author, Geography. Austin: The Steck Co., 1962, 48 pp.

Co-author, Texas and Their Land. Austin: The Steck Co., July, 1963, 232 pp.

Co-author, Atlas of Texas. Bureau of Business Research, The University of Texas, Austin, 1963, 83 pp.

The Place of Physical Geography in the Curriculum, New Viewpoints in Geography, Twenty-ninth Yearbook of National Council for the Social Studies, Chapter XIII, 1959, pp. 211-228.

Developing a Sense of Place and Space, Skills in the Social Studies, Thirty-third Yearbook of the National Council for Social Studies, Chapter IX, 1963, pp. 148-170.

Articles:

Beginnings in Geographic Education, Journal of Geography, LII, No. 2 (February, 1963), pp. 62-77.

Implications in the Social Studies for Geography, Peabody Journal of Education, XXXI, No. 4 (January, 1954), pp. 201-205.

The Unique Change in School Geography, Journal of Geography, LIV, No. 1 (January, 1-55), pp. 25-32.

Geography and the News, Journal of Geography, LVI, No. 8 (November, 1957), pp. 364-365.

Paperbound Books for the Teacher of Geography, Journal of Geography, LVI, No. 3 (March, 1957), pp. 126-128.

Geographic Role in the Social Studies, Social Studies Texan, X, No. 2 (November, 1958), p. 3.

Irrigation Patterns in Texas, Annals of the Association of American Geographers, XLIX, No. 2 (June, 1959), p. 192. (abstract)

Irrigation Patterns in Texas, Southwestern Social Science Quarterly, XL, No. 3 (December, 1959), pp. 203-212.

Teaching Geography in the Public Schools, Social Studies Texan, XI No. 1 (November, 1959), pp. 3-4.

The Texas Academy of Science - 1958 Resume, The Texas Journal of Science, XI, No. 1 (March, 1959), pp. 112-118.

Geographical-Historical Concepts in American History-Commentary, Annals, Association of American Geographers, L, No. 2 (June, 1960), pp. 93-94.

Visualization of Latitude and Longitude, Journal of Geography, LXI, No. 1 (January, 1962), pp. 9-11.

An Experiment in Map Reading, Journal of Geography, Vol. 63, No. 9 (December, 1964), pp. 427-428.

Geography--How To Teach It, Texas Outlook, Vol. 48, No. 11 (November, 1964) pp. 27 and 39.

Improvement of Instruction in Geography, Social Education, Vol. 29, No. 7 (November, 1965) pp. 452-458.

Geography In Elementary Social Studies, The Instructor, LXXV, No. 8, (April, 1966), pp. 34-35.

Manuals:

Co-author, Texas Resources and Industries. Austin: University of Texas Bureau of Business Research, 1958. 67 pp.

Co-author, Life Near and Far. Austin: The Steck Co., Revised 1965. 96 pp.

Co-author, Life in Different Lands. Austin: The Steck Co., Revised 1965. 112 pp.

Co-author, Life in the Americas. Austin: The Steck Co., Revised 1965. 144 pp.

Co-author, Life in Lands Overseas. Austin: The Steck Co., Revised 1965. 164 pp.

Editor:

Co-editor, Geography As A Professional Field. U.S. Office of Education, 1966, 95 pp.

Associate Editor, Journal of Geography, 1956 - present

Member of Editorial Advisory Board, SOCIAL EDUCATION, 1960-64. Editor, Houston Independent School District Textbook, TEXAS TODAY, 1960.

Editor, Houston Independent School District Reference Book, HOUSTON TODAY, 1961.

Editor, Denoyer-Geppert Company, SIMPLIFIED MAP OF TEXAS, 1959.

Editor, Proceedings, 4th Conference for Advancement of Science and Mathematics Teaching, 1957, Austin, Texas.

Editor, Proceedings, 5th Conference for Advancement of Science and Mathematics Teaching, 1958, Austin, Texas.

Editor, Proceedings, 6th Conference for Advancement of Science and Mathematics Teaching, 1959, Austin, Texas.

In Press and Accepted:

Guest Editorial, JOURNAL OF GEOGRAPHY, September 1967.

Geography in the Elementary Curriculum, SOCIAL EDUCATION, October 1967.

Introduction, IMPERIAL TEXAS, By Donald Meinig, University of Texas Press, 1967 or 1968.

Appendix B

INFORMATION PERTAINING TO TEXAS TECH

1. Enrollment

12th class day of the fall semester:

Year	Total	Percentage Increase	Men	Percentage Increase	Women	Percentage Increase
1963	12,036	7.6	7,731	5.0	4,305	12.6
1964	13,827	14.8	8,730	12.9	5,097	18.4
1965	16,305	17.9	10,138	16.1	6,167	21.1
1966	17,768	9.0	10,970	8.2	6,798	10.2
1967	18,646	4.9	11,336	3.3	7,310	7.5
Five-year Increase:		54.2		45.5		69.8

Estimated:

Year	Total	Percentage Increase	Men	Percentage Increase	Women	Percentage Increase
1968	19,391	4.0	11,731	3.5	7,660	4.8
1969	20,631	6.4	12,482	6.4	8,149	6.4
1970	21,986	6.6	13,236	6.0	8,750	7.4
1971	23,336	6.1	14,001	5.8	9,334	6.7
1972	24,736	6.0	14,841	6.0	9,895	6.0
1973	26,121	5.6	15,673	5.7	10,448	5.6
1974	27,551	5.5	16,530	5.5	11,021	5.5
1975	28,928	5.0	17,357	5.0	11,571	5.0
1976	30,228	4.5	18,136	4.5	12,092	4.5
1977	31,437	4.0	18,862	4.0	12,575	4.0

2. Student Source

Year	Counties in Texas	States	Foreign Lands
1963-64	234	46	34
1964-65	230	44	31
1965-66	241	47	34
1966-67	239	49	30

3. Degrees

The Bachelor's is offered in 83 fields; the Master's in 47 and the Doctor's in 20. A new Law School and a School of Education opened in September, 1967.

Degrees Awarded

	Bachelor			Master			Doctor		
Year	Men	Women	Total	Men	Women	Total	Men	Women	Total
1963	942	455	1397	141	55	196	17	1	18
1964	1053	515	1568	148	72	220	17	3	20
1965	1090	613	1703	208	61	269	16	3	19
1966	1161	724	1885	247	96	343	17	2	19
1967	1326	751	2077	238	99	337	25	5	30

4. Cost Per Average Full-time Student From Educational and General Funds Only

Year	Amount	Tuition and Fees Paid by Average Full-time Student	Percentage Paid by Student
1963-64	$705.15	$133.76	18.97
1964-65	683.78	131.96	19.30
1965-66	703.05	130.55	18.56
1966-67	751.52	130.12	17.31

5. Net General Revenue Appropriations
(For Educational and General Operations Only)

Year	Amount	Percentage Increase
1963-64	$6,999,547	24.2
1964-65	6,807,445	2.7*
1965-66	10,077,727	48.0
1966-67	10,408,139	3.3
1967-68	15,382,942	47.8

*Decrease

6. Total Operating Budget

Year	Educational and General	Percentage Increase	Other	Percentage Increase	Total(a)	Percentage Increase
1963-64	9,237,511	17.4	6,195,583	16.5	15,433,094	17.1
1964-65	9,850,218	6.6	7,795,840	25.8	17,646,058	14.3
1965-66	13,041,590	32.4	8,625,902	10.6	21,667,492	22.8
1966-67	14,010,656	7.4	9,267,731	7.4	23,278,387	7.4
1967-68	18,531,486	32.2	12,098,541	30.5	30,630,027	31.6

(a) Excludes Building Funds and Agency Funds

7. Research

Estimated funds expended each year by sources:

Source	1963-64	1964-65	1965-66	1966-67
Federal Government	$157,835.17	$207,159.45	$217,707.76	$ 271,797.36
State Appropriation	177,843.93	198,074.33	185,463.15	198,013.76
Textile Research (State)	89,252.78	92,761.66	111,976.74	204,235.21
Private Foundations	106,311.89	100,057.29	141,977.83	158,517.83
Others	37,992.40	89,787.78	110,999.87	209,280.64
Total	$569,236.17	$687,840.51	$768,125.35	$1,041,844.80
Increase	$ 9,220.14	$118,604.34	$ 80,284.84	$ 273,719.45

8. Plant Value

August 31, 1926 (after one year's operation) - $1,424,000.

Year	Plant Value	Percentage Increase	Dollar Increase
1963-64	$59,164,239.54	13.8	$ 7,177,280.58
1964-65	61,091,832.37	3.2	1,927,592.83
1965-66	64,161,044.68	5.0	3,069,212.31
1966-67	78,920,935.12	23.0	14,759,890.44

9. Number of Buildings - Main Campus in Lubbock

Fall	Total	Permanent
1963	164	98
1964	163	98
1965	163	99
1966	177	100
1967	208	107

10. Square Footage of Floor Space (All buildings as of 8-31-67)

Year	Gross Square Footage	Amount of Increase	Percentage Increase	Acres
1963	2,794,785	262,131	.10	64.16
1964	3,303,921	509,136	.18	75.85
1965	3,454,864	150,943	.05	79.31
1966	3,492,730	37,866	.01	80.18
1967	4,124,838	632,108	.18	94.69

11. Building Program

Completed 1966-67

19 Temporary Buildings for classrooms, laboratories and offices - Fall, 1966	$ 221,066.00
Completion of south basement and third floor of Library	207,756.00
Foreign Languages-Mathematics Building	1,391,397.00
Utility Tunnels including Steam and Chilled Water Piping	1,077,847.00
16 Temporary buildings for classrooms, laboratories and offices - Fall, 1967	218,057.00
Residence Halls - Wiggins Complex - Phase I	11,000,000.00
President's Home (Purchased)	65,000.00
Total Completed	$14,181,123.00

Under Construction or in Planning	Estimated Cost	Estimated Completion Date
3 Temporary Buildings for laboratories and offices	$ 63,370	October, 1967
Sheep and Goat Facilities	55,000	November, 1967
Utility Tunnels	740,683	January, 1968
Textile Chemical Research Laboratory	1,250,000	May, 1968
Fluid Dynamics Laboratory	250,000	May, 1968
Central Heating and Cooling Plant	4,800,000	June, 1968
Relocation of Museum	500,000(a)	August, 1968
Business Administration Building	4,565,000	September, 1968
Biology Building	5,130,931	July, 1969
Law School Building	3,055,485	September, 1969
Architecture and Art Building	4,414,653	September, 1969
Chemistry Building	5,496,078	January, 1970
Residence Halls - Wiggins Complex, Phase II	9,000,000	September, 1970

(a) College's cost

12. Population - Fall Semester Estimated

Year	Daytime	Nighttime
1963	14,200	5,300
1964	16,068	7,200
1965	18,405	7,225
1966	19,968	7,225
1967	21,145	8,315

13. Library

Year	No. of Volumes	Percentage Increase	Two-week Circulation	Percentage Increase
1963	567,870	7.5	147,643	36.7
1964	639,807	12.6	165,852	12.3
1965	740,620	15.75	176,220	6.25
1966	815,531	10.1	190,087	7.9
1967	886,747	8.7	206,639	8.7

14. Payroll

A. Employees

Year	Full-time	Part-time	Student	Total	% of Increase
1963-64	1,520	414	784	2,718	11.0
1964-65	1,687	460	870	3,017	11.0
1965-66	1,789	232	1,240	3,261	11.8
1966-67	1,956	222	1,645	3,823	17.2
1967-68	2,200	299	1,872	4,371	14.3

B. Faculty

Year	Full-time	Part-time	Teaching Assistants	Total	% of Increase
1963-64	501	23	214	738	20.2
1964-65	513	29	218	760	3.0
1965-66	551	46	283	880	15.8
1966-67	620	70	354	1,044	18.6
1967-68	702	68	387	1,157	10.8

C. Total Salaries Paid

Year	Amount	% of Increase
1963-64	$ 9,306,725.00	14.7
1964-65	10,580,096.00	13.7
1965-66	12,672,086.00	19.8
1966-67	15,087,420.80	19.1

15. Teaching Salaries (Average Budgeted)

Year	TTC	Rank Among Texas State Institutions
1963-64	$7,851	2nd Profs.; 3rd Assocs.; 5th Assts.; 15th Instrs.
1964-65	8,387	3rd Profs.; 4th Assocs.; 4th Assts.; 6th Instrs.
1965-66	9,267	3rd Profs.; 6th Assocs.; 4th Assts.; 9th Instrs.
1966-67	9,456	6th Profs.; 8th Assocs.; 9th Assts.; 18th Instrs. 6th all ranks.

16. Scholarships

Year	State Appropriated and Donated Funds		Exemptions Under State Law	
	No. Awarded	Amount	Service Veterans	High School Valedictorians
1963-64	815	$113,441	145	66
1964-65	904	119,661	136	71
1965-66	1,411	165,218	120	75
1966-67	1,453	170,639	122	76

17. Semester Hours Taught*

	1963	1964	1965	1966	1967
Lower	115,736	133,417	158,850	172,585	171,742
Upper	50,253	55,345	62,932	69,445	77,189
Grad.	4,341	5,272	6,639	8,009	10,908
Total	170,330	194,034	228,421	250,039	259,769

* Does not include Air Science, Military Science, or Bible

18. Total Registrations*

	1963	1964	1965	1966	1967
Lower	40,189	46,417	55,493	60,635	59,887
Upper	17,217	18,778	21,394	21,394	26,436
Grad.	1,506	1,854	2,309	2,725	3,815
Total	58,912	67,049	79,196	87,166	90,138

* Does not include Air Science, Military Science, or Bible

19. Graduate Enrollment

	Men	Women	Total
Fall 1967	1288	570	1858
Spring 1967	1156	555	1711
Fall 1966	1083	500	1583
Spring 1966	992	479	1471
Fall 1965	934	461	1395
Spring 1965	794	389	1183
Fall 1964	763	362	1125
Spring 1964	681	361	1042
Fall 1963	632	294	926
Spring 1963	494	296	790

Appendix C

DEPARTMENTAL AND SCIENCE DIVISION STATISTICS

Department of Mathematics

Tenure	1963-64		1964-65		1965-66	
	Tenure	Non-Tenure	Tenure	Non-Tenure	Tenure	Non-Tenure
Professors	6	0	5	3	6	3
Associate Professors	3	2	3	1	3	6
Assistant Professors	8	4	9	4	8	4
Instructors	0	10	1	9	3	8
Part-time Instructors	0	5	0	5	0	5
Teaching Assistants	0	22	0	21	0	27
Total	17	43	18	43	20	53

	1966-67		1967-68	
	Tenure	Non-Tenure	Tenure	Non-Tenure
Professors	8	2	5	3
Associate Professors	4	6	7	6
Assistant Professors	8	4	8	8
Instructors	4	8	4	5
Part-time Instructors	0	5	0	3
Teaching Assistants	0	28	0	51
Total	24	53	24	76

Ph.D.'s

	1963-64		1964-65		1965-66	
	Ph.D. in Math.	Without Ph.D. in Math.	Ph.D. in Math.	Without Ph.D. in Math.	Ph.D. in Math.	Without Ph.D. in Math.
Professors	4	2	5	3	6	3
Associate Professors	1	4	0	4	5	4
Assistant Professors	2	10	4	9	4	8
Total	7	16	9	16	15	15

	1966-67		1967-68	
	Ph.D. in Math.	Without Ph.D. in Math.	Ph.D. in Math.	Without Ph.D. in Math.
Professors	7	3	6	2
Associate Professors	5	5	8	5
Assistant Professors	2	10	6	10
Total	14	18	21	17

Budget Summary

	Academic Year 1963-64	Summer 1964	Academic Year 1964-65	Summer 1965	Academic Year 1965-66	Summer 1966
Salaries	$317,160	$37,336	$336,590	$43,377	$407,255	$35,181
ME	4,900		4,900		4,382	
Travel	1,500		1,800		2,500	
Clerical Help	4,440		4,440		6,540	
Student Help	5,500		5,500		3,200	
Total	$333,500	$37,336	$353,230	$43,377	$423,877	$35,181

	Academic Year 1966-67	Summer 1967	Academic Year 1967-68	Requested Summer 1968
Salaries	$488,220	$51,556	$630,248	$75,338
ME	6,470		9,600	
Travel	3,600		4,000	
Clerical Help	6,540		10,800	
Student Help	3,200		3,800	
Total	$508,230	$51,556	$658,448	$75,338

Budget Summary

Biology

	Academic Year 1963-64	Academic Year 1964-65	Academic Year 1965-66	Academic Year 1966-67	Academic Year 1967-68
Salaries	$183,819	$212,775	$252,515	$280,414	$330,900
ME (Travel)	37,000	39,000	50,000	50,500	57,500
Clerical Help	6,450	6,450	11,640	12,300	17,040
Student Help	10,000	10,000	12,500	12,140	10,500
Total	$237,269	$268,225	$326,655	$355,354	$415,940

Geosciences

	1963-64	1964-65	1965-66	1966-67	1967-68
Salaries	$115,111	$125,750	$164,230	$179,184	$258,404
ME (Travel)	17,350	17,300	16,700	17,700	18,300
Clerical Help	8,760	8,850	9,720	11,510	11,630
Student Help	5,100	4,600	4,900	6,000	6,100
Total	$146,321	$156,500	$195,550	$214,394	$294,434

Chemistry

	1963-64	1964-65	1965-66	1966-67	1967-68
Salaries	$172,800	$177,500	$218,135	$278,300	$327,280
ME (Travel)	66,640	58,942	61,000	61,000	78,000
Clerical Help	31,560	35,100	36,620	38,100	44,085
Student Help	11,800	11,800	11,800	12,800	11,000
Total	$282,800	$283,342	$327,555	$390,200	$460,365

Physics

	1963-64	1964-65	1965-66	1966-67	1967-68
Salaries	$121,400	$125,100	$146,292	$173,700	$205,066
ME (Travel)	19,060	19,560	20,000	20,000	33,500
Clerical Help	11,340	11,940	12,570	16,974	16,810
Student Help	3,600	3,600	3,600	3,600	3,600
Total	$155,400	$160,200	$182,462	$214,274	$258,976

SCHOOL OF ENGINEERING

	Resident Instruction Salaries	Salaries and Wages	Maintenance Equipment and Travel	Instructional Administration
1963-64	$ 687,707.00	$ 88,320.00	$109,351.00	$44,863.00
1964-65	721,257.00	93,460.00	110,960.00	45,243.00
1965-66	916,590.00	108,030.00	100,675.00	52,580.00
1966-67	1,077,785.00	111,490.00	101,675.00	53,260.00
1967-68	1,113,352.67	134,260.00	106,120.00	75,373.00

Budgeted Teaching Salaries; Mathematics (9 months)

	1963-64			1964-65		
	Min.	Max.	Aver.	Min.	Max.	Aver.
Professors	$10,500	$12,300	$11,125	$10,000	$12,750	$11,531
Associate Professors	9,000	10,000	9,260	9,500	10,000	9,900
Assistant Professors	6,600	8,500	7,525	7,000	9,300	8,023
Instructors	5,700	6,400	6,120	6,000	6,800	6,377
T.A.'s	2,000	2,000	2,000	2,000	2,200	2,021

	1965-66			1966-67		
	Min.	Max.	Aver.	Min.	Max.	Aver.
Professors	$11,025	$14,910	$12,950	$11,025	$17,000	$14,336
Associate Professors	11,025	11,550	11,340	11,000	12,000	11,857
Assistant Professors	7,875	11,025	8,819	7,875	10,500	8,929
Instructors	6,000	7,350	6,737	6,615	7,500	7,099
T.A.'s	2,000	2,200	2,021	2,000	2,200	2,021

	1967-68		
	Min.	Max.	Aver.
Professors	$13,184	$18,000	$15,450
Associate Professors	11,356	16,500	13,782
Assistant Professors	8,111	13,000	10,337
Instructors	7,000	7,570	7,188
T.A.'s	2,400	2,800	2,477

Budgeted Teaching Salaries (9 months)

	1963-64		1964-65		1965-66	
	Max.	Min.	Max.	Min.	Max.	Min.
Biology						
Professors	$11,500	$9,300	$12,600	$9,700	$15,620	$10,710
Associate Professors	9,200	9,200	9,600	9,600	11,025	9,135
Assistant Professors	8,400	7,000	8,900	7,400	9,450	8,400
Chemistry						
Professors	12,500	9,400	12,759	10,200	15,750	11,340
Associate Professors	9,200	8,100	9,800	8,500	11,235	10,185
Assistant Professors	8,100	7,000	8,750	7,300	9,870	8,295
Geosciences						
Professors	10,800	9,200	12,100	9,500	14,700	10,400
Associate Professors	8,500	8,500	9,150	9,050	10,500	9,450
Assistant Professors	7,900	6,700	9,000	7,150	8,400	7,980
Mathematics						
Professors	10,800	9,200	12,100	9,500	14,700	10,400
Associate Professors	9,100	9,000	11,500	9,500	11,550	11,025
Assistant Professors	8,500	6,600	9,300	7,000	11,025	7,875
Physics						
Professors	12,500	9,800	12,750	10,700	15,750	12,285
Associate Professors	9,900	8,200	10,700	15,750	12,600	9,712
Assistant Professors	8,800	6,251	9,000	8,500	11,025	9,555

	1966-67 Max.	1966-67 Min.	1967-68 Max.	1967-68 Min.
Biology				
Professors	$15,500	$10,900	$17,000	$12,400
Associate Professors	11,500	9,800	12,500	10,000
Assistant Professors	9,800	8,400	10,700	8,700
Chemistry				
Professors	17,000	12,000	19,000	12,500
Associate Professors	12,500	10,000	13,830	10,300
Assistant Professors	10,500	8,800	11,100	9,200
Geosciences				
Professors	16,000	10,400	17,000 (20,000vtg)	11,400
Associate Professors	11,000	9,450	12,000	10,500
Assistant Professors	8,500	8,400	10,500	8,500
Mathematics				
Professors	17,000	11,025	18,000	13,184
Associate Professors	14,000	11,000	16,500	11,356
Assistant Professors	10,500	7,875	13,000	8,111
Physics				
Professors	17,000	12,300	19,000	13,200
Associate Professors	13,600	9,800	14,800	10,166
Assistant Professors	11,100	10,100	12,300	11,100

Teacher-Student Ratio by Department - Fall 1966

Department	Staff Head Count	Staff F.T.* Equiv.	Number Reg.	Semester Credit Hours	Full-time Student Equiv.	Student-Teacher Ratio
Biology	45	32.40	3,769	13,995	933.00	30.66
Chemistry	49	29.73	2,829	10,305	687.00	23.11
Geosciences	25	18.10	1,606	6,091	406.06	22.43
Mathematics	74	52.35	6,750	20,952	1,396.80	26.68
Physics	26	16.40	1,021	3,811	254.07	15.49
School of Engineering						
Architecture and Allied Arts	35	32.68	2,458	6,735	449.00	13.74
Chemical Engineering	10	6.10	401	1,028	68.53	11.23
Civil Engineering	16	11.90	797	2,229	148.60	12.49
Electrical Engineering	21	14.50	970	2,722	181.46	12.51
Industrial Engineering	25	13.45	1,165	2,550	170.00	12.64
Mechanical Engineering	15	11.45	687	1,870	124.67	10.89
Petroleum Engineering	3	3.00	29	70	4.67	1.56
Textile Engineering	2	1.40	50	148	9.87	7.05

* Full-time Equivalent

Semester Hours Taught - Physics

	1963	1964	1965	1966	1967
Lower	3,052	3,712	4,145	3,256	3,864
Upper	443	379	222	332	325
Grad.	66	111	202	223	297
Total	3,561	4,202	4,569	3,811	4,486

Total Registrations - Physics

	1963	1964	1965	1966	1967
Lower	763	928	1,042	814	966
Upper	175	143	82	124	117
Grad.	25	48	78	83	108
Total	963	1,119	1,202	1,021	1,191

Semester Hours Taught - Engineering

	1963	1964	1965	1966	1967
Lower	6,142	6,444	7,664	7,808	6,471
Upper	8,426	7,469	7,586	8,942	9,101
Grad.	431	541	643	602	752
Total	14,999	14,454	15,893	17,352	16,324

Total Registrations - Engineering

	1963	1964	1965	1966	1967
Lower	2,101	2,191	2,589	3,141	2,660
Upper	3,125	2,725	2,727	3,204	3,215
Grad.	147	187	221	212	270
Total	5,373	5,103	5,537	6,557	6,145

Semester Hours Taught - Chemistry

	1963	1964	1965	1966	1967
Lower	5,262	6,054	6,904	8,026	7,123
Upper	1,690	1,554	1,849	2,002	2,274
Grad.	262	395	297	277	240
Total	7,214	8,003	9,050	10,305	9,637

Total Registrations - Chemistry

	1963	1964	1965	1966	1967
Lower	1,338	1,548	1,761	2,829	1,773
Upper	425	380	455	670	782
Grad.	96	153	121	109	86
Total	1,859	2,081	2,337	3,608	2,641

Semester Hours Taught - Geosciences

	1963	1964	1965	1966	1967
Lower	3,452	4,014	5,057	5,506	5,138
Upper	195	198	261	423	426
Grad.	56	97	127	162	199
Total	3,703	4,309	5,445	6,091	5,763

Total Registrations - Geosciences

	1963	1964	1965	1966	1967
Lower	870	1,008	1,274	1,410	1,317
Upper	65	66	87	141	141
Grad.	23	32	45	55	71
Total	958	1,106	1,406	1,606	1,529

Semester Hours Taught - Mathematics

	1963	1964	1965	1966	1967
Lower	12,636	14,655	17,430	17,505	19,285
Upper	3,294	3,321	3,045	2,994	2,301
Grad.	234	317	331	405	824
Total	16,164	18,293	20,806	20,904	22,410

Total Registrations - Mathematics

	1963	1964	1965	1966	1967
Lower	4,212	4,885	5,810	5,599	5,797
Upper	1,098	1,107	1,015	998	767
Grad.	90	115	121	137	289
Total	5,400	6,107	6,946	6,734	6,853

Semester Hours Taught - Biology

	1963	1964	1965	1966	1967
Lower	9,484	10,618	12,366	12,233	12,410
Upper	1,066	1,339	1,415	1,574	1,594
Grad.	54	135	112	188	276
Total	10,604	12,092	13,893	13,995	14,280

Total Registrations - Biology

	1963	1964	1965	1966	1967
Lower	2,472	2,755	3,199	3,134	3,128
Upper	366	465	497	560	550
Grad.	18	55	44	75	110
Total	2,856	3,275	3,740	3,769	3,788

Enrollment by Majors

	1963		1964		1965	
	Un	Grad	Un	Grad	Un	Grad
Biology	53	4	76	13	80	3
Chemistry	117	45	145	39	185	40
Geoscience	32	11	44	12	53	15
Mathematics	397	41	420	57	385	60
Engineering	1984	70	2031	88	2296	101
Physics	65	13	51	19	72	27

	1966		1967	
	Un	Grad	Un	Grad
Biology	93	6	102	11
Chemistry	135	45	125	31
Geoscience	59	18	14	1
Mathematics	417	53	418	80
Engineering	2383	102	2395	109
Physics	69	31	71	39

Research Monies

Year	State	Federal	Private	Total
Chemistry				
1963-64	$5,725.00	$148,106.67	$175,856.92	$329,688.59
1964-65	5,088.15	7,949.73	146,863.55	159,901.43
1965-66	9,700.00	78,754.44	215,609.49	304,063.93
1966-67	2,690.00	39,251.51	193,435.61	235,377.12
1967-68	6,262.00	NO DATA	NO DATA	6,262.00
Biology				
1963-64	12,529.00	37,028.54	1,400.00	50,957.54
1964-65	12,855.00	80,678.52		93,533.52
1965-66	14,911.44	69,342.39	8,738.38	92,992.21
1966-67	11,331.00	79,744.83	19,130.43	110,206.26
1967-68	10,570.00	NO DATA	NO DATA	10,570.00
Geosciences				
1963-64	1,952.00			1,952.00
1964-65	8,832.00	50,442.41		59,274.41
1965-66	4,507.00	29,055.80		33,562.80
1966-67	10,236.00	39,507.76		49,743.76
1967-68	28,745.00	NO DATA		28,745.00

Year	State	Federal	Private	Total
Physics				
1963-64	$16,485.00			$ 16,485.00
1964-65	10,698.00	$10,000.00		20,698.00
1965-66	38,502.00	25,000.00	$20,000.00	83,502.00
1966-67	30,803.00	39,490.00	32,000.00	102,293.00
1967-68	41,556.00	123,000.00	20,000.00	184,556.00
Mathematics				
1963-64				
1964-65	$3,166.00			3,166.00
1965-66	4,174.00	$ 3,600.00		7,774.00
1966-67	1,500.00			1,500.00
1967-68	9,762.00	$11,380.00		21,142.00

Graduates (degrees awarded)

	1963			1964		
	Bachelor	Master	Doctorate	Bachelor	Master	Doctorate
Biology	5	0	0	4	0	0
Chemistry	22	8	2	29	8	4
Geoscience	10	4	0	5	3	0
Mathematics	88	10	0	83	12	0
Engineering	312	24	0	337	37	0
Physics	7	0	0	7	4	0

	1965			1966		
	Bachelor	Master	Doctorate	Bachelor	Master	Doctorate
Biology	9	0	0	3	0	0
Chemistry	25	9	1	38	12	2
Geoscience	7	1	0	14	4	0
Mathematics	94	18	0	79	17	0
Engineering	232	37	2	216	50	0
Physics	8	3	0	1	8	0

	1967		
	Bachelor	Master	Doctorate
Biology	31	0	0
Chemistry	29	6	2
Geoscience	10	6	0
Mathematics	62	12	1
Engineering	257	31	3
Physics	9	8	0

DEPARTMENT OF PHILOSOPHY

REPORT TO THE PRESIDENT ON PHILOSOPHY

August, 1968

The Department of Philosophy became a separate administrative unit in September, 1966. However, the following report will attempt to sketch the history of the discipline since the opening of the College, and with only three exceptions staff who have taught philosophy will be listed with their publications records. Those exceptions are Dr. James H. Granberry (who was chairman of History and will appear in that Department's report). Dean James M. Gordon (who taught a course once or twice and who will appear in the report of the Department of Classical and Romance Languages); and Mr. James Platt (who as a graduate student in Education taught an introductory section for a six-weeks summer term a few years before the Department of Philosophy was instituted). There will, of course, be no summary statement of the departmental budget (see I: 4 below) for the last ten years since the cost of philosophy was included in the cost of the Department of Education and Philosophy prior to September, 1966.

I.

History of the Department and Report on Operations

1. Philosophy was included in subject matter offerings in the first catalog listing of courses (First Annual Catalog, 1925-1926, published January, 1926). Six Philosophy courses were listed: Introduction to Philosophy, Ethics, Logic, History of Philosophy, Aesthetics and Philosophy of Religion. The current program is no more than an expansion of this "core" curriculum for many of the same titles are still used. We now have two courses in logic: Introduction to Logic and Intermediate Logic; whereas, History of Philosophy has become History of Ancient and Medieval Philosophy, History of Modern Philosophy, and Development

of American Philosophy.

Philosophy was in a "Department of Philosophy and Sociology" from 1927 to 1929. From 1929 until 1932 it was listed under the Department of History. In 1932 the Department of Philosophy and Sociology was re-created and apparently was administered directly out of the Office of the Dean of Arts and Sciences until 1946. From 1946 to 1950 it was administered by the Head of the Department of Education and Psychology. In the fall of 1950 the Department of Education and Philosophy was created from the Departments of Education and Psychology and Philosophy and Sociology. The "new" department remained with the title indicated until the Department of Philosophy began to function two years ago.

No graduate degrees have been awarded in philosophy. The Department has been approved by the Graduate Council for offering a minor at the master's degree level. On at least one occasion--and this was in 1957, a doctoral candidate in English used philosophy for his minor, but he had acquired several graduate hours in philosophy at another institution. A total of 25 students have received Bachelor of Arts degrees with a major in philosophy since the beginning of the institution.

2. With the exceptions mentioned in the preceding section, the following is a list of all persons who have taught philosophy at Texas Technological College:

Archie J. Bahm, Ph.D., University of Michigan. He served as an unofficial acting chairman of the Department of Philosophy and Sociology under Dean J. M. Gordon. Dr. Bahm came in 1934 and left in 1946 at the rank of associate professor. He was (and still is) a prolific writer.

Ivan L. Little, Ph.D., University of Nebraska. He succeeded Dr. Bahm in 1946 and is serving as the first chairman of the department. He has also served as Associate Dean (and for a brief period as Acting Dean) of the School of Arts and Sciences since 1959.

Thomas F. Storer, Ph.D., University of Iowa. Dr. Storer came in the fall of 1959. He went to India in 1960 to serve as a Fullbright teaching scholar. Returning to his duties at Texas Tech in September, 1961, he died of a cerebral hemorrhage in November of the same year. While he was here Dr. Storer held a joint appointment in the Departments of Education and Philosophy and Mathematics. He was a brilliant logician and was reasonably competent in the philosophy of science.

Charles S. Hardwick, Ph.D., University of Texas. He first taught at this institution in 1960. Since that time he has received the doctorate. His interest in research is promising and his aid in departmental administration is significant.

Bruce Waters, Ph.D., Ohio State University. Dr. Waters, who has replaced Dr. Storer in the teaching of logic and philosophy of science, came in 1962. He has proved to be a meticulous and exacting teacher.

Zuhdi T. Faruki, Ph.D., University of Indiana. Dr. Faruki was appointed assistant professor in 1963 and left in 1967 without gaining tenure. His interest was primarily in Oriental philosophy.

Mrs. Mary Lou Godbehere Rawlings, M. A., Texas Technological College. Mrs. Rawlings will not enter further in this report except in connection with current costs and operations (see II: 2). She has the rank of instructor and is included here for the sake of completeness in listing personnel who have taught philosophy on this campus. Mrs. Rawlings has an M.A. degree with a major in English, but she has proved to be a careful and valuable teacher of the introductory course. Decision regarding tenure will be made later.

James F. Donaldson, Ph.D., Laval Universitie. Dr. Donaldson joined the philosophy faculty in 1967. His research interests are in late Roman and early medieval Latin and Greek classics. Since classical philosophy is one of the

important areas to be stressed as the Department gains greater depth and maturity, Dr. Donaldson's appointment was made with his specific qualifications in mind. He is engaged in the translation of a fifth century A. D. commentary on Aristotle's De Interpretatione.

The accessible publication list for these faculty members appears in the Appendix.

3. The table given below is self-explanatory:

Number of Students Enrolled in Philosophy, 1955-1968*

Year	Fall	Spring	Summer	Total
1955-56	32	31	-	63
1956-57	56	59	-	115
1957-58	55	76	25	156
1958-59	79	95	77	251
1959-60	144	171	45	360
1960-61	195	243	159	597
1961-62	277	196	85	558
1962-63	338	287	42	667
1963-64	373	304	121/15	813
1964-65	359	346	282/153	1140
1965-66	476	513	74/47	1110
1966-67	587	589	88/0	1264
1967-68	593	639	84/58	1374

*This table has been expanded beyond the ten year period in order to illustrate the numbers of enrollments before and after the Department of Education and Philosophy made the introductory philosophy course a requirement in the elementary education program in 1957. This point is mentioned again under Section III below.

4. Since the Department of Philosophy was not created until September, 1966, the tables given below reflect the teaching salaries in philosophy from 1957 to 1966, but show no separate maintenance and operation costs. Full departmental costs are available for the period beginning September, 1966 to August, 1968.

Faculty Salaries 1957-1966

1958-59	$8,650	1962-63	$13,000
1959-60	$8,200	1963-64	$15,600
1960-61	$3,000	1964-65	$18,133
1961-62	$5,529	1965-66	$26,198

Summary Tabulation of Departmental Budget
Since Inception of Department in 1966

	Salaries	Stud. Assts. &/or Part-Time Help	M. E. & T	Total
1966-67	$40,952.42	$900.00	$1220.00	$43,072.42
1st SS	1,013.00			
2nd SS	1,075.00			2,088.00
1967-68	$38,300.00	$1000.00	$1450.00	$40,750.00
1st SS	1,584.00			
2nd SS	2,234.00			3,818.00
TOTALS	$85,158.42	$1900.00	$2670.00	$89,728.42

These figures reflect the actual budget figures. The 1967-1968 budget carries Ivan L. Little with no salary from the Department; but the same budget indicates that he was paid $9,814.92 from teaching salary in 1966-1967. This accounts for the salary total being greater for 1966-67 than for 1967-68.

II.

Current Departmental Status

There are no freshman courses in philosophy. The following table shows the enrollment in sophomore, junior, and senior courses during the 1968 Spring Semester:

Sophomore	580
Junior	24
Senior	35
Total	639

Of the 580 students taking sophomore courses (Introduction to Philosophy, Introduction to Logic, and Ethics) 189, or approximately 32%, were students with upper level undergraduate classification. No graduate courses were offered.

2. These students were taught by 4.25 F.T.E. The instructional staff with teaching salaries for the entire 1967-1968 academic year were as follows:

Ranks of Faculty & Their Compensation
(1967-1968 & Summer '68)

Professor

Ivan Lee Little, Chairman	(on budget of Arts and Sciences Dean's office)
Thomas Bruce Waters	$12,000

Assistant Professor

James Frances Donaldson	$11,084
Charles Sidney Hardwick	$11,667

Instructor

Mrs. Mary Lou Godbehere Rawlings	$7,367

3. The students were taught in 1500 square feet of classroom space and the faculty were housed in 631 square feet of office space.

4. Dr. James Donaldson is the only faculty member who has a state-supported research grant at this time. He spent the second term of the 1968 Summer Session working on a translation of a fifth century writer. Dr. Hardwick has made application for future consideration. Drs. Hardwick and Little are

working on an introductory text and are collecting material for one or more projects in the sociology of knowledge. Dr. Bruce Waters is collecting and publishing ideas on the philosophy of history.

Dr. Hardwick will have one extension course at Reese Air Force Base in the 1968 Fall Semester.

5. Departmental operating expenses for the 1967-68 fiscal year were:

Salaries	$42,118*
Student assistants and/or part-time help	1,000
Maintenance and Equipment	1,250
Travel	200
	$44,568

*The departmental budget does not show the salary of the chairman. His annual salary has been carried on the budget for the Dean of Arts and Sciences.

III.

Departmental Aims and Objectives for the Next Five to Ten Years

1. The philosophy department will continue to develop its program of undergraduate instruction with emphasis on the major fields of philosophical inquiry. The program is designed to give students studying in other subject areas a critical appreciation of the history of philosophy, an understanding of the emergence and influence of philosophical systems, and the relationships between philosophical ideas and those of art, literature, economics, politics, and other aspects of culture. In addition to service courses designed to introduce students of other disciplines to philosophy, the program will also give students wishing to major in philosophy, courses which will prepare them for graduate work in philosophy.

This will include a core of courses in the history of philosophy, mataphysics, epistemology, value theory, and logic and the philosophy of science. It is anticipated that some increase in undergraduate course offering will be required during this five to ten year period to enable the department to keep abreast of shifting emphasis in the various core areas mentioned above.

2. One area in the undergraduate program can be strengthened to the advantage of not only the philosophy department, but other departments as well--primarily those dealing with science and the humanities. Within the immediate future we plan to strengthen the program in the philosophy of science. There is a strong feeling among members of the philosophy department that this program would contribute much toward bridging the gulf which exists between the sciences and the humanities. The program will cover three subject areas: history and philosophy of science; problems of theory construction; and logic and scientific method. Courses in the history and philosophy of science will acquaint students in the humanities with the principal scientific discoveries of Western civilization, and with the impact of these discoveries on Western culture. The lives and works of such men as Aristotle, Copernicus, Kepler, Galileo, Descartes, Harvey, Boyle, Newton, Dalton, Darwin, Einstein, etc., will be considered. The student will be challenged to gain an appreciation of scientific discoveries, and the social, political, economic, and technological backgrounds out of which these discoveries emerged. Emphasis is to be given to the major 'revolutions' which have occurred in scientific thought and the impact of these revolutions on all aspects of Western culture. The students will also gain some insight into the patterns of scientific discovery. Such a program will be beneficial to students of the various sciences whose knowledge of the history of science is largely confined to the discoveries made in their particular fields. These courses, are to show, hopefully, that science and technology function within the total

context of culture, and that science and technology have, from time to time developed in direct relationship to social, economic, and political influences, and that science and technology have, in turn, brought about radical changes in social, economic, and political institutions. The program will also include strong emphasis on logic and scientific method. Mathematical logic has recently become an area of considerable interest in philosophy. This area of study can be developed in conjunction with a philosophy of science program. Studies in advanced logic can be related to set theory, axiomatics, and deductive techniques in both science and mathematics, and offer an opportunity for interdisciplinary studies in philosophy, science, and mathematics. Also, Boolean algebra, a discipline common to logic, mathematics, and computer science offers further opportunity for interdisciplinary studies. Studies in scientific methodology should afford students in the physical and social sciences the opportunity to share a common understanding of the structure and function of scientific method and the technique of theory construction. To realize the objectives of the program in the philosophy of science as outlined above, the department needs to recruit at least two new faculty members, trained in the two areas mentioned, within the next five to ten years.

3. Within the next five to ten years, a graduate program at the Masters Degree level is planned. Such a program would serve three purposes: to provide a Masters Degree as a terminal degree to students interested in teaching at a junior college level; an interim degree for those wishing to go on to a Ph.D.; and to provide supporting work in philosophy for those seeking a Ph.D in other areas of study at Tech. With the projected development of a junior college system in Texas by the Coordinating Board, there will be an increased demand for teachers of philosophy at the junior college level. Several junior colleges in Texas now offer at least one course in philosophy in their curriculum. Based on

the information available, those who teach these courses in junior colleges frequently lack adequate training in philosophy. Usually these teachers have received degrees with majors in other areas and minors in philosophy. A Masters Degree program at Texas Tech would help to train junior college teachers with better qualifications for teaching philosophy.

4. In our longer range planning in the program in the philosophy of science, we shall investigate the possibility of bringing to the campus guest lecturers in the philosophy of science. These lectures will be given by persons qualified to deal with the impact of science on the humanities. It is hoped that such a course would take the place of our present course entitled "Introduction to Philosophy" and would fulfill degree requirements for students seeking three hours credit in philosophy as a humanities or as a social science elective. It will be proposed that the lecturer or lecturers will be responsible for teaching the one course (estimated enrollment of 500), and that while on the campus he (they) be available to the philosophy department and other interested departments as a consultant(s). This program would help to alleviate the pressure now being felt in the department due to the increased student load in Introduction to Philosophy, and it would also help stimulate interest in the philosophy of science program proposed above.

5. In conjunction with statements made above regarding a Masters Degree program in philosophy, the department is planning a proposal to be submitted to the United States Office of Education for a summer institute in the humanities. The request is planned to be for a program of financial aid for teaching junior college teachers in philosophy and the humanities. The program would allow them to take graduate courses during the summer session to strengthen their background in fields in which they do not feel adequately prepared. This program, although administered by the philosophy department, would involve other departments concerned with studies and research in the humanities.

6. Staff will need to be increased and strengthened at the undergraduate level in order to provide a stronger base for developing a graduate program. Current staff strength of 4.25 will need to grow to 6.0 or 7.0 by 1973 and to 8.0 or 9.0 by 1978. Recruiting must be directed toward getting faculty who will teach undergraduate courses and help develop a graduate program. Therefore, recruits must be competent at all levels of teaching and must show some facility for research. These competencies ideally should be present in each individual; if not, a proper balance for the total department will nonetheless be vital to the achievement of departmental goals.

Projection of numbers of staff needed is not based specifically or even generally upon anticipated overall College enrollment, but upon what is believed to be the minimum time necessary to locate and absorb personnel into the Department. Philosophy is a sensitive area for recruiting; it is our feeling that screening of new personnel will be extremely important within the next five to ten years. We who are currently on the staff are not interested in helping to provide a nucleus of leadership for student rebellion; rather we hope that the Department can distinguish itself for sanity, creative teaching, and scholarship.

There is the possibility, of course, that the Department may not need this many teachers at the times indicated, but there is some evidence that the numbers of students taking philosophy (especially the sophomore courses) is determined by the number of sections made available to them. Obviously, a saturation point will be reached, but it has not been reached since philosophy course offerings began to increase as the result of the Department of Education and Philosophy making the introductory course mandatory for elementary education majors in 1957. As the curriculum called for the course in the student's senior year, it was not until the 1960-61 academic year that the number of student registrations had become significant (See I:3). True, there was a slight decrease

in registrations for 1961-62 from the previous year but this was caused by the death of Dr. Thomas Storer in November of 1961. He was not replaced during that year. Growth has been generally steady, but a considerable slowdown (in our opinion) has been occasioned by de-emphasis of summer teaching, from 1966 to the present summer. It is to be noted, for example, that lack of courses taught in the 1966 summer session put the number of registrations for the year below that of 1964-65.

Theoretically office and classroom space should increase by 50% within 5 years and by 100% within 10 years. This means that 2,250 square feet of classroom space will be needed for instruction in philosophy by 1973 and at least 3,000 square feet by 1978. Office space requirements actually will be proportionately greater because our present office space is unrealistic for a faculty in a "self-sustaining" department. For instance, the Department has no secretary of its "own" now. Secretarial staff in the Arts and Sciences Dean's office currently take care of secretarial needs in the Department. Consequently, even the present office space is inadequate. At least 150 extra square feet would be needed if the Department had to supply its own secretarial space. Our office space at present is 631; we need about 780 square feet. By 1973 we anticipate a need for at least 1,050 square feet of office space and approximately 1,350 square feet by 1978. Certainly by that time the Department will need at least 300 spare feet of office space for teaching assistants, a graduate reading room of approximately 225 square feet and a seminar room of similar size. In summary, here are the anticipated space needs in the two five year intervals under discussion in this report:

Anticipated Space Needs in Square Feet

	Office	Classroom
1973	1,050	2,250
1978	1,350	3,000
	300 (T.A.'s)	450 (graduate reading rooms)
Total for 1978	1,650	3,450

APPENDIX

Archie J. Bahm

"Henry Bradford Smith on the Equivalent Form of Barbara," The Monist, Vol. XLII, No. 4, October, 1932, pp. 632-633.

"A Religious Affirmation," The New Humanist, Vol. VI, No. 4, July-August, 1933, p. 48.

"Humanism and Personalism," The Personalist, Vol. XV, No. 2, Spring, 1934, pp. 162-164.

Review of A Natural Approach to Philosophy by Lewis Guy Rohrbaugh, The International Journal of Ethics, Vol. XLV, No. 3, April, 1935, p. 374.

"Should Philosophy Be Taught in High School?" The Texas Outlook, Vol. XIX, No. 12, December, 1935, p. 9.

Review of A Modern Book of Aesthetics by Melvin Rader, The International Journal of Ethics, Vol. XLVI, No. 2, January, 1936, p. 251.

Review of Values and Reality by Leo R. Ward, The International Journal of Ethics, Vol. XLVI, No. 2, January, 1936, p. 252.

Review of Problems of Conduct, Second Revised Edition by Durant Drake, The International Journal of Ethics, Vol. XLVI, No. 2, January, 1936, 252.

"Humanist Doctrine," The New Humanist, Vol. IX, No. 2, Summer, 1936, pp. 116-118.

"Dek Specoj de Senmorteco," USE-EHO (Esperanto, Timisoara, Roumania), July, 1936.

Review of Los Principios de la Etica Social: Concepto, Axiologia y Realizacion de la Moralidad by Fransisco Larroyo, The International Journal of Ethics, Vol. XLVII, No. 2, January, 1937, pp. 251-252.

"Humanism is Not Atheism," Unity, Vol. CXIX, No. 4, April 19, 1937, pp. 71-72.

"Dek Specoj de Senmortetco," Scienca Gazeto (Rockford, Illinois), July-August, 1937. Republication of item 17.

"A Scientific Argument for Personal Immortality," The Personalist, Vol. XVIII, No. 1, Winter, 1937, pp. 82-83.

"Dek Specoj de Senmortetco," Heroldo de Esperanto (Scheveningen, Holland), January 16, 1938.

"Dek Specoj de Senmortetco," Esperantia Internacia (Scheveningen, Holland), February, 1938.

Review of Our Human Truths by F. C. S. Schiller, Philosophic Abstracts, Vol. I, No. 2, p. 17.

" Humanism is Not Naturalism," The Humanist Bulletin, Vol. II, No. 3, June, 1940, p. 5.

"The Present Faiths of a Humanist," The Humanist Bulletin, Vol. II, No. 4, Autumn, 1940, p. 4.

Review of Philosophical and Literary Pieces by Samuel Alexander, Philosophic Abstracts, Vol. I, No. 3, Fall, 1940, p. 4.

Review of Wisdom in Conduct by Christopher Browne Garnett, Philosophic Abstracts, Vol. I, No. 3, Fall, 1940, p. 7.

Review of The Private and Public Life of Socrates by Rene Kraus, Philosophic Abstracts, Vol. I, No. 3, Fall, 1940, p. 7.

"The Living Bible," Unity, Vol. CXXVI, No. 10, January 20, 1941, pp. 154-156.

"Correspondence," The Humanist Bulletin, Vol. III, No. 1, January, 1941, p. 11.

"Humanism versus Humanists," The Journal of Liberal Religion, Vol. II, No. 4, Spring, 1941, p. 197.

"That Good Old Golden Rule," Your Life, Vol, 8, No. 3, March, 1941, p. 16.

"Philosophy and Religion," Unity, Vol. CXXVII, No. 2, April, 1941, pp. 28-29.

"What is Philosophy?" The Scientific Monthly, Vol. LII, No. 6, June 1941, pp. 533-560.

"Santayana and Humanism," The Humanist, Vol. I, No. 1, Spring, 1941, pp. 30-32. A book review.

"Humanism and Sect Membership," The Humanist, Vol. I, No. 2, Summer, 1941, pp. 54-56.

An Interpretation of the Nature of Presence ("specious present") and Some Implications of the Interpretation, University Microfilms, Publication No. 329, Ann Arbor, September, 1941. Reproduction of doctoral dissertation dated January 3, 1933.

Review of Democracy in Change: A New Dimension by Charles M. Perry, Philosophic Abstracts, Vol. II, No. 7, Fall, 1941, p. 11.

Review of The Ideologies of Religion by George P. Conger, Philosophic Abstracts, Vol. II, No. 8, Winter, 1941-42, pp. 5-6.

Review of Contemporary Religious Thought: An Anthology, Philosophic Abstracts, Vol. II, No. 8, Winter, 1941-42, P. 11.

Review of The Philosophy of Esthetic Individualism by Henry Rago, Philosophic Abstracts, Vol. II, No. 8, Winter, 1941-42, p. 15.

Review of The History and Meaning of the Term Social Justice by Leo W. Shields, Philosophic Abstracts, Vol, II, No. 8, Winter, 1941-42, p. 16

"Is The Humanist Manifesto Humanistic?" Unity, Vol. CXXVII, No. 11, January, 1942, pp. 188-189.

Contributions to the Dictionary of Philosophy edited by D.D. Runes, The Philosophical Library, N.Y., January, 1942.

" Religion is Natural," Unity, Vol. CXXVIII, No. 2, April, 1942, p. 27.

"I Am Responsible" (Correspondence), The Humanist, Vol. II, No. 1, Spring, 1924, p. 41.

Review of Meister Eckhart: A Modern Translation by Raymond F. Blakney, Philosophic Abstracts, Vol. II, No. 10, Summer, 1942, p. 3.

Review of The Quest for Wisdom by Christopher B. Garnett, Philosophic Abstracts, Vol. II, No. 10, Summer, 1942, P. 6.

Review of The Development of the Sciences, Second Series by Oystein Ore, Frank Schlesinger, Henry Margenau, John A. Timm, C.R. Longwell, L.L. Woodruff, W.R. Miles and J.F. Fulton, Philosophic Abstracts, Vol. II, No. 10, Summer, 1942, p. 11.

Review of A New Earth and a New Humanity by Oliver L. Reiser, Philosophic Abstracts, Vol. II, No. 10, Summer, 1942, pp. 11-12.

Review of Diccionario De Filosofia by Jose Ferrater Moral, Philosophic Abstractsm Vol. II, No. 10, Summer, 1942, p. 19.

"Religious Humanism Refined," Unity, Vol. CXXVIII, No. 6, August, 1942, pp. 93-94.

"Humanism is More Than a Philosophy" (Part IV of a "Symposium -- Is Humanism a Religion" with A. E. Hayden, Corliss Lamond, A. D. Fricke, William Floyd, J. H. Leuba and A. C. Diffenbach), The Humanist, Vol. II, No. 3, Autumn, 1942, pp. 108-109.

"Personality," Chapter X of Society Under Analysis edited by Elmer Pendell, The Jacques Catell Press, 1942, pp. 231-244.

"What is knowledge?" The Scientific Monthly, Vol. LVI, No. 3, March, 1933, pp. 266-273.

"Humanism and World Leadership," Unity, Vol. CXXIX, No. 5, July, 1943, pp. 77-78.

Review of A Realistic Philosophy of Religion by A. Campbell Garnett, The Humanist, Vol. III, No. 2, Summer, 1942, pp. 87-88.

"Religious Faith" (A Couplet), The Humanist, Vol. III, No. 3, Autumn, 1943, p. 27.

Review of The Prospects of American Democracy by George S. Counts, Philosophic Abstracts, No. 11, 1943, pp. 4-5.

Review of What Man Can Make of Man by William E. Hocking, Philosophic Abstracts, No. 11, 1943, p. 7.

Review of Science and Education by S. R. Humby and E. J. F. James, Philosophic Abstracts, No. 11, 1943, p. 7.

Review of Thinking for Every Man by A. Gordon Melvin, Philosophic Abstracts, No. 11, 1943, p. 9.

Review of Voices of Democracy by Bernard Molohon, Philosophic Abstracts, No. 11, 1943, p. 9.

"Teleological Arguments," The Scientific Monthly, Vol. LVIII, No. 5, May, 1944, pp. 377-383.

The New Individualism (Mimeographed), published by the author, Spring 1945, pp. 88.

Review of Man's Way: A First Book in Philosophy by Henry Van Zandt Cobb, Philosophic Abstracts, No. 12, 1944, p. 9.

Review of Education Between Two Worlds by Alexander Meiklejohn, Philosophic Abstracts, No. 12, 1944, p. 11.

Review of In the Sweat of Thy Face by Thomas Quigley, Philosophic Abstracts, No. 12, 1944, p. 15.

Review of A Realistic Philosophy of Education by Herbert A. Tonne, Philosophic Abstracts, No. 12, 1944, p. 19.

What's Ahead for Me? (Booklet of suggestions for college freshman), The Hogg Foundation, Austin, Texas, 1945, pp. 29.

Review of Social Darwinism in American Thought by Richard Hofstadter, The Humanist, Vol. V, No. 3, Autumn, 1945, p. 142.

"Opposition of Compound Propositions" (Note on symbolic logic), Philosophy of Science, Vol. XIII, No. 1, January, 1946, pp. 78-79.

"In Defense of Philosophy, School and Society, Vol. 63, No. 1625, February, 1946, p. 115.

"Humanism -- A Religion for Scientists," The Scientific Monthly, Vol. LXII, No. 4, April, 1946, pp. 310-315.

"Intension and Extension," The New Scholasticism, Vol. XX, No. 2, April, 1946, p. 183.

"Arguing About Freedom," Unity, Vol. CXXXII, No. 3, May, 1946, pp. 38-40.

Review of The Creative Mind by Henri Bergson, The Humanist, Vol. VI, No. 1, Spring (May), 1946, p. 48.

Review of Time as Dimention and History by Hubert G. Alexander, Philosophic Abstracts, Vol. V, No. 19-20, 1946, p. 2.

Review of Philosophy in American Education, Its Tasks and Opportunities by Brand Blanshard, C. J. Ducasse, C. W. Hendel, A. E. Murphy and Max otto, Philosophic Abstracts, Vol. V. No. 19-20, 1946, p. 3.

Review of Preface to An American Philosophy of Art by A. Philip McMahon, Philosophic Abstracts, Vol. V, No. 19-20, 1946, p. 11.

Review of The Continuing Battle for the Control of the Mind of Youth by Porter Sargent, Philosophic Abstracts, Vol. V, No. 19-20, 1946, p. 13.

"Freedom is Fitness," The Scientific Monthly, Vol. LXIII, No. 4, August, 1946, pp. 135-36.

"New Rules for Sorites," The New Scholasticism, Vol. XX, No. 4, October, 1946, pp. 323-333.

"A Proposed College Curriculum," Bulletin of the American Association of University Professors, Vol. XXXII, No. 3, Autumn, 1946, pp. 545-550.

"Organic Unity and Emergence," The Journal of Philosophy, Vol, XLIV No. 9, April 24, 1947, pp. 241-244.

"What is a Liberal'Education'," School and Society, Vol. LXVI, No. 1700, June 26, 1947, pp. 63-64.

Review of The Principles of Aesthetics, Second Edition by DeWitt H. Parker, Philosophic Abstracts, Vol. VII, No. 24, Summer, 1947, p. 11.

Review of The Riddle of the Early Academy by Harold Cherniss, Philosophic Abstracts, Vol. VIII, No. 25, Fall, 1947, pp. 6-7.

Review of Politics and Morals by Bonedetto Groce, Philosophic Abstracts, Vol. VIII, No. 25, Fall, 1947, p. 7.

Review of The Domain of Reality by William Gerber, Philosophic Abstracts, Vol. VIII, No. 25, Fall, 1947, pp. 9-10.

Review of The Moral Theory of Evolutionary Naturalism by William E. Quillian, Philosophic Abstracts, Vol. VIII, No. 25, Fall, 1947, p. 14.

"Democracy Defined," School and Society, Vol. 66, No. 1704, August 23, 1947, pp. 135-138.

"Beauty Defined," The Philosophical Review, Vol. LVI, No. 5, Sept., 1947, pp. 582-586.

"The Generic Theory of Truth," The Personalist, Vol. XXVII. No. 4, Autumn, 1947, pp. 370-375.

"Emergence of Purpose," The Journal of Philosophy, Vol. XLIV, No. 23, Nov. 6, 1947, pp. 633-636.

"Rightness Defined," Philosophy and Phenomenological Research, Vol. VIII, No. 2, December, 1947, pp. 266-268.

Review of Reason and Conduct in Hume's Treatise by Rachael M. Kydd, Philosophic Abstracts, Vol. IX, No. 26, Winter, 1947, pp. 4-5.

"Emergence of Values," The Journal of Philosophy, Vol. XLV, No. 15, July 15, 1948, pp. 411-414.

"Existence," Library of the Xth International Congress of Philosophy, Vol. I, August, 1948, pp. 353-354.

"Organic Unity and God," Iliff Review, Vol. V, No. 3, Autumn, 1948, pp. 98-102.

"Teleological Arguments," republished in Readings in Biological Science by Irving W. Knobloch, Appleton-Century-Crofts, 1948, pp. 407-416.

Review of The Principles of Moral Judgment by W. D. Lamont, Philosophic Abstracts, Vol. X, No. 29-30, Fall-Winter, 1948, p. 1.

Review of The Approach to Metaphysics by E. W. F. Tomlin, Philosophic Abstracts, Vol. XI, No. 31, Spring, 1949, p. 5.

Review of Time, Knowledge and the Nebulac by Martin Johnson, Philosophic Abstracts, Vol. XI, No. 31, Spring, 1949, p. 14.

Review of The Spirit of Chinese Philosophy by Fung Yu-lan, Philosophic Abstracts, Vol. XI, No. 31, Spring, 1949, pp. 32-33

Review of The Main Problems of Philosophy by Oswaldo Robles, Philosophic Abstracts, Vol. XI, No. 32, Summer, 1949, pp. 72-73.

Review of Power and Events, An Essay on Dynamics in Philosophy by A.P. Ushenko, Philosophic Abstracts, Vol. XI, No. 32, Summer, 1949, p. 78.

Review of The Gay Genius: The Life and Times of Su Tungpo by Lin Yutang, Philosophic Abstracts, Vol. XI, No. 32, Summer, 1949, pp. 80-81.

"Existence and Its Polarities," The Journal of Philosophy, Vol. XLVI, No. 20, Sept. 29, 1949, pp. 629-637.

Review of Man and the World: Practical Philosophy and Law of Nature by A. Thangal Kunju Musaliar, New Mexico Quarterly Review, Vol. XX, No. 1, Spring, 1950, pp. 109-111.

Review of Philosophy of Nature by Poritz Schlick, The Humanist, Vol. X, No. 2, April, 1950, pp. 82-83.

Oriental Philosophy Newsletter, No. 1 (mimeographed), May, 1950, pp. 1-4.

Review of The Nature-Nurture Controversy by Nicholas Pastore, The Humanist, Vol. X, No. 5, Oct., 1950, p. 221.

Oriental Philosophy Newsletter, No. 2 (mimeographed), Oct., 1950, pp. 1-4.

"Spiritualism, Materialism and Organicism," The Philosophical Quarterly (Amalner, India), Vol. XXIII, Nos. 3 & 4, Oct. 1950 and Jan. 1951, pp. 105-108.

Review of The Upanishads: A New Translation, Vol. I. by Swami Nikhilananda, Oriental Philosophy Newsletter, No. 2, Nov. 1950, p. 2.

Review of Indian Realism (Vol. IV. of A History of Indian Philosophy) by Surendranath Dasgupta, Oreintal Philosophy Newsletter, No. 2, Nov., 1950, p. 3.

Review of The Vedanta of Shankara: A Metaphysics of Value by Ram Pratap Singh, Oriental Philosophy Newsletter, No. 2, Nov., 1950, p. 3.

Review of Essays in Zen Buddhism by D. T. Suzuki, Oriental Philosophy Newsletter, No. 2, Nov. 1950, p. 3.

Review of Hindu Psychology: Its Meaning for the West by Swami Akhilananda, Oriental Philosophy Newsletter, No. 2, Nov. 1950, p. 3.

Review of Toward the Supreme Goal by Swami Varajananda, Oriental Philosophy Newsletter, No. 2, Nov., 1950, p. 4.

Review of Shri Mahavira Commemoration Volume I., 1948-49 edited by K. P. Jain, Oriental Philosophy Newsletter, No. 2, Nov. 1950, p. 4.

Review of Yasastikka and Indian Culture by K. K. Handiqui, Oriental Philosophy Newsletter, No. 2, Nov. 1950, p. 4.

"Oriental Philosophy," Review of Metaphysics, Vol. IV, No. 2, December, 1950, pp. 311-313.

"An Appreciation of Syadvad Logic," The Voice of Ahinsa, Vol. 1, No. 1, Jan. - Feb., 1951, pp. 15-16.

Review of Ethics and Society: An Appraisal of Social Ideals by Melvin Rader, Philosophic Abstracts, Vol. XIII, No. 39, Spring, 1951, p. 63.

Review of Process and Unreality: A Criticism of Method in Whitehead's Philosophy by Harry K. Wells, Philosophic Abstracts, Vol. XIII, No. 39, Spring, 1951, p. 73.

"Varieties of Humanism," The Standard, Vol. XXXVIII, No. 6, April, 1951, pp. 333-337.

"Jaina Logic and World Peace," The Voice of Ahinsa, Vol. I, No. 5, Sept.-Oct., 1951, p. 3.

Review of The Philosophy of Edmund Montgomery by Morris Keeton, The Humanist, Vol. XII, No. 2, March-April, 1952, p. 91.

Philosophy: An Introduction, John Wiley and Sons, N.Y., and Chapman and Hall, London, April, 1953.

Review of Religion in Chinese Garment by K. L. Richelet, Journal of Bible and Religion, July, 1953, p. 218.

"Organicism's Nine Types of Philosophy," Proceedings of the XIth International Congress of Philosophy, Vol. III, August 20-26, 1953, pp. 52-56.

Review of Origin of History as Metaphysics by Marjorie L. Burke, The Humanist, Vol. XIII, No. 5, Sept.-Oct., 1953, pp. 236-237.

Review of Many Mansions by Gina Ceriminara, The Humanist, Wol. XIII, No. 5, Sept-Oct., 1953, p. 238.

Review of Buddhism and Zenby Ruth McCandless and Nyogen Senzaki, Journal of Bible and Religion, January, 1954, p. 73.

Review of The Sacred Scriptures of the Japanese by Post Wheeler, Journal of Bible and Religion, January, 1954, p. 73.

"How Organiciam Defines Knowledge with Respect to Phenomenalism and Realism," Southwestern Philosophical Conference Newsletter, Spring, 1954, pp. 5-6.

Philosophy: An Introduction reproduced in sound records by the National Committee for Recording for the Blind (pp. 411 - XIV). Recordings released May, 1954.

Review of Great Systems of Yoga by Earnest Wood, Journal of Bible and Religion, Vol. XXII, July, 1954, pp. 217-218.

"Evolutionary Naturalism," Philosophy and Phenomenological Research, Vol. XV, No. 1, Sept., 1954, pp. 1-12.

Review of Dialectic: A Way Into and Within Philosophy by Gustav E. Mueller, Southwestern Philosophical Conference Newsletter, Fall, 1954, pp. 3-6.

Review of Humanism as the Next Step by Lloyd and Mary Morain, ETC, Review of General Semantics, Vol. XII, No. 1, Autumn, 1954, pp. 71-72.

Review of Religions of India by Louis Renou, Western Folklore, Vol. XIV, No. 3, 1955, pp. 227-228.

Review of Mysticism, Philosophy and Religion by Mohan Singh, Philosophy East and West, Vol. IV, No. 3, Oct., 1954, pp. 277-278.

Review of The Principal Upanishads edited by S. Radhakrishnan, Journal of Bible and Religion, Vol. XXIII, Jan., 1955, pp. 68-69.

Review of A Philosophy of the Real and the Possible by H. T. Costello, Philosophy and Phenomenological Research, Vol. XV, No. 3, March, 1955, p. 445.

Review of Buddhist Texts -- Through the Ages Edited by E. Conze, I. B. Horner, D. Snellgrove and A. Waley, Journal of Bible and Religion, Vol. XIII, April, 1955, p. 152.

"Jainism and Organicism," The Voice of Ahinsa, Vol. V, No. 8, August, 1955, pp. 235-236.

Review of God and Polarity: A Synthesis of Philosophics by Wilmon H. Sheldon, Philosophy and Phenomenological Reserach, Vol. XVI, No. 1, Sept. 1955, pp. 132-134.

"Philosophies of East-West Culture," The Voice of Ahinsa, Vol. V. No. 9, Sept. 155, p. 270.

"Meanings of Negation," The Voice of Ahinsa, Vol. VI, No. 1, January, 1956, pp. 12013.

"The Middle Way Reexamined," The Philosophical Quarterly (Amalner, India), Vol. XXIX, No. 1, April, 1956, pp. 17-21.

"Buddhist Aesthetics," The Journal of Aesthetics and Art Criticism, Vol. XVI, No. 2, Dec., 1957, pp. 249-252.

"The Organicist Argument Regarding Inference Beyond Experience," Review of Metaphysics, Vol. XI, No. 2, December, 1957, pp. 337-341.

Large sections of Philosophy: An Introduction (Item 132) translated into Hindi as part of Darsan Sastra Ko Mula Tattva (The Chief Principles of Philosophy) by A.B. Tiwari, Pushak Bhavan, Ragamandi, Agra, India, without the author's knowledge. A Second Edition appeared in 1959 similarly. A third Edition, with further modifications, was to appear in 1963.

"Does Seven-Fold Predication Equal Four-Cornered Negation Reversed?" Philosophy East and West, Vol. XII, Nos. 3 and 4, Oct. 1957-Jan. 1958, pp. 127-130. Revised.

Lao Tzu's Tao Teh King, Frederick Ungar Publishing Co., N.Y., N.Y., May, 1958, pp. 127. (Two editions: Cloth and Paperback.)

Philosophy of the Buddha, Rider and Co., London, June, 1958, pp. 175.

"Organitic Dialectic," Philosophy and Phenomenological Research, Vol. XVIII, No. 4, June, 1958, pp. 541-543.

Exerpt from Philosophy: An Introduction, pp. 159-161, republished in Shilry Ullman Weedon's College Remedial Reader (Exercizes in Standard Textbook Reading), pp. 201-213. Published by G. P. Putnams Sons, N.Y., June, 1958.

"Aesthetic Experience and Moral Experience," The Journal of Philosophy, Vol. LV, No. 20, Sept. 25, 1958, pp. 837-846.

What Makes Acts Right? The Christopher Publishing House, Boston, October, 1958, pp. 207.

"Does Seven-Fold Predication Equal Four-Cornered Negation Reversed?" The Voice of Ahinsa, Vol. XIII, No. 11, Nov. 1958, pp. 371-373. (A preliminary draft of Item 158 above, recalled after submission, but kept and published by the editor.

"Introduction" (pp. vi-ix) to Lambdoma, or Mathematics, Music, Mythology and Metaphysics by Mohan Singh and Julius Schwabe, Academy of Spiritual Culture, Amritsar, Indian, 1958.

Philosophy of the Buddha, Harper and Brothers, N.Y., N.Y. March, 1959, (Republication, with errors corrected, by Harpers, original contractors.)

"The New Philosophy Names Its Enemies," New Mexico Quarterly, Vol. XXIX, No. 2, Summer, 1959, pp. 223-234.

"The New Conservatism," The Colorado Quarterly, Vol. VIII, No. 2, Autumn, 1959, pp. 131-141.

"Matter and Spirit: Implications of the Organicist View," Philosophy and Phenomenological Research, Vol. XX, No. 1, Sept., 1959, pp. 103-108.

Review if The Aesthetic Experience According to Abhinavagupta by Raniero Gnoli, Journal of Aesthetics and Art Criticism, Vol. XVIII, No. 2, December, 1959, pp. 270-271.

Logic for Beginners, Student Outlines Company, Boston, May, 1960, pp. 95 + viii.

Review of Studies in the Middle Way, Third Edition by Christmas Humphreys, The Personalist, Vol. 41, No. 4, Autumn, 1960, pp. 515-516.

Review of The Buddha's Philosophy by G. F. Allen, The Personalist, Vol. 41, No. 4, Autumn, 1960, p. 516.

Review of Zen and Shinto by Chikao Fujisawa, The Personalist, Vol. 41, No. 4, Autumn, October, 1960, p. 517.

Review of Revelation and Reason in Advaita Vedanta by K. S. Murty, The Personalist, Vol. 41, No. 4, Autumn, October, 1960, p. 522.

Review of Zen and Japanese Culture by D. T. Suzuki, Journal of Aesthetics and Art Criticism, Vol. XIX, No. 2, Winter, 1960, pp. 238-239.

Types of Intuition (Monograph), University of New Mexico Press, Albuquerque, New Mexico, February 15, 1961, pp. 58 + 4.

"Polarity: A Descriptive Hypothesis," Philosophy and Phenomenological Research, Vol. XXI, No. 3, March, 1961, pp. 347-360.

Review of Japanese Buddhism by Charles Eliot, The Personalist, Vol. XLII, No. 2, Spring, April, 1961, p. 263.

Review of Zen Comes West: The Present and Future of Zen Buddhism in Britain by Christmas Humphreys, The Personalist, Vol. XLII, No. 2, Spring, April, 1961, p. 263-264.

Review of The Concept of Man: A Study in Comparative Philosophy by S. Radhakrishnan and P. T. Raju, The Journal of Philosophy, Vol. LVIII, No. 11, May 25, 1961, pp. 300-303.

Yoga: Union with the Ultimate, A New Version of the Ancient Yoga Sutras of Patanjali, Frederick Ungar Publishing Co., N.Y., N.Y., June, 1961, pp. 162. (Two editions: Cloth and Paper back)

Review of Indian Aesthetics, Second Edition (Comparative Aesthetics, Vol. I) by K. C. Pandey, Journal of Aesthetics and Art Criticism, Vol. XIX, No. 2, Summer, 1961, pp. 471-472.

"The New Conservatism," The Humanist, Vol. 21, No. 5, Sept.-Oct., 1961, pp. 292-300. (Republication of Item 169, abbreviated.)

Review of Systematic Pluralism: A Study in Methaphysics by H.A. Myers Philosophy and Phenomenological Research, Vol. XXII, No. 2, December, 1961, pp 275-276.

"Meanings of Negation," Philosophy and Phenomenological Research, Vol. XXII, No. 2, December, 1961, pp. 179-184.

Republication of three tables of valid forms of syllogisms from my Logic For Beginners (Item 172) (pp. 64, 65, 66, first two rows form each) in Appendix, pp. 325-328, of Robert J. Kreyche's Logic for Undergraduates, Revised Edition, Holt, Reinhart and Winston, N.Y., 1961.

"The Responsible Brotherhood." (Letter to the editor), Saturday Review, Vol. 44, Dec. 2, 1961, pp. 28, 63.

Review of Forest Academy Lectures on Yoga by Swami Chidananda, Philosophy East and West, Vol. XI, No. 4, January, 1962, pp. 270-271.

Review of Revelation and Reason in Advaita Vedanta by K. S. Murty, The Personalist, Vol. 41, No. 4, Autumn, October, 1960, p. 522.

Review of Zen and Japanese Culture by D. T. Suzuki, Journal of Aesthetics and Art Criticism, Vol. XIX, No. 2, Winter, 1960, pp. 238-239.

Types of Intuition (Monograph), University of New Mexico Press, Albuquerque, New Mexico, February 15, 1961, pp. 58 + 4.

"Polarity: A Descriptive Hypothesis," Philosophy and Phenomenological Research, Vol. XXI, No. 3, March, 1961, pp. 347-360.

Review of Japanese Buddhism by Charles Eliot, The Personalist, Vol. XLII, No. 2, Spring, April, 1961, p. 263.

Review of Zen Comes West: The Present and Future of Zen Buddhism in Britain by Christmas Humphreys, The Personalist, Vol. XLII, No. 2, Spring, April, 1961, p. 263-264.

Review of The Concept of Man: A Study in Comparative Philosophy by S. Radhakrishnan and P. T. Raju, The Journal of Philosophy, Vol. LVIII, No. 11, May 25, 1961, pp. 300-303.

Yoga: Union with the Ultimate, A New Version of the Ancient Yoga Sutras of Patanjali, Frederick Ungar Publishing Co., N.Y., N.Y., June, 1961, pp. 162. (Two editions: Cloth and Paper back)

Review of Indian Aesthetics, Second Edition (Comparative Aesthetics, Vol. I) by K. C. Pandey, Journal of Aesthetics and Art Criticism, Vol. XIX, No. 2, Summer, 1961, pp. 471-472.

"The New Conservatism," The Humanist, Vol. 21, No. 5, Sept.-Oct., 1961, pp. 292-300. (Republication of Item 169, abbreviated.)

Review of Systematic Pluralism: A Study in Methaphysics by H.A. Myers Philosophy and Phenomenological Research, Vol. XXII, No. 2, December, 1961, pp 275-276.

"Meanings of Negation," Philosophy and Phenomenological Research, Vol. XXII, No. 2, December, 1961, pp. 179-184.

Republication of three tables of valid forms of syllogisms from my Logic For Beginners (Item 172) (pp. 64, 65, 66, first two rows form each) in Appendix, pp. 325-328, of Robert J. Kreyche's Logic for Undergraduates, Revised Edition, Holt, Reinhart and Winston, N.Y., 1961.

"The Responsible Brotherhood." (Letter to the editor), Saturday Review, Vol. 44, Dec. 2, 1961, pp. 28, 63.

Review of Forest Academy Lectures on Yoga by Swami Chidananda, Philosophy East and West, Vol. XI, No. 4, January, 1962, pp. 270-271.

"What is Self? The Organicist Answer." Darshana: An International Quarterly, Vol. II, No. 1, January, 1962, pp. 9-35.

Philosophy of the Buddha, Collier Books, paperback Division of Crowell-Collier Publishing Co., N.Y., February 15, 1962, pp. 157. Republication of Item 167.)

Directory of American Philosophers, I, 1962-1963 (mimeographed), which I both edited and published, Albuquerque, N.M., March, 1962, pp. 325.

Nonhaiku. Haiku. Organhaiku. (poem) Literature East and West, Vol, VI, Nos. 2 and 3, Spring and Summer, 1962, p. 72

"Theories of Polarity," Darshana: An International Quarterly, Vol. II, No. 4, October, 1962, pp. 1-23.

"Teleological Arguments," republished in Readings in Biological Science, Revised Edition, by Irving W. Knobloch, Appleton-Century-Crofts, N.Y. (Republication of Item 102.)

"Vedantic Contributions to Organicism," The Philosophical Quarterly (Smalner, India), Vol. XXXIV, No. 4, January, 1963, pp. 243-247.

Report on "Philosophy in India" appearing as part of the report of the American Philosophical Association Committee on International Cultural Cooperation, Proceedings of the American Philosophical Association, 1962-63, pp. 77-80. (Published in December, 1963.)

"More About Four-Cornered Negation," The Voice of Ahimsa, Vol. XIII, No. 12, Dec., 1963, pp. 285-288.

"Introduction to the Bhagavad Gita," Bharati (Bulletin of the College of Indology, Banaras Hindu University), No. 6, Part II, 1962-63, pp. 81-101. (Published in 1964.)

Directory of American Philosophers II, 1964-1965, published by A.J. Bahm, Albuquerque, January, 1964. pp. 397.

"Was Gautama a Buddhist?" Bulletin of the Ramakrishna Mission Institute of Culture, Calcutta, Vol. XV, No. 1, January, 1964, pp. 9-15.

"'Absolutism' versus 'Relativism' in Ethics," Journal of the Philosophical Association, Amravati, India, Vol. IX, Nos. 33-34, January-April, 1964, pp. 39-43.

"Interpreting the Gita," Indian Journal of Philosophic Studies, Hyderabad, Vol. I., No. 1, February, 1964, pp. 21-25.

"Inconsistencies in Naming Patterns in the Bhagavad Gita," Prajna, Banaras Hindu University Journal, Vol. IX, No. 2, March, 1964, pp. 75-78.

"Basic Conditions of Group Life, " Navras, Aurangabad, India, Vol. 1, No. 2, March, 1964, pp. 9-17.

Philosophy, An Introduction, Asia Publishing House, Bombay, March, 1964. pp. 441 + 14. Republication of item 123. Subsidized by U.S.I.S. for low-cost distribution to Indian students.

"What is Self-Obligation?" The Pakistan Philosophical Journal, Lahore, Vol. III, No. 4, April, 1964, pp. 33-39.

"Absolutism versus Relativism in Ethics," New World, Taipei, Taiwan, Vol. 3, No. 3, May, 1964, pp. 6-7. Chinese translation of item 202.

"Philosophic Thought in America," Bulletin of the Ramakrishna Mission Institute of Culture, Calcutta, Vol. XV, No. V., May, 1964, pp. 165-170.

"Godless Religion," Playboy, Vol. 11, No. 6, June, 1964, p. 58. Letter to the Editor.

Review of The Philosophy of Culture: An Introduction to Creative Humanism, by N.K. Devaraja, The Humanist, Vol. 24, No. 4, July-August, 1964, p. 127.

Review of Metaphysics by Richard Taylor, Philosophy and Phenomenological Research, Vol. XXV, No. 1, Sept., 1964, pp. 1947-1948.

"Radhakrishanan: From an American Perspective," Dr. Radhakrishanan Souvinir Volume in honor of his 75th Birthday. Edited and published by J.P. Atreya, Moradabad, India, Sept. 6, 1965, pp. 31-33.

The World's Living Religions, Dell Publishing Co., N.Y. Laurel Edition paperback, October 20, 1964. pp. 384.

"Buddhism and Christianity," Prajmm, Banaras Hindu University Journal, Vol. X, No. 1, Nov. 14, 1964, pp. 75-85.

"Map of Religions," The Christian Science Monitor, Dec. 21, 1964, p. 12. Letter to the Editor.

"Theories of Conscience," Ethics, Vol. LXXV, No. 2, January, 1965, pp. 128-131.

"Meanings of Intelligence," Philosophical Studies, Maynooth, Ireland, Vol. XIV, 1965, pp. 151-155.

"Meanings of Negation," New World, Taipei, Taiwan, Vol. 3, No. 1, 1965, Chinese translation of item 187.

Review of The Philosophy of Matter in an Atomic Era: A New Approach to the Philosophy of Science by Ruth Reyna, The Personalist, Vol. 46, No. 1, Spring, 1965, pp. 140-141.

"Some Principles for Choosing," Philosophy Today, Vol. XI, No. 1/4, Spring, 1965, pp. 52-60.

"Some Principles for Choosing," Philosophy Today, Vol. XI, No. 1/4, Spring, 1965, pp. 52-60.

Logic For Beginners, Bureau of Tamil Publications, Madras, March 1965. pp. 117 + 6. Tamil translation of item 172 by K. R. Appalchari, Subsidized by the U.S.I.S. for low-cost distribution to Indian students.

Yoga for Business Executives and Professional People, The Citadel Press, N.Y., June, 1965. pp. 416.

"The Freedom-Determinism Controversy," The Pakistan Philosophical Journal, Vol. IX, No. 3, Jan., 1965, pp. 48-55.

"Four Kinds of Intrinsic Value," Darshana International, Vol. V, No. 3, July, 1965, pp. 22-31.

"Self as Value," Darshana International, Vol. V., No. 4, Oct., 1965. pp. 34-39.

Review of Modern Indian Thought by V.S. Maravane, The Personalist, Vol. 46, No. 4, Autumn, 1965, pp. 545-547.

"Comparative Aestheitcs," The Journal of Aesthetics and Art Criticism, Fall, 1965, Vol. XXIX, No. 1, pp. 48-55.

"Types of Intuition," Psychics International, Moradabad, India, Vol. 1, No. 4, pp. 33-69.

"Grace," The Iliff Review, Vol. XXII, No. 1, Winter, 1965, pp. 21-22.

"Non-Reductionistic Existentialism," The Monist, Vol. 50, No. 1, January 1966, pp. 145-156.

"Are the New Conservatives Irresponsible?" The Midwest Quarterly, Vol. VII, No. 2, Winter, 1966, pp. 105-121.

"Self as Multi-Dimensional," Research Journal of Philosophy and the Social Sciences, Meerut, India, Vol. II, No. 2, 1966, pp. 1-8.

Directory of American Philosophers III, 1966-67, February, 1966, pp. 514. Published by the author, Albuquerque, N.M.

An abstract of "Nonreductionistic Existentialism," The Review of Metaphysics, Vol. XIX, No. 4, June, 1966, p. 854.

"Who Are the New Conservatives?" The Journal of Thought, Vol. I, No. 3, July, 1966, pp. 8-15.

Review of Oriental Aesthetics by Thomas Munro, Journal of Aesthetics and Art Criticism, Vol. XXIV, No. 4, Summer, 1966, pp. 585-593.

"Time for Megalopolitan Philosophy?" The Philosophy Newsletter, No. 2, Fall, 1966, pp. 6-7.

"Is Existentialism Itself Phoney?" The Trenton Review, Inaugural Issue, Fall, 1966, pp. 53-89.

Yoga for Business Executives, Stanley Paul and Co., London, Jan. 16, 1967. Page 416.

Philosophy, An Introduction, Vol. I. pp. 330. Bureau of Tamil Publications, Madras, April, 1967. Tamil translation of half of item 132.

"Organicism -- The Philosophy of Interdependence," International Philosophical Quarterly, Vol. VII. No. 2, June, 1967. pp. 251-284.

Abstract of "Organicism: The Philosophy of Interdependence," International Philosophical Quarterly, Vol. VII, No. 2, June, 1967, pp. 251-284.

Abstract of "Organicism: The Philosophy of Interdependence," The Review of Metaphysics, Vol. XXI, No. 1, Sept., 1967, p. 178.

"New Left Philosophies," The Journal of Thought, Vol. 2, No. 4, Nov., 1967, pp. 13-18.

Comment on Garside's "Religious Experience and Psychoanalysis," in Newsletter-Review of the R.M. Bucke Memorial Society for the Study of Religious Experience, Vol. II, No. 2, Autumn, 1967, p. 34.

Comment on Yu's "The Buddhist View of Self," in Newsletter-Review of the R. M. Bucke Memorial Society for the study of Religious Experience, Vol. II. No. 2, Autumn, 1967, p. 36.

"Why crises Recur," The Personalist, Vol. XLIX, No. 1, Winter, 1

"Organicism and the World as Purposed," The Pacific Philosophy Forum, Vol. VI. No. 2, Dec., 1967, pp. 63-74.

Review of Action and Purposeby, Richard Taylor, in Philosophy and Phenomenological Research, Vol. XXVIII, No. 2, Dec., 1967, pp. 290-292.

Review of Metaphysics of Natural Complexesby Justus Buchler, in Philosophy and Phenomenological Research, Vol. XXVIII, No. 2, Dec., 1967, pp. 292-293.

Review of Cosmic Humanism by Oliver L. Reiser, In Religious Humanism, Vol. II. No. 1, Winter, 1968, p. 46.

Directory of American Philosophers IV, 1968-69, Feb., 1968, pp. 439. Published by the author, Albuquerque.

BOOKS BY ARCHIE J. BAHM

PHILOSOPHY, AN INTRODUCTION
John Wiley and Sons, N.Y., 1953, o.p.
Asia Publishing House, Bombay, London, N.Y., 1964.
Tamil translation, Bureau of Tamil Publications, Madras, 1967.
Bengali translation, Sinha Publishing Co., Calcutta, in preparation.
Hindi translation, Rajhamal Prakashan, Delhi, Contract offered.

PHILOSOPHY OF THE BUDDHA
Harber and Brothers, N.Y., 1958, o.p.
Rider and Co., London, 1958.
Collier Books, N.Y., paperback, 1962, o.p.
Capricorn Books, paperback, 1969.

WHAT MAKES ACTS RIGHT?
Christopher Publishing House, Boston, 1958.

TAO TEH KING by LAO TZU
Frederick Ungar Publishing Co., N.Y., 1958.

LOGIC FOR BEGINNERS
College Outlines Co., Boston, paperback, 1960.
Tamil translation, Bureau of Tamil Publications, Madras, 1965.

YOGA: UNION WITH THE ULTIMATE (Patanjali's Yoga Sutras)
Frederick Ungar Publishing Co., N.Y., 1961.

TYPES OF INTUITION
University of New Mexico Press, Albuquerque, paper 1961

THE WORLD'S LIVING RELIGIONS
Bell Publishing Co., N.Y., Laurel Edition paperback, 1964.
Swedish translation, Wahlstrom and Widstrand, Stockholm, under contract.
Japanese translation. Ryozo Kuwahara, Osaka, in preparation.

YOGA FOR BUSINESS EXECUTIVES
Citadel Press, N.Y., 1965, o.p.
Stanley Paul and Co., London, 1967.
Information, Inc., N.Y. (Sales only, 1967)

DIRECTORY OF AMERICAN PHILOSOPHERS I, 1962-63, 1963
DIRECTORY OF AMERICAN PHILOSOPHERS II, 1964-65, 1964
DIRECTORY OF AMERICAN PHILOSOPHERS III, 1966-67, 1966
DIRECTORY OF AMERICAN PHILOSOPHERS IV, 1968-69, in preparation.

Ivan L. Little

"The Existential Dimension of Values," Proceedings of the Tri-State Faculty Conference on Moral and Spiritual Values in Higher Education, 1955.

"Some Problems in the Sociology of Knowledge," Proceedings of the Southwestern Sociological Society, 1956.

"Toward an Intercultural Understanding of Values," Proceedings of the Tri-State Faculty Conference on Moral and Spiritual Values in Higher Education, 1957.

Three Major Epistemic Types: The Emergence and Significance of the Sociological Theory of Knowledge, Rodgers Litho, Inc., Lubbock, Texas, 1961.

"A Refutation of Stace's Refutation of Moore's'Refutation of Idealism'," Proceedings of the New Mexico and West Texas Philosophical Society, 1965.

"A Non-Mystic Looks at Psychedelic Mysticism," Proceedings of the New Mexico West Texas Philosophical Society, 1967. Also Editor for 1967.

"1984 May Not Happen," Proceedings of the New Mexico-West Texas Philosophical Society (to be published for 1968.) Also Editor for 1968.

Thomas Fred. Storer

"The Logic of Value Imperatives," Philosophy of Science, Vol. 13, #1, January 1946.

discussed by E. W. Hall in What Is Value, (p. 143-148, passim) Routledge and Kegan Paul, London, 1952.

"The Philosophical Relevance of a 'Behavioristic Semiotic'," Philosophy of Science, Vol. 15, #3, October, 1948.
Replied to by Charles Morris in the same number.

Three Reviews in the Journal of Symbolic Logic, April, 1949.

"On Communication," Philosophical Studies, Vol. 1, #3, April, 1950.

"On Defining 'Soluble'," Analysis, Vol. II, 1951
Replied to by Bergmann, Analysis, Vol. 12, 1952.

"On Defining 'Soluble'--Reply to Bergmann," Analysis, Vol. 14, 1954.
Reviewed, Journal of Symbolic Logic, January, 1959.

"Linguistic Isomorphism," Philosophy of Science, Vol. 19, #1, January, 1952.

"An Analysis of Logical Positivism," Methods, p. 245-274, 1951.

"A Note on Empiricism," Philosophical Studies, Vol. 4, #5, October, 1953.
Replied to by Hochberg, Philosophical Studies, Vol. 5, #2.

Replied to by Kauf, Philosophical Studies, Vol. 5, #4.

"Comments of Professor Plochmann's: Is Quantity Prior to Quality?" Philosophy of Science, Vol. 21, #1, January, 1954.

"The Notion of Tautology," Philosophical Studies, V, #5, October, 1954. Reply by Resher, Philosophical Studies, VI, #4, June, 1955.

Reply by Christensen, Philosophical Studies, VIII, #1,2, January-February, 1957.

Charles S. Hardwick

"Doing Zen and Doing Philosophy," Philosophy East and West, October, 1963.

Zudhi Faruki - no information available.

Bruce Waters

"Physical and Psycho-Physical Causation in the Light of Recent Philosophical Discussion" The Ohio State University Press, 1936 Reprinted from Abstracts of Dr's Dissertation #18.

The Journal of Philosophy Vol. XXXV #4, "Positivistic and Activistic Theories of Causation," Feb. 17, 1938.

"Particulars, Universals and Verification" Reprinted from"Philosophy of Science" Vol. 7, #1, January, 1940.

"The Past and the Historical Past" Reprinted from The Journal of Philosophy, Vol. LII. No. 10, May 12, 1955

The Journal of Philosophy, "The Past and the Historical Past" Published by Journal of Philosophy, Inc., May 12, 1955

"Historical Narrative" in The Southern Journal of Philosophy, Vol. 5, No. 2 Fall, 1967. Published by Philosophy Dept., Memphis State University, Memphis, Tennessee.

James F. Donaldson

"The Origins of Hegel's Dialectic" Laval Theologique et Philosophique (in press) Quebec, Canada

DEPARTMENT OF PHYSICS

AN EVALUATION OF THE PAST DEVELOPMENT

AND

A PROPOSAL FOR THE FUTURE DEVELOPMENT

OF THE

DEPARTMENT OF PHYSICS

A Report

to the

President

of

Texas Technological College

Submitted October, 1968

PREFACE

This report has been prepared by the faculty of the Department of Physics at the request of Dr. Grover E. Murray, President, Texas Technological College. Preparation of the report proved to be valuable since it stimulated a review and evaluation of the recent development of the department, pointed up strengths and weaknesses in the departmental programs, and provided a basis for thinking about the future. Solutions have not been found to all of the problems which the department expects to face in the next ten years, but many of these have become better defined and some points of attack are now obvious.

Although the report is long, summary sections have been included in each part. It is suggested that the casual reader pay particular attention to the material contained in the Introduction, pages 1-2; Part I, A, pages 3-4; Part II, A, pages 15-16; and Part III, C, pages 42-44. Detailed data, evaluations, projections, and plans contribute to the remainder of the report.

TABLE OF CONTENTS

INTRODUCTION

This report contains (1) a summary of the departmental activity for the last forty-two years, (2) a statement of the current status of the department, and (3) a proposal for the development of the Physics Department over the next ten years. The primary emphasis of the report is in Part III, with Parts I and II providing the background for the projected growth. Part I emphasizes the development within the past five years.

The Physics Department considers its mission to be teaching and research in the broadest sense. Of course, the teaching of undergraduate students is well-defined by the usual course offerings and enrollments. There are some course offerings in the graduate program; however, it is accepted that the backbone of graduate education is student research. The teaching mission includes the extension area, possibly through institute programs for public school teachers.

The Physics Department in many respects must be considered a young department. Of the thirteen full-time faculty (September 1, 1968), one is new, four have been here for three years or less, eight for six years or less, and eleven for nine years or less. The department is establishing its research programs while maintaining a balance in teaching. Some faculty are developing national and international reputations in their fields. Generally, the faculty have had enthusiasm for their programs and for the overall development of the Physics Department.

However, the faculty have at times been disappointed in the financial support which has been granted by their institution. This is in part generated by the accelerated rate of development of their own programs and also by the expanded support and development in Physics Departments at other comparable institutions.

Individual faculty have used the "bootstrap" approach for their own programs and have had some successes. However, the development of the departmental support facilities has not kept pace. The faculty senses that their own programs may not develop further unless the support for the overall department improves. The following facilities are among those which are inadequate with the current capacity of the department: lecture and demonstration facilities for survey courses, laboratory space and equipment for the intermediate and senior experimental courses, research space for equipment and graduate student work, machine shop, electronic shop, glass shop, reading room space and volumes, supporting technical and secretarial staff. In addition, many pieces of equipment are needed which are beyond the support of the programs of individual faculty.

This report is written from the point of view that the Physics Department has made good pedagogical use of the facilities available to it. However, if Texas Technological College is going to educate its students of physics in a manner competitive with that of comparable institutions, then considerable additional support will be required. Parts I and II of this report demonstrate justification for this additional support and what benefits might be expected from current performance. Then Part III is a proposed plan for development and expansion in a manner which should be sound with respect to the capacity of the physics faculty and this institution in the next ten years.

PART I

HISTORICAL SUMMARY

A. General

The Department of Physics first offered courses in 1926. The first undergraduate degree was awarded to a physics major in 1928 and the first Master of Science was awarded in 1932. The department reached a hallmark in awarding its first Ph.D. in August, 1968.

Professor E. F. George served as the first department head from 1926 to 1942. In 1943 Professor C. C. Schmidt became head and served until 1958. The present chairman, Professor H. C. Thomas, was appointed in 1958. Appendix I contains a listing, by year, of all faculty in the department since its inception.

The Physics Department offers the following degrees, with year of program approval and total degrees awarded in parenthesis:

Bachelor of Science	(1926)	(108)
Bachelor of Engineering Physics	(1957)	(54)
Master of Science	(1930)	(47)
Doctor of Philosophy	(1964)	(1)

The major emphases in the department until 1958 were the preparation of undergraduate physics majors and the "service teaching" of the survey courses in general physics. Despite the inability of the department to recruit and retain highly qualified staff throughout these years,

especially after 1945, a number of well-trained students have been graduated with the B.S. degree. Many of these graduates have continued their education at reputable graduate schools and, with few exceptions, have performed creditably.

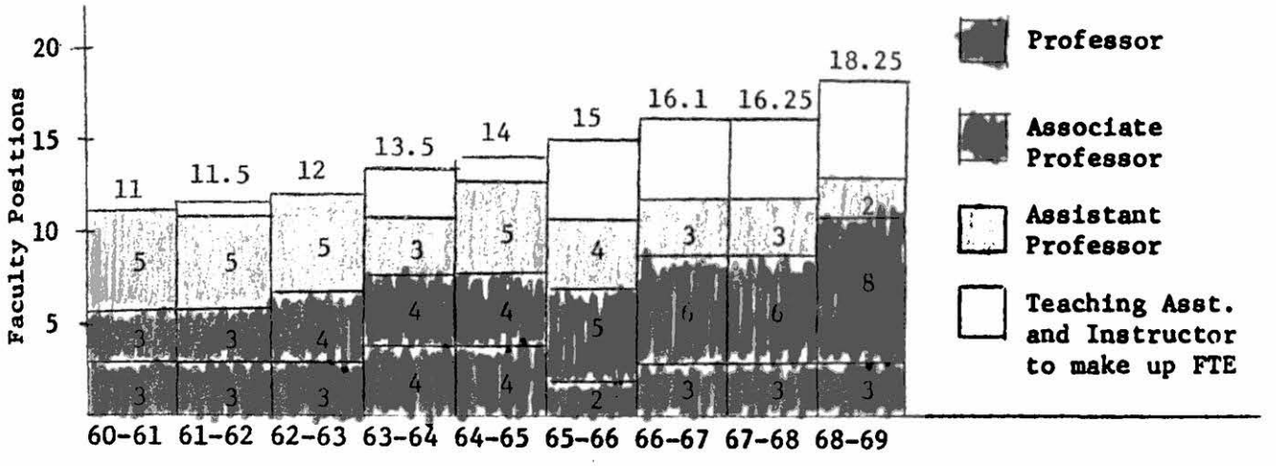
In 1958 the institution undertook a program of strengthening graduate education in physics with the goal of developing a Ph.D. program. In 1964 the Ph.D. degree was officially approved. There were seventeen graduate students and $6,850.00 available for the program from sources other than state-appropriated funds. Since initiation of the program, the major tasks of the department have been the recruiting of a competent graduate faculty and the development of research facilities. The various fellowship programs of the federal government, which were administered by this institution, contributed substantially to the growth of the graduate program.

B. Recent Development of the Department of Physics

1. Faculty

Table 1 summarizes the faculty strength by rank over the last nine years. Currently (1968-69) there are thirteen full-time faculty with the rank of assistant professor and above; the full-time teaching equivalent is 18.25. One point, evident from Table 1, is that the departmental size has shown a growth of 36% in FTE and 18% in the professional ranks since 1963 (six years). Eleven of the thirteen current faculty have the Ph.D. Note, that of the current faculty, only three were at Texas Tech prior to the fall of 1960.

TABLE 1
Breakdown by Rank of Physics Faculty

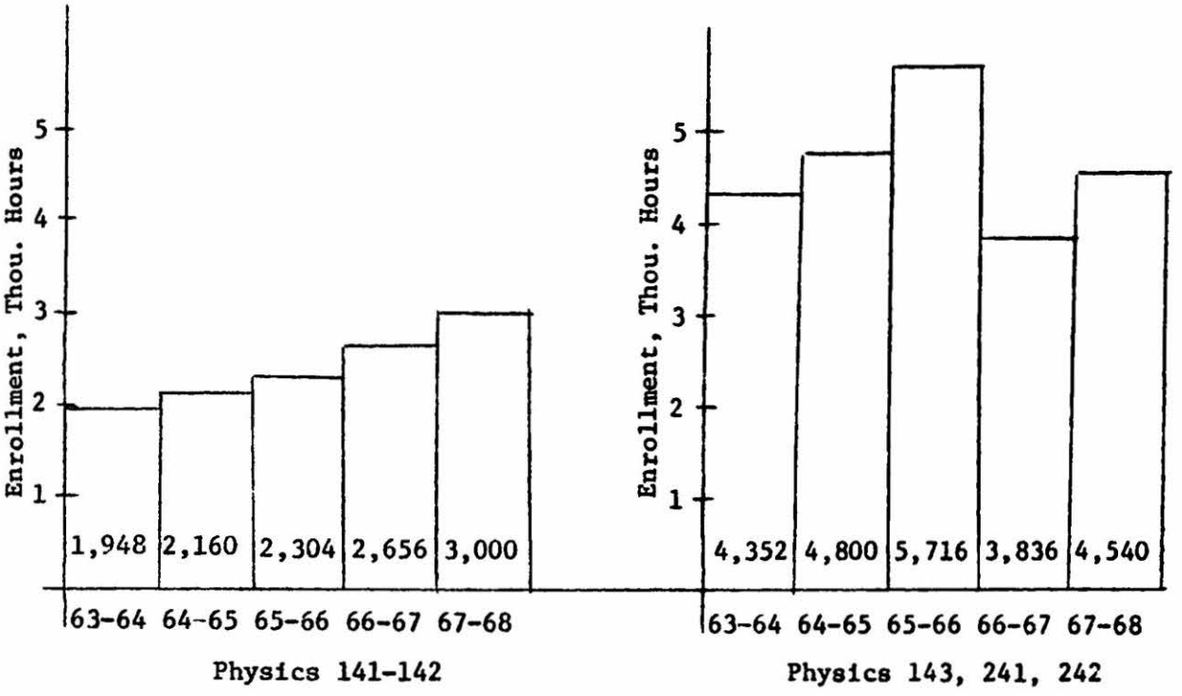


2. Survey Instruction (General Physics)

For several years the Physics Department has offered two series of survey courses: (1) for engineering students, physics majors, and some other science majors, Physics 143, 241, (242); and (2) for primarily non-technical students, i.e., pre-meds, architects, zoology, business students, and a very few education majors, Physics 141,142. The engineering enrollment has declined from its peak level in the late 1950's, but the non-technical course has shown a substantial increase in enrollment in the last five years. These enrollments are summarized in Table 2. Additional data may be found in Appendix V.

Note that the Physics 143, 241, 242 sequence suffered a drop in enrollment during 1966-67. This occurred because (1) engineering students were advised to delay one semester in starting their physics courses, and (2) Physics 242 ceased to be a required course for all engineering students.

TABLE 2
Enrollment for Full Years in Survey Physics Courses

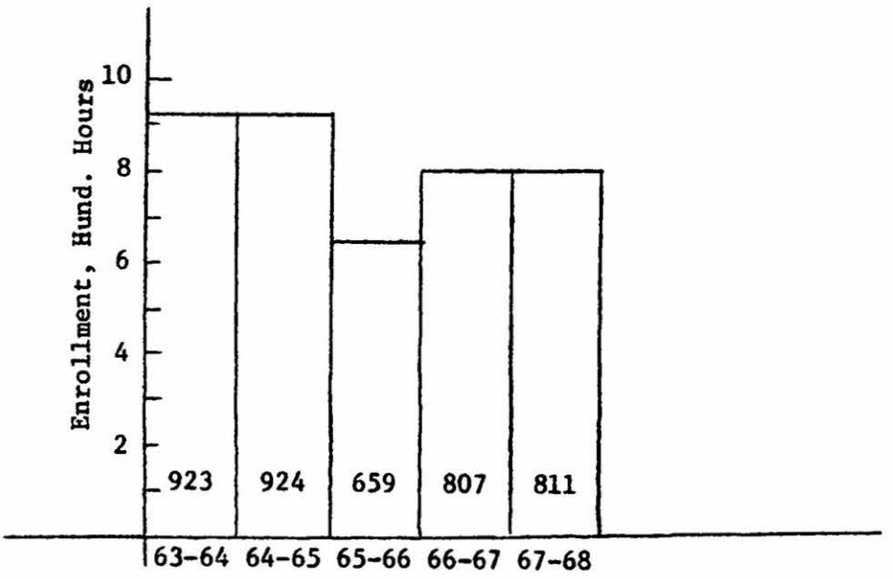


3. Undergraduate Education (Physics Majors)

The Physics Department has generally had a reputation in the physics community of providing sound training for its undergraduate physics majors. Several of these have pursued successful graduate careers at institutions with well-established Ph.D. programs.

Table 3 summarizes the undergraduate enrollment in physics courses by credit hour over the past five years. (This table reflects enrollment of all undergraduates exclusive of those in the survey courses.) There appears to be a regular trend in the annual enrollments except for the unexplained drop (other than fewer majors) during 1965-66. The general trend has been to slightly lower enrollment.

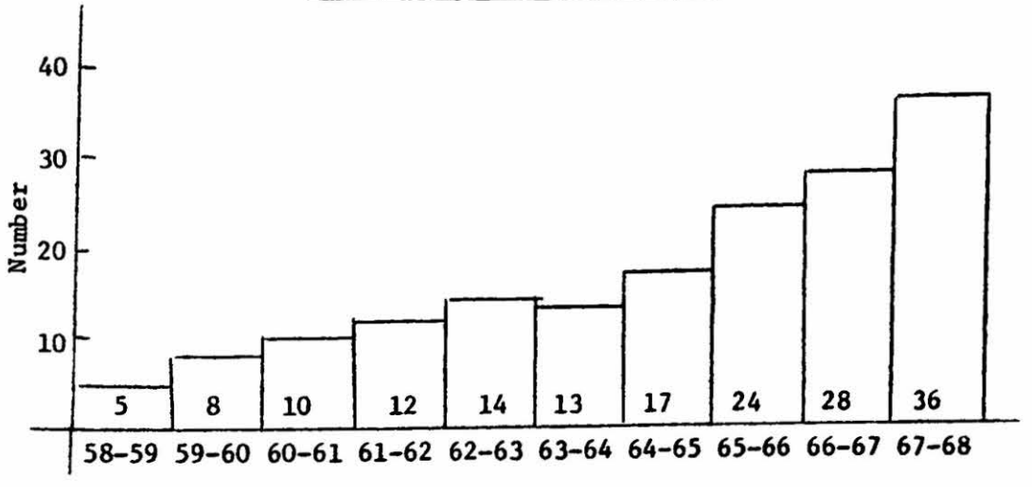
TABLE 3
Enrollment for Full Years in Upper Division,
Undergraduate Physics Courses



4. Graduate Education

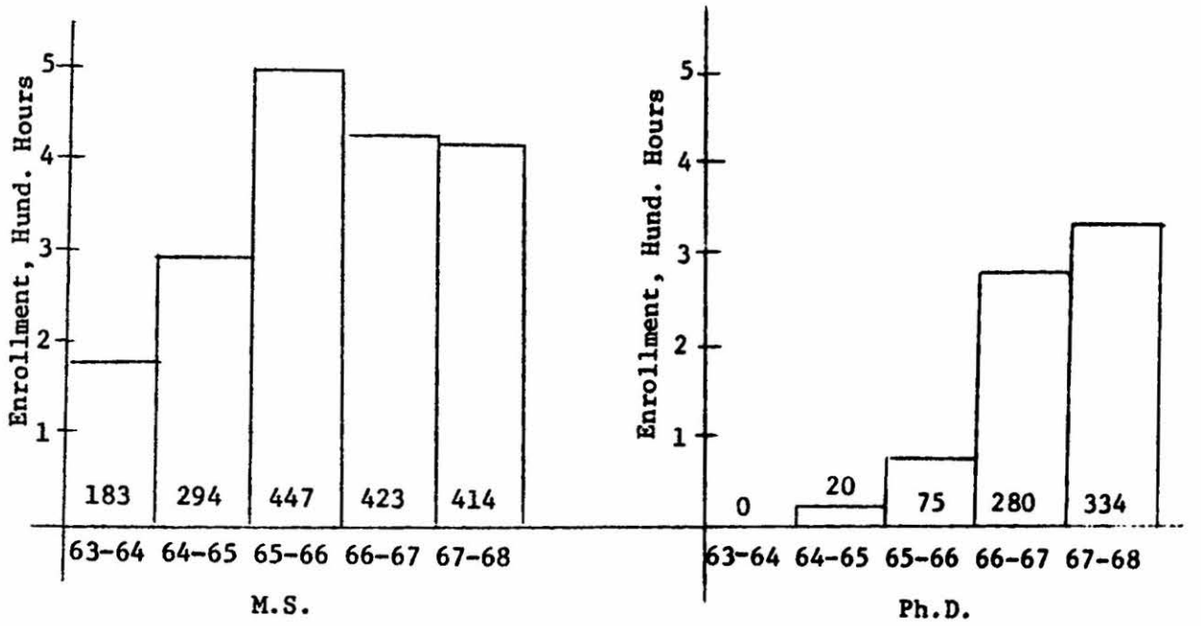
The most remarkable growth in the Physics Department has been in the area of graduate education. Table 4 lists the number of

TABLE 4
Full-Time Graduate Students



graduate students by academic year, and Table 5 shows the enrollments in physics by credit hour for students in the M.S. and Ph.D. programs for each of the last five years. Only within the past year or two has the number of Ph.D. credit hours reflected the growth of the graduate program.

TABLE 5
M.S. and Ph.D. Enrollments for Full Year



For any new graduate program, a department has limited selectivity with respect to the quality, aptitude, background, and motivation of the initial students. The academic mortality rate will be high. Our experience has been no exception. However, there is a core of good students. They are working hard and will eventually complete the Ph.D. program. When compared with comparable physics

departments, we have been quite successful in recruiting quality students, although the total number of students may not be as large. Additional data may be found in Appendix III.

The growth of any graduate program requires a number of stipends for the students. The usual methods of support are (1) teaching assistantships, (2) fellowships, and (3) research assistantships. Early in the development of the physics graduate program, research assistantships were non-existent and the number of teaching assistantships was limited by the teaching equivalent in the department. The Physics Department received much needed support from the Federal fellowship programs administered by this institution. In addition to providing the stipends for students, the cost of education supplements contributed an initial source for research funds (see Table 8).

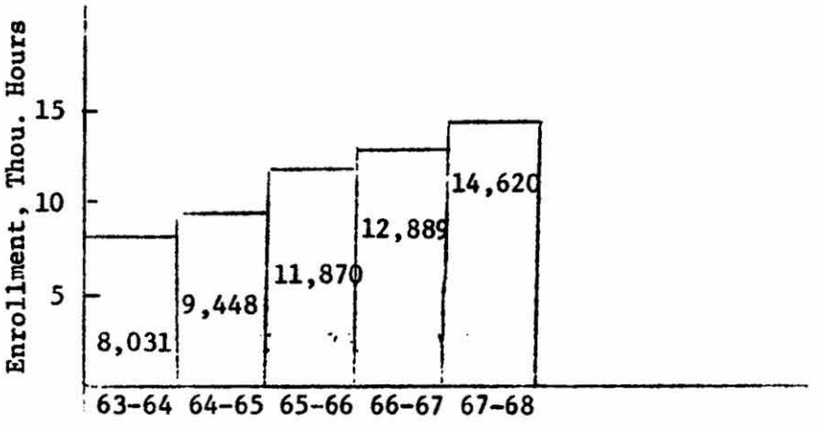
5. Total Effective Enrollment

Graduate education is well known to be more expensive than undergraduate education. This is reflected in the formula method of appropriation developed by the Coordinating Board. These formulas give significant leverage to graduate enrollments.

Table 6 gives the total effective enrollment in physics courses by student credit hour for the past five years. Graduate enrollments have been multiplied by the appropriate weighting factor for faculty salaries to convert them to equivalent undergraduate hours. This table reflects quite clearly that physics enrollments have increased substantially. The rate of growth has been approximately 1,650 hrs/yr, even though undergraduate enrollment has remained relatively

flat. Also, the drops in undergraduate enrollment in 1965-66 and engineering enrollment in 1966-67 are only slightly perceptable in the combined effective enrollment. The effective enrollment has increased 83% since 1963 (five years).

TABLE 6
"Effective" Enrollments for Full Years



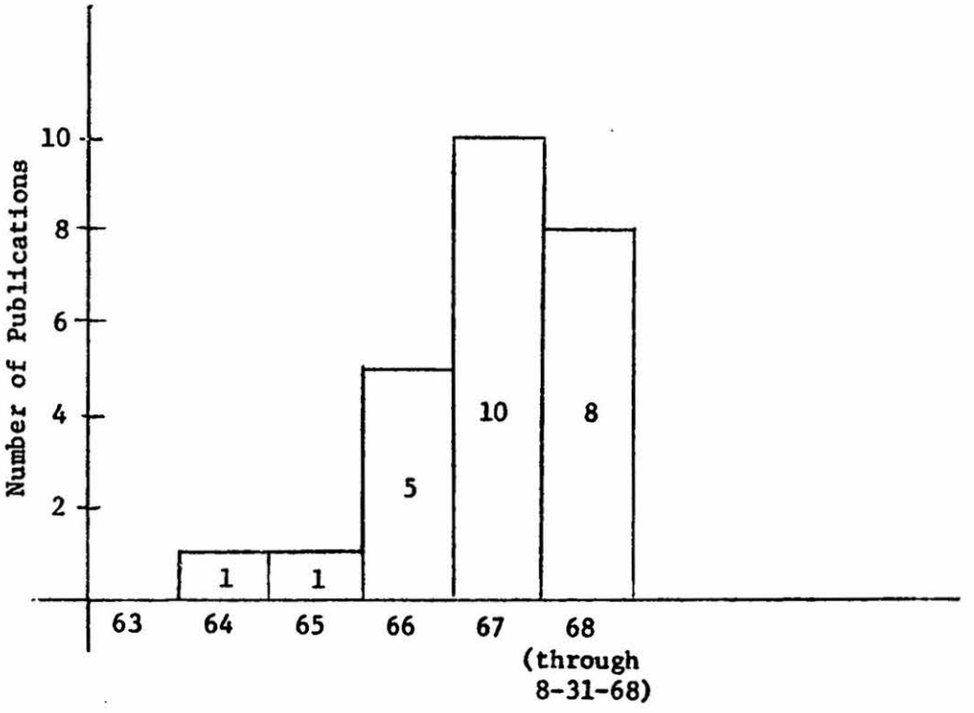
One point that conversion of the graduate to undergraduate enrollment neglects is that graduate faculty salaries are a little higher due to the competitive market. This is rightfully reflected in the data since the rate of growth of the full-time equivalent teaching faculty has been lower than the rate of growth of the effective enrollment by a factor of approximately one-half.

6. Research

Research productivity is a relatively new concept in the Physics Department. Only within the past four years or so have funds become available for specialized equipment, teaching loads been reduced to a level which encourages research, and productivity been expected of

the faculty. Table 7 summarizes the publications in the recognized and refereed research journals. Although there has been a relatively

TABLE 7
Publications by Faculty and Students



large growth in the rate of publication, it should and will be higher when (1) more researching faculty are hired, and (2) more graduate students approach the terminal status with their dissertation results being published. Of those publications listed in Table 7, seven include students as co-authors. Seven of the faculty have at least one piece of work represented in Table 7. A complete list of publications for the current faculty is given in Appendix II.

7. Research Monies

Table 8 summarizes the funds available for the support of faculty and graduate research over the last six years. The four

TABLE 8

Physics Research Monies

Year	State	Fellow-ship Grants	Private	Federal	Total
1963-64	16,485	--	--	--	16,485
1964-65	10,689	6,850	--	--	17,539
1965-66	8,502	34,735	36,890	3,438	83,565
1966-67	10,803	31,989	32,000	23,750	98,542
1967-68	29,423	27,244	30,667	100,138	187,482
1968-69	24,766	15,000	52,000	112,750	204,516

sources included in the table are (1) state-appropriated research funds; (2) federal government contracts and grants; (3) grants from private sources, primarily the Robert A. Welch Foundation; and (4) cost of education and supplemental grants from federal fellowship programs. See Appendix III.

The accelerated growth of the non-state appropriated funds follows very closely the development of the Ph.D. program in physics. Physics has been quite fortunate to move into this cycle. Graduate students are necessary to attract research grants and contracts; at the same time, these sources of funds are needed to provide stipends for graduate students.

8. Physics Department Budget (State Appropriation)

The department budget over the last ten years is summarized in Table 9. These are funds, exclusive of organized research, which are provided by the state appropriation.

TABLE 9

State-Appropriated Budget

Year	Salaries	Summer Salaries	M.E.&T.	Staff	Total
1968-69	234,982	15,000†	33,500*	21,060	304,542
1967-68	205,066	15,417	31,000*	21,660	273,133
1966-67	173,700	13,187	20,000*	15,990	222,877
1965-66	146,292	17,037	20,000*	16,170	199,499
1964-65	125,100	14,149	19,560*	15,240	174,049
1963-64	121,400	13,650	19,060*	14,940	169,050
1962-63	94,050	14,400	10,760	11,700	130,910
1961-62	90,200		12,800	11,084	114,084
1960-61	88,625		12,100	9,960	110,685
1959-60	81,716		11,800	9,960	103,476
1958-59	78,700		9,400	9,600	97,700
1957-58	54,550		3,518	9,720	67,788

†Estimated.

*Includes $1,500 for travel; no data on travel funds in prior years.

TABLE 10

Comparison of Actual and "Enrollment Calculated" Budgets for those Years in Which the Formula Applied

	Salaries		Operation		Total	
Year	Actual	Calc.	Actual	Calc.	Actual	Calc.
1968-69	249,982	235,213	54,560	74,298	304,542	309,511
1967-68	220,483	197,475	52,660	57,600	272,143	255,075
1966-67	186,887	180,771	35,990	47,770*	222,877	228,541
1965-66	163,329	138,405	36,170	43,600*	199,499	182,005

*Since an operations formula was not used in these years, the amount had to be estimated.

An attempt has been made in Table 10 to compare the budget with the amounts which the physics enrollments "justify" for those years where formulas have been used for the state appropriation. (The appropriate formulas and per cent appropriation were used for each year.) Although the "calculated" (or theoretical) budget may have a few errors, it should be substantially correct.

The "calculated" budget has been rather close to the actual budget over the few years for which the formula method of appropriation has been in effect. This is especially significant since the department has shown a good growth in number of faculty and student credit hours taught. However, it should be noted that almost all of the growth has been justified by the graduate program.

PART II

CURRENT STATUS OF THE DEPARTMENT OF PHYSICS

A. Summary of Five Year Development

The information in Part I of this report may be summarized as follows. From the fall of 1963 to the fall of 1968:

1. The number of permanent faculty has increased from eleven to thirteen and the full-time teaching equivalent from 13.5 to 18.25 (1968-69).
2. The "effective" number of student credit hours taught has increased from 8,031 to 14,620.
3. Enrollment in the "engineering" survey course peaked in 1965, dropped drastically in 1966, and in 1967-68 regained the 1963 level.
4. Enrollment in the "non-technical" survey course has increased 50% since 1963 and now amounts to 40% of the general physics instruction.
5. Undergraduate instruction to physics majors is 12% below the 1963 level.
6. The Ph.D. enrollment has risen from zero in 1963 to 334 semester hours in 1967-68.
7. The M.S. enrollment has risen from 183 semester hours in 1963 to a peak of 497 in 1965-66 then down to a level of 420 semester hours for the last two years.

8. The state-appropriated departmental budget has increased from $169,050 for 1963-64 to $304,542 for 1968-69.
9. Funds for grants and contracts have risen from $16,485 in 1963-64 to $178,720 for 1967-68 with firm commitments of $204,516 to date for 1968-69.
10. The total number of full-time graduate students has risen from thirteen to thirty-nine.
11. The publication rate in the department has increased from an annual rate of approximately zero prior to 1964 to ten papers/year in 1967 and twelve papers/year through the first eight months of 1968.

B. Evaluation of the Current Status in the Department of Physics

The information in the previous section indicates clearly that the complexion of the Physics Department has changed quite dramatically in the last five to ten years. Generally, the department is satisfied with the progress that has been made to date. However, for a department that has had to operate on a limited budget, some areas have been neglected at the expense of building the graduate research program. This section contains, what is hoped to be, a candid and critical evaluation of the level of development of each of the areas of the Physics Department's activity.

1. Faculty

A list by rank of the current physics faculty and their salaries for 1967-68 can be found in Appendix I. The faculty is heterogeneous with respect to training and interest. Since the goals and levels of

accomplishment in the department have been changing rapidly, each of the faculty has been hired under different conditions with different credentials required at that time. Only the most recent faculty have been hired on the basis that research productivity is a necessary, but not sufficient, requirement for advancement.

Other particulars concerning participation of the faculty will be considered under the appropriate sections of this part of the report.

2. Space

Presently the Physics Department occupies approximately one-third of the Science Building. An additional temporary building has become available to the department in each of the years 1966, 1967, 1968. The space allotted to physics in the Science Building has been constant since the new wing was completed in 1962.

An approximate distribution of the space is as follows:

Lecture Classrooms (shared)	2,784 sq. ft.
Teaching Laboratories	4,392 sq. ft.
Offices	3,265 sq. ft.
Research Laboratories	6,720 sq. ft.
Machine and Electronic Shops and Reading Room	1,484 sq. ft.
Storage for laboratory equipment	680 sq. ft.
Total	19,325 sq. ft.

The space in temporary buildings is

Lecture Classroom (shared)	2,400 sq. ft.
Teaching Laboratories	2,400 sq. ft.
Nuclear Laboratory	3,600 sq. ft.
Total	8,400 sq. ft.

Of the space currently used for research, 3,177 sq. ft. was "confiscated" from the teaching labs and 1,232 sq. ft. from the equipment storage. At least 2,400 sq. ft. of this space has what may be considered as inadequate electrical wiring for research equipment.

Currently, space is completely inadequate for (1) teaching laboratories in the survey courses, (2) intermediate labs for physics majors, (3) lecture in classes with more than sixty students, (4) machine shop, (5) reading room, and (6) graduate student research.

3. Budget

A breakdown of the state-appropriated funds available to the Physics Department for 1968-69 is as follows:

Academic Year Salaries	$234,982	($235,213)
Summer Salaries	15,000	
M. E. & T.	33,500	($74,298)
Staff and Operations	21,060	
State Research Funds	21,932	

In parentheses are the amounts calculated on the basis of enrollments. The agreement between the two columns is quite close in view of the fact that physics has been expanding and is also one of the more expensive disciplines for instruction.

A primary deficiency in the budget is its ability to provide growth for a graduate research program while maintaining an acceptable level for the survey and intermediate laboratories. In addition, it is not possible to provide capital outlay for large pieces of equipment for departmental use.

4. Survey Courses (General Physics)

Approximately 40% of the teaching load of the Physics Department is in the general physics courses. Although physics majors do enroll in these courses, they are taught primarily for the benefit of the student who will be taking only this two semester series. The students enroll in lecture sections of 100 to 250 students for three hours per week. In addition, each student is required to attend a weekly laboratory for a three-hour period. The total credit is four hours.

It is the sense of the faculty in the department that these courses have been neglected for at least twenty-five years. However, the neglect has just become more obvious as comparison with a dynamic and growing graduate program is possible. Even though physics is the study of natural phenomena, it is remarkable how much is actually taught from a theoretical point of view. The quality of the teaching may be more than adequate as far as this type of presentation allows, but this neglects the observational aspects of physics: (1) lecture demonstration equipment is non-existent, and (2) most of the laboratory experiments and equipment have little, if any, relevance to contemporary science. At the same time, the classrooms available to physics for these lectures have not been suitable for the

accommodation of demonstration material. Also technical assistance, even in the form of teaching assistants for example, have not been available to the faculty. It has been necessary to confiscate teaching laboratory space for research laboratories. Some labs are taught in prefabs and some in the Science Building, on occasion using the same equipment.

5. Undergraduate Courses (Physics Majors)

Physics has a core curriculum for its majors. In this curriculum approximately twenty-five credits are taken in the lecture classes while three credits are taken in the laboratory courses. The lecture courses are standard and are probably taught as well, if not better, than any other group in the department.

Again the physics intermediate laboratories are a problem. Space has been taken for expanding research programs. Adequate funding has been lacking. Technical support for equipment maintenance has been lacking or marginal. Too few faculty have been willing to take some responsibility for the labs because of lack of support and because teaching loads are a discouraging factor. Most of the equipment is pre-1940. Some faculty feel that there should be greater coordination of efforts in the undergraduate program.

6. Graduate Curriculum

There is a core curriculum for graduate physics majors. All students for the Ph.D. take thirty-five credit hours. In addition, essentially all students take at least twelve hours of math and six hours for a second minor in a specialized area of physics other than their research field. The department has substituted the "tool subject" to meet the requirement of the second foreign language.

The primary task of the department has been the recruitment of a competent graduate faculty. There are still a few courses in the core curriculum which suffer from the lack of a suitably trained instructor. There are several areas where elective courses in the specialized fields would strengthen substantially the curriculum.

7. Research

Basic scientific research, as conducted in the universities, is considered by many to be the highest form of teaching. This is not meant to imply that a school should be first a research center and secondly a university for learning. However, teaching and research should be blended together to complement each other.

If the Physics Department wishes to gain national recognition and attract both a competent faculty and highly qualified graduate students, it is essential to develop a long-range, organized research program. The research projects, conducted by advanced degree candidates under the direction of faculty supervisors, should be of such a nature that the final results are worthy of publication in scientific journals.

Areas of basic research in physics presently being actively studied in major universities are: Astrophysics, Atomic and Molecular, Biophysics, Elementary Particles, Fluids, Geophysics, Low Temperatures, Nuclear, Plasmas, Relativity, and Solid State.

The areas of research which are presently active in this department are atomic and molecular, nuclear, and solid state physics. The strengths of these areas are indicated below by number of faculty and students, grants and contracts for 1968-69, publications, and particular areas of investigation.

1. Atomic and Molecular Physics

   Faculty: four; Mann, Mires, Quade, Hatfield (new)

   Post-Doctoral Fellows: none

   Graduate Students: thirteen

   Grants: State, $16,234; Private, $12,000; Federal, $82,766

   Publications: ten

   Areas: crystal field theory, magnetic susceptibilities, molecular dynamics, infrared spectroscopy, microwave spectroscopy, atomic structure, optical spectroscopy, paramagnetic resonance, electronic excitation of atoms

2. Nuclear Physics

   Faculty: four; Howe, Kim, Lodhi, Thomas

   Post-Doctoral Fellows: none

   Graduate Students: six

   Grants: State, $8,532; Private, 0; Federal, 0

   Publications: nine

   Areas: beta and gamma ray spectroscopy, nuclear structure, theory of polarized electron scattering from nuclei, neutron and proton scattering

3. Solid State Physics

   Faculty: three; Das Gupta, Marshall, Sandlin

   Post-Doctoral Fellows: one

   Graduate Students: thirteen

   Grants: State, $11,718; Private, $40,000; Federal, $30,000

   Publications: six

Areas: x-ray, Raman, and Compton scattering, electronic structure of crystals, magnetic susceptibility, low temperature specific heat, magnetoacoustic effect

Currently the greatest faculty deficiencies are in theoretical solid state and experimental nuclear physics.

A brief description of some of the areas of research in the department is as follows:

1. Elastic and Thermal Properties of Solids--The anharmonic nature of the ionic bonding forces in solids is being investigated by means of studying the temperature dependence of the adiabatic and isothermal elastic constants together with low temperature measurements of the specific heats of solids. Fermi surfaces of metals are being investigated by the method of magnetoacoustics.

2. Solid State--In progress are studies of linear expansivity related to the postulated second order phase transition between the normal and superconducting states of a metal in zero magnetic fields. Other studies are related to Umklapp processes in thermal conduction phenomena in solids at low temperatures.

3. X-Ray and Nuclear Gamma Ray Spectroscopy--The newly observed Compton-Raman bands predicted by A. Sommerfeld can be used to determine the electron energy levels in various solids. The Compton-Raman scattering process in periodic crystalline fields is under investigation using a three crystal spectrometer.

4. Microwave Spectroscopy--Studies are currently being conducted on vibration-internal rotation interactions, barriers to internal rotation, equilibrium orientation of molecules, and the tunneling effect over the frequency range of 8.5 to 50 GHz.

5. Atmospheric Optics--A recording microdensitometer is used to scan a reduced photographic image of a variable spatial frequency test pattern, in order to evaluate the effects of variation in optical paths upon optical images.

6. Magnetic Properties of Crystals--Research is being conducted on the properties of various magnetic crystalline structures as well as magnetic ions in host crystals. Magnetic susceptibility measurements on isotropic and anisotropic materials from below 4.2°K to over 600°K provide information for theoretical models of the magnetic ions.

7. Electron Spin Resonance--Electron spin resonance investigations are being conducted on dilute paramagnetic ions in host crystals, to obtain information on crystal structure, electronic structure, magnetic spin-spin interactions and exchange effects for the ground and some excited states between 4°K and room temperature.

8. Nuclear Spectroscopy--Studies are currently being conducted on beta and gamma ray spectra with emphasis placed on beta spectral shape measurements and the determination of internal conversion coefficients.

9. Infrared Spectroscopy--Studies are currently being conducted on the vibration-rotation spectra of planar and symmetric top molecules in the gas phase in the range of one to 4.5 microns.

10. Atomic Structure--Theoretical problems in atomic structure are also being investigated. These include a project to determine average self-consistent field functions for atoms and the effect of spatial correlation on the multiplet structure of the $(2p)^2$ and $(3d)^2$ electronic configurations. Also under study is the breakdown of Russell-Saunders coupling in highly excited helium atoms. All of these should provide new information regarding the intra-electron interactions in these two-electron systems. The optical Faraday effect in some divalent S-state ions has also been under study.

11. Theoretical Nuclear Physics--Studies in theoretical nuclear physics are being pursued in the areas of nuclear model and theory with special reference to shell cluster models. Also semi-phenomenological independent particle model and nuclear systematics based on velocity-dependent nucleon-nucleon and nucleon-nuclear potential are being developed. Investigations into nuclear structure from scattering and reaction and the mechanism of nuclear reactions involving light nuclei are in progress.

12. Theoretical Nuclear Physics--The nuclear collision has been investigated to gain insight into the structure of nuclei. Predictions have been made as to the detectability of the nuclear charge polarization effect in case of the polarized target. This work is being extended to more general cases involving highly deformed nuclei.

13. Muonium Molecules and Other Mesic Systems--The theoretical study of the muonium and allied problems resulted in the prediction of the possibility of the formation of the muonium water molecules. More elaborate study of muonium and other mesic systems is in progress.

8. Support Facilities

Every science department needs certain support facilities to assist faculty and students in teaching and research. Among these facilities are machine shop, electronic shop, glass shop, cryogenic supply, and reading room. Currently the Physics Department has a machine shop and a reading room of sorts. At one time, it was attempted to staff an electronics shop with a graduate student, but this did not prove satisfactory.

1. Machine Shop--Currently there is a moderately equipped machine shop which occupies approximately 792 sq. ft. The shop is staffed with two machinists, one of which works full time in the x-ray physics program. The other splits his time among the various jobs required of the rest of the department. The principal tools in the shop are two small lathes and two small mills. In addition, there are various drills, grinding wheels, saws, etc. Except for the addition of a mill this year, the physics machine shop has remained essentially unchanged for seven years. This shop was originally designed and equipped solely for the purpose of maintaining the undergraduate teaching laboratories.

   An adequately equipped and staffed shop is necessary to construct and maintain equipment for the teaching laboratories. In addition, shops make a significant contribution to research. In the case of original experiments, a large portion of the components are not available from commercial sources. Often construction of apparatus is "cut and try." The quality of a machine shop limits the quality and type

of experimentalist that can be hired by the department. The shop is also a necessary support item in obtaining outside funds for research.

2. Reading Room--Since 1964 the Physics Department has started acquiring books and a few research journals for use in its reading room. Books have been purchased with departmental operating funds and special funds from the Dean's office. The journals have been subscribed with department operating funds. The reading room occupies 140 sq. ft. and has one table. Although this facility is a start, it will not provide desirable services for a productive department. Both space and volumes are inadequate for the present faculty and graduate students.

PART III

PROPOSED TEN YEAR DEVELOPMENT FOR THE DEPARTMENT OF PHYSICS

A. General Objectives and Goals

The Physics Department considers its mission to be that of providing the best possible training for its undergraduate and graduate students. The majority of students presently being taught in the Physics Department are enrolled in the survey or general physics courses. For most of these students, these courses provide their only formal contact with physics. The students must be exposed to both the classical and most contemporary aspects of physics. They should learn well a few fundamental principles, but at the same time should gain a qualitative insight of the contribution of physics to their culture.

The aim of the programs for the undergraduate and graduate physics majors is different from that for the non-major. For the majors, the department should provide the soundest possible professional training and scientific discipline. Most of the students receiving the B.S. will become engaged in scientific activity, either through industrial employment or enrollment in graduate school. The students who receive the terminal degree will pursue research careers at industrial and government laboratories or accept teaching and research positions at colleges and universities.

Generally, the Physics Department has been satisfied with the students enrolled in its courses. Texas Tech attracts students from a large geographical area and population base, which results in a typical distribution in background, ability, and capacity for the students. The experience of the Physics Department is consistent with that of the college; significantly, the "best students" are not "skimmed off" to any critical degree by other institutions. Even the graduate students, in spite of the newness of the program, reflect this distribution, a fact which indicates the ability of a large institution to attract within its region. Only in the number of graduate students is there any indication of the youthfulness of the program.

It is the objective and responsibility of the Physics Department to provide the best possible education to students of physics within the limit which the resources of this institution can support. This is especially critical since Texas Tech (a state-supported institution) serves a geographical area and population base which are larger than those that support the primary university in many other states. Our graduates will be competing with graduates from institutions in these states, especially with regards to opportunities at graduate schools and for employment.

The physics faculty recognizes that departments which provide quality instruction do not occur over night. It takes time for faculty, departments, and institutions to mature. The Physics Department has made good and productive use of the resources available to it. But additional support is necessary. Some of the areas and facilities which should be expanded or developed are discussed in Part III of this report. Certain items, for example, space, are critical and need immediate attention.

It is the hope of the Physics Department that this report will provide the background and stimulus for fruitful discussions within the department and between the department and university administration for the future development of the Physics Department. Of special importance to the department is the university's support in seeking and obtaining the financial resources necessary for this strengthening and development.

B. Projections and Needs of the Department of Physics

1. Projected Enrollment

Any permanent growth in the size of the physics faculty must be related to an overall increase in student enrollments at the survey, intermediate, and graduate level. The data presented in pages 5-10 of this report provide a basis for projection in the next five to ten years.

Over the last five years, the annual increase in "effective" departmental teaching load (p. 9) has averaged 1,650 hours per year. From 1966-67 to 1967-68, the increase was approximately 1,730 hours. Of this increase 60% was attributable to the survey courses and 40% to the graduate courses. Over the entire five-year period, 1963-64 through 1967-68, the "effective" teaching load of the department increased 82%.

1. Graduate--It is the goal of the Physics Department to eventually reach a level of seventy to eighty full-time graduate students. Until the fall of 1968, the number of graduate students had been increasing at the rate of eight to twelve students per year. For 1968-69, the number of graduate students will remain at the

1967-68 level. It is assumed that this is a temporary situation due to the Viet Nam conflict. When the draft situation approaches normal or veterans start returning for graduate work, it is anticipated that our eight to twelve annual increase will resume. The academic years 1968-69 and 1969-70 appear to be the problem.

Even so, preliminary figures show that physics will have a "paper"* gain in graduate enrollment for 1968-69. This is because in the past graduate students have not enrolled in sufficient hours to reflect their real work load. This "paper" increase will be equivalent to a typical two-year growth of graduate enrollment. After this time, the real growth in size of the graduate student body should resume until a level of approximately seventy to eighty students is attained.

2. Physics Majors--On the basis of the enrollment trend over the past five years, the only safe prediction would be that the undergraduate enrollment will remain at approximately the same level. Nationally the number of undergraduate physics majors increased 12% in 1967-68 so we are not doing as well as the national average.

Any increase or decrease in undergraduate enrollment will have very little effect on the "effective" teaching load of the department (see p. 9). It is interesting to note that only 8.4% of the nations undergraduate physics majors are taught in the south central states, a percentage which does not entirely reflect the population differences. It is the opinion of the Physics

---

*The enrollment in physics graduate courses will increase in 1968-69 since the students have been encouraged to enroll in a full load.

Department that it should make a definite attempt to increase enrollment in the undergraduate program.

3. Survey Courses--The Physics Department expects the enrollment in the Survey Courses to show a small growth each year. Such a growth can arise from (1) an increase in enrollment at Texas Tech, (2) a larger percentage of Engineering students, or (3) increased interest in physics. Any combination of these which would provide enrollment increases similar to those experienced for the last five years would substantially increase the teaching load of the department. Some faculty feel that the Physics Department ought to offer, possibly in conjunction with another department, an additional survey course in Physical Science. This would be primarily for students majoring in education and would be offered if the institution felt there were sufficient need.

2. Faculty Growth

Over the last five years, the teaching equivalent in the Physics Department has increased from 14 to 18.25, an approximate gain of 4.25 or 30%. During the same period, the effective enrollment increased 82%. The departmental budget from state appropriations remained essentially balanced during this period. These figures suggest that a growth in effective enrollment of 13% is necessary for the addition of another FTE, if the current FTE and effective enrollment are used as the base. The department does not project a growth of 82% in enrollment over the next ten years, however, there is every reason to expect that the current growth rate of 1,600 hours per year will be maintained.

There is not a consensus in the department on the basis upon which new faculty should be hired. One point of view is that the department should hire the "best men" available without too much concern about their area of specialization. The other is that faculty should be hired to support existing programs or to fill what are felt to be weaknesses in the teaching and research programs. Almost all of the current faculty have been hired on the former basis.

If the Physics Department wishes to expand into new areas only after the currently active areas are adequately staffed, the following are suggested levels of support for each field. Presently, our most urgent deficiency lies in the area of theoretical solid state physics. The areas of experimental nuclear and solid state also need additional staff members.

Projected needs for present areas of study are:

1. Atomic and Molecular--Three additional faculty members and ten additional graduate students within ten years.
2. Nuclear--One additional faculty member (experimentalist) and six additional graduate students as soon as possible. Four additional faculty members and twenty additional graduate students within ten years.
3. Solid State--One additional faculty member (theorist) as soon as possible. Four additional faculty members and twelve additional graduate students within ten years.

New areas into which we could conveniently expand within the next ten years are:

1. Relativity--Three faculty members and nine graduate students.
2. Geophysics--Two faculty members and six graduate students.
3. Astrophysics--Two faculty members and six graduate students.
4. Biophysics--Two faculty members and six graduate students.
5. Low Temperatures--One faculty member and three graduate students.

3. Space

Because of the critical shortage of space available to the Physics Department, the exodus of the Biology Department to their new building has been anxiously awaited. The Physics Department has requested the use of one-half of the space now used by biology, which would amount to approximately 11,000 sq. ft. In addition, the "old" Biology Auditorium is needed to teach the survey courses.

This additional space would relieve the pressure on the Physics Department for three to five years for research labs, teaching labs, and support facilities, such as shops and reading rooms. In planning for the longer term, the department requests that the institution consider adding a wing to the northwest of the Science Building to match the wing on the southwest. An identical wing, neglecting the auditorium, would add an additional 15,000 sq. ft. to the current space of 63,300 sq. ft. in the Science Building.

Most of the rooms in the old part of the Science Building were designed and constructed with inadequate wiring as either teaching or research labs. These rooms will have to be rewired to handle the electrical demand which will be placed by the equipment to be used in them. The Physics Department has already found this to be necessary in its labs which are presently in the old building.

4. Survey or General Physics Courses

It has become apparent to the physics faculty that the introductory physics courses may have been neglected in the past several years. This neglect has been rationalized since the department has been engaged in an upgrading of its advanced undergraduate and graduate courses. Funds and faculty have been needed (and still are!) for the initiation of new and the expansion of existing research programs. Research support was necessary to implement the Ph.D. program and to strengthen the M.S. program.

Establishment of research has been accomplished with some success, but partially at the expense of the introductory courses. In the future, more attention must be paid to the students taught in these courses. A survey of the students and faculty shows quite clearly that the laboratories, which are taught as a part of the general physics courses, are inadequate. This problem has been aggravated by having the laboratories taught in different buildings. The lecture portions of the courses have tried to keep pace with modern developments in physics, but the laboratories have used equipment and experiments of another vintage. There is little correlation of the physics taught in the lectures with that taught in the labs.

Within the last ten years, there has been a well-defined effort in this country directed to the improvement of the approach in teaching the conventional general physics. Modern equipment has been developed for student use. Imaginative experiments have been devised. Sophisticated lecture demonstration facilities have been incorporated into the survey courses at almost all major institutions. These new

aids for teaching can be stimulating to both the faculty and students of physics. Closed circuit TV has not yet been utilized by the Physics Department at Texas Tech.

The department knows that something must be done about these courses. It recognizes that to do something will cost money; essentially, it would amount to re-equipping (for the first time in thirty to forty years) four or five teaching labs and purchasing demonstration equipment. Also it recognizes that one of the faculty will need to assume responsibility for the program. At present it has not been resolved whether this individual should come from the current staff or a new man should be hired specifically to develop this program.

5. New Course in Physical Science

It has been brought to the attention of the Physics Department that a real need may exist at this institution for a so-called Physical Science course. At many colleges and universities, such a course is taught primarily for education and business administration majors. Often the course is taught as a cooperative effort among two or more departments. The subject matter is usually presented in a qualitative manner, without an accompanying laboratory, but with a large number of experimental demonstrations.

The Physics Department has an interest in participating in such a course, but only if it would have strong support from the School of Education and partial support from the School of Business Administration. The Physics Department wishes to suggest that Deans and faculty of the involved schools and departments investigate the matter and provide a recommendation to what degree such a course would be feasible.

6. Intermediate and Advanced Undergraduate Physics Laboratories

It is accepted that experience in the laboratory is a necessary requirement in the education of a physicist. The laboratory gives students an opportunity to (1) study directly physical phenomena, (2) develop skills of instrumentation, (3) gain insight into the nature of measurement, and (4) develop familiarity with sophisticated apparatus and techniques.

With the limited space and funds available, the involved faculty have done a fairly good job with the labs. However, more must be done. Certain revisions are necessary in the undergraduate physics curriculum to insure a correlation and balance between the theoretical and experimental aspects of physics. Approximately 4,000 sq. ft. of space is needed for these labs. Approximately $30,000 could be used for modern equipment immediately. Thereafter, $10,000 per year for a few years would bring the program to an acceptable level.

Preparation for laboratory courses is considerably more time consuming than for the equivalent credit hour load in lecture courses. An adjustment in teaching load should be made to encourage faculty efforts in the laboratory teaching. A technician, possibly in connection with the introductory labs, should be hired on a long-term basis for maintenance of the equipment.

7. Research Financial Support

The Physics Department needs to expand its base for outside support. There are eight faculty with supported research for 1968-69, four of which are from non-state funds. The level of support for

these latter four faculty is satisfactory, but the number with outside support needs to double as soon as possible. It is reasonable to expect that at least twelve physics faculty participate in supported research within three to five years.

Some agencies of the Federal government use a rule of thumb that $12,000 is the average amount needed per year for each graduate student. This includes a student stipend, funds for equipment, and summer faculty salary. It is also realized in the average figure that some students will be theorists and others will be supported by teaching assistantships and fellowships.

The current level of support, $204,516 for 1968-69, is enough to support seventeen students. Presently, there are thirty-nine graduate students in physics. Although the rate of increase of research support has been encouraging, the department still has not reached a satisfactory level to support the thirty to thirty-five students which should be actively engaged in research.

8. Stipends for Graduate Students

Essentially all of the graduate students in physics in the United States receive financial support of some kind. This support is usually channeled through, if not supplied by, the university at which the student does his graduate work. Consequently, if a dynamic, ongoing graduate program is to be developed, provisions must be made for the financial support of most of the students in the program and effective recruiting practices must be established to attract capable students.

In 1967 the Department of Physics instituted a program designed to fulfill the latter requirement. A list of speakers from the department was distributed to most of the schools in the area from which graduate students might be drawn. These speakers presented a research type seminar to interested undergraduate students and talked to them about the program at Texas Tech. This program is being continued along with other recruiting practices and is expected to yield good results in the future.

The solution to the first requirement, that of supplying financial support for graduate students, is not so apparent and presents a major problem to the development of the program. In the fall of 1968, sixteen students received their major support as part-time instructors or teaching assistants, six students from NDEA or NSF scholarships, eight students from research assistantships supplied by non-state funds, and the equivalent of three from scholarship money supplied by the state. The remainder of the students obtained jobs of one sort or another, as for example in the Computer Center.

We need support for at least ten additional graduate students for 1969-70, fifteen for 1970-71, and twenty for 1971-72 if we are to approach our goal of sixty students by 1971 and if we are to maintain the momentum which the program now has.

It is reasonable to assume that the acquisition of additional research funds can, and will, provide support for an increasing number of students. However, this support will neither be sufficient nor will it develop rapidly enough to meet our needs for the next three to five years. Therefore, the department requests that the sum of $24,000, for the support of ten graduate students, be supplied by the university for each of the next three years.

9. Summer Institute Programs

The Physics Department recognizes a need to provide continuing education for science teachers in the public schools in Texas and other states. The summer institute programs provide a public service in meeting this need. The Physics and Chemistry Departments have submitted a proposal to initiate an institute in the summer of 1969 for ninth grade physical science teachers. In addition, there is serious discussion and planning for the offering of a summer institute for high school physics teachers to begin in the summer of 1970.

The Physics Department feels that participation in the Summer Institute Program is worthwhile and provides (1) a valuable and much needed public service, (2) opportunity for summer employment for faculty, and (3) educators in the state an opportunity to become familiar with science activities at Texas Tech.

10. Support Facilities

The present faculty desire to work independently in the areas of their choice. However, certain items of major equipment should be supplied by the school to be used in a common manner by any or all faculty members and students. Such items would consist of the following:

1. Liquid nitrogen machine
2. Machine shop
3. Glassblowing shop
4. X-ray unit for crystal alignment
5. Crystal cutting and polishing equipment
6. Crystal growing apparatus

7. Reading room
8. Glass shop
9. Electronics shop

Research excellence in physics is strongly dependent on good support facilities and staff. The experimental support facilities can be divided into four major areas: machine shop, electronics shop, glass shop, and a cryogenic facility. At the present time, the Physics Department is grossly lacking in all of these areas. The following needs are anticipated in the next ten years.

1. Machine Shop--Personnel: A tool and die maker is needed immediately; two to four additional people will be needed within ten years. Equipment: Equipment needed in the next ten years include a bandsaw, sheet metal rolling machine, sheet metal shear, sheet metal bender, horizontal bandsaw, large lathe, large milling machine, two additional small milling machines, surface grinder, shaper, and numerous small tools. Total cost of this equipment will be approximately $150,000.

   In addition to new personnel and equipment, the machine shop should maintain an adequate stock of materials for efficient operation. This would cost about $20,000.
2. Electronics Shop--Personnel: One electrical engineer and one electronics technician should be added to the staff within five years. An additional technician will be needed within ten years. An adequate stock of electronic supplies should be maintained for efficient operation. The cost of this stock would be approximately $5,000.

3. Glass Shop--A glass technician, glass lathe, and an annealing oven are needed within five years. One additional technician will be needed in the next ten years. Physics would be interested in cooperating with Chemistry in developing a glass shop.
4. Cryogenic Facility--The department needs either a nitrogen liquifier or a large storage dewar in the immediate future. In either case, this would supply sufficient coolants for other departments on the campus.
5. Reading Room--As soon as more space is available to the Physics Department, it will be possible to expand the Reading Room from its present 140 sq. ft. In 1966 the department started subscription (in addition to the library subscriptions) to the most critical journals. At the same time, some departmental funds as well as special funds from the Dean of Arts and Sciences have been used to purchase a few books.

The Reading Room needs more books and journals as soon as space, need, and funding will justify it. Active, researching faculty and students often need published data to be quickly and easily available. An annual budget of $1,000 to $1,500 per year would develop an adequate Reading Room within ten years.

The Physics Department is willing to combine its Reading Room with that of Geoscience to avoid duplication of space and personnel. The department has also been quite interested in the suggestion of a physical science joint library which might be housed underground between the Chemistry and Science Buildings.

C. Summary of Part III

The following points summarize the extended discussions presented in Part III of this report.

1. Enrollment--It is projected that the average rate of increase in effective enrollment in physics courses of 1,650 hours per year will continue for at least five years. This increase will be distributed nearly equal between the survey and graduate courses.
2. Faculty Growth--Continued at the rate of 3/4 FTE per year as long as the current growth in effective enrollment is maintained. First priority for theoretical solid state, second for experimental nuclear. The department has an interest in appointing senior physicists for one semester or one year appointments.
3. Space--Approximately 10,000 sq. ft. of additional space for teaching and research laboratories, support facilities, and offices are needed immediately. Also a 250 student auditorium is needed for five to eight classes per semester. Some funds (approximately $150,000) will be needed for renovation and equipping of the space made available when Biology leaves the Science Building.
4. General Physics Laboratories--These laboratories need a complete overhaul. Cost: $30,000 first year, $15,000 second year, and $5,000 every year thereafter. One faculty member should be assigned full time to making these go the first year and then one-half time faculty every year thereafter. Space is needed to put all labs in the Science Building.

5. General Physics Lectures--A suitable auditorium is a necessity. So is demonstration equipment. Cost: $10,000 first year, $2,000 per year for three years. One full-time faculty is necessary for one year to get the demonstrations going, thereafter a one-quarter time faculty is necessary.
6. Intermediate Laboratories--An overhaul is needed. Cost: $25,000 first year, $3,000 every year thereafter. Improved teaching load is needed for faculty responsible for the labs.
7. Research Support--The number of faculty with research supported by outside agencies needs to double from the current four within one year, triple within three to five years. The associated level of funding needs to increase 50% within eighteen months, double within four years, triple within six years.
8. Support Facilities--Approximately 1,000 additional square feet are needed immediately for the machine shop along with the necessary tools. Cost: $100,000 first year, $50,000 second year, $20,000 third year. Physics needs 400 additional square feet for a Reading Room and associated books and journals. Cost: $5,000 first year, $1,000 per year for ten years.
9. Graduate Student Stipends--Approximately eight to ten new stipends are needed each and every year. These must come from fellowships, teaching assistantships, and research grants. The department requests $24,000 in each of the next three years for graduate student stipends.
10. Miscellaneous--For one three-year period, an additional $100,000 per year is needed for a general upgrading of the department.

11. New Physical Science Course--The department wishes to consult with the Schools of Education and Business Administration to ascertain whether or not there is a need for a qualitative physical science course.

12. Summer Institutes--The department wishes to initiate the offering of a summer institute for high school teachers of science as a public service.

APPENDIX I

LIST OF FACULTY TEACHING IN PHYSICS

DEPARTMENT BY YEAR AND RANK

Professor	1967-68 Salaries
William Henry Abbitt, 1927-1941	
Kamalaksha Das Gupta, 1966-1968	$17,200
James Wendell Day, 1963-1968	$13,200
Jules DeLaunay, 1945-1946	
Richard Leroy Dolecek, 1946	
Enoch Franklin George, Head, 1926-1942	
Clarence Simpson Mast, 1926-1936	
William Walter Merrymon, 1958-1964	
Joseph Harold Rush, 1956	
Clarence Carl Schmidt, Head, 1943-1957; 1958-1964	
Henry Coffman Thomas, Head, 1958-1968	$19,000
William Morris Young, Adjunct Professor, 1927	

Associate Professor	
Richard Emerson Berry, 1962-1964	
David Jacob Besdin, 1954-1957	
James Wendell Day, 1958-1962	
Jules DeLaunay, 1942-1944	
Richard Leroy Dolecek, 1943-1945	
Clarence Gerald Gardner, 1963-1964	
Herman Glaser, 1950-1953	
Preston Frazier Gott, 1959-1968	$10,166
Harry Hill, 1926-1942	
Young Nok Kim, 1964-1968	$13,300

Chester Meek McKinney, 1953	
Glen Alan Mann, 1965-1968	$12,200
Billy Jack Marshall, 1965-1968	$14,800
William Walter Merrymon, 1949-1957	
Alvin Victor Pershing, 1943	
Donald Stover Piston, 1942	
Charles Richard Quade, 1966-1968	$14,000
Joseph Harold Rush, 1955	
Billy Joe Sandlin, 1960-1968	$13,200
Clarence Carl Schmidt, 1928-1942	

Assistant Professor

Oliver Loyd Basford, 1957-1964	
Grover Preston Burns, 1946	
James Hollie Cross, 1947-1948	
James Wendell Day, 1947-1958	
Paul Penn Elliott, 1950	
Clarence Gerald Gardner, 1960-1962	
Preston Frazier Gott, 1950-1958	
David Allen Howe, 1963-1968	$12,100
Mohammad Arfin Khan Lodhi, 1963-1968	$11,100
Chester Meek McKinney, 1951-1952	
Glen Alan Mann, 1960-1964	
Raymond William Mires, 1964-1968	$12,300
Willie Edward Phillips, 1959-1962	
John Clarence Resler, 1954-1955	
Billy Joe Sandlin, 1956-1959	
Dean Charles Severance, 1958-1962	
Russell Jack Steffy, 1950-1953	
Pat Morris Windham, 1956	
Charles Richard Quade, 1965	

Current Faculty, 1968-69

Henry Coffman Thomas, Chairman, Professor
Kamalaksha Das Gupta, Professor
James Wendell Day, Professor

Preston Frazier Gott, Associate Professor
David Allen Howe, Associate Professor
Young Nok Kim, Associate Professor
Glen Alan Mann, Associate Professor
Billy Jack Marshall, Associate Professor
Raymond William Mires, Associate Professor
Charles Richard Quade, Associate Professor
Billy Joe Sandlin, Associate Professor

Lynn LaMar Hatfield, Assistant Professor
Mohammad Arfin Khan Lodhi, Assistant Professor

APPENDIX II

LIST OF PUBLICATIONS OF PRESENT FACULTY

Kamalaksha Das Gupta

K. Das Gupta, "Conversion of Vitreous and Monoclinic (α) Selenium to the Hexagonal Modification," Nature 143, 165 (1939).*

K. Das Gupta, "X-Ray Diffraction by Supercooled Liquid Sulphur," Nature 143, 332 (1939).*

K. Das Gupta, "Devitrification of Vitreous Se at Various Temperatures and the Conversion of Monoclinic (α) Se into Hexagonal Modification," Sci. & Cult., India, 5, 636 (1940).

K. Das Gupta, The Presence of S_w in Colloidal Sulphur," Sci. & Cult., India, 5, 638 (1940).

K. Das Gupta, "The Fluorescence of Organic Compounds by X-Rays," Sci. & Cult., India, 5, 497 (1940).**

K. Das Gupta, "The Fluorescence of Organic Compounds by X-Rays. II," Sci. & Cult., India, 5, 569 (1940).**

K. Das Gupta, "A Study of Allotropes of Se by X-Ray," Ind. Jour. Phys. 15, 389 (1941).**

K. Das Gupta, "X-Ray Study of Se in the Liquid and Colloidal State," Ind. Jour. Phys. 15, 401 (1941).*

K. Das Gupta, "K Emission Spectra of Si and C from SiC," Sci. & Cult., India, 7, 614 (1942).

K. Das Gupta, "EMF Due to Difference in Temperatures between Two Electrodes Dipped into Ionic Solutions," Sci. & Cult., India, 9, 563 (1944).

K. Das Gupta, "Soft X-Ray K Valence Band Shift and Heat of Formation of Chemical Compounds," Sci. & Cult., India, 11, May Issue, (1946).

K. Das Gupta, "Soft X-Ray K Absorption and Emission Edge of Aluminum and Silicon in Mica," Sci. & Cult., India, 11, 701 (1946).

K. Das Gupta, "K-Emission and Absorption Spectra of Cl in Chlorides and their Ultraviolet Absorption Bands," Sci. & Cult., India, 11, 703 (1946).

K. Das Gupta, "Soft X-Ray K-Absorption and Emission Spectra of Mg, Al, Si, and their Oxides," Ind. Jour. Phys. 20, 226 (1946).

K. Das Gupta, "Second Order Chlorine K-Valence Band Spectra of Chlorides," Ind. Jour. Phys. 20, 226 (1947).

K. Das Gupta, "Soft X-Ray K Emission and Absorption Spectra of Sodium Halides and their Ultraviolet Absorption Bands," Sci. & Cult., India, 14, 124 (1948).

K. Das Gupta, "The Soft X-Ray Valance Band Spectra and the Heat of Formation of Chemical Compounds and Alloys," Phys. Rev. 80, 281 (1950).

K. Das Gupta, "A New Type of X-Ray Scattering," Nature 166, 663 (1951).

K. Das Gupta, "A New Type of X-Ray Scattering. II," Nature 167, 313 (1951).

K. Das Gupta, "Soft X-Ray L Spectra of Fe, Co, Ni, Cu, and their Oxides," Ind. Jour. Phys. 25, 555 (1951).***

K. Das Gupta, "Soft X-Ray Spectra of Mg-Al, Mg-Si, and Al-Si Alloys," Phil. Mag. 46, 77 (1955).*

K. Das Gupta, "Modified Radiation in X-Ray Scattering," Sci. & Cult., India, 21, 542 (1956).

K. Das Gupta, "Electron Transfer Type Modified Smekal Lines in X-Ray Scattering on Long and Short Wavelength Side of the Monochromatised Incident X-Ray Beam," Sci. & Cult., India, 21, 624 (1956).

K. Das Gupta, "Study of Kα and AlL_{23} Bands by a Newly Constructed Soft X-Ray Ruled Grating Spectrograph," Jour. Sci. Indus. Res., India, 1B, 129 (1955).***

K. Das Gupta, "A New Bent Crystal Soft X-Ray Vacuum Spectrograph," Jour. Sci. Indus. Res., India, 16B, 524 (1957).***

K. Das Gupta, "A New Experimental Technique for X-Ray Diffraction," Jour. Sci. Indus. Res., India, 17B, 131 (1958).***

K. Das Gupta, "Smekal-Raman Modified X-Ray Scattering," Phys. Rev. Letters 3, 38 (1959).

K. Das Gupta, "Conical Two Crystal Monochromator for Scattering Diffraction and Absorption Cross Section Work with Slow Neutrons," Rev. Sci. Instr. 32, 602 (1961).

K. Das Gupta, "Characteristic Modified X-Ray Scattering," Phys. Rev. 128, 2181 (1962).

K. Das Gupta, "Recoil Electron Resonance in Crystals and the Stokes and Anti-Stokes Modified Lines in X-Ray Scattering," Phys. Rev. Letters 13, 338 (1964).

K. Das Gupta, "Soft X-Ray Emission Spectra of Amorphous Palladium-Silicon Alloys," App. Phys. Letters 6, 104 (1965).

K. Das Gupta, "Combined X-Ray Diffractometer and Spectrometer for Lunar and Planetary Analysis," Advanced in X-Ray Analysis, Vol. 9, Plenum Press, 1966.

K. Das Gupta, "Coherent Crystal Radiation Affects the Measurement of the X-Ray Linewidths," Phys. Rev. Letters 21, 657 (1968).***

*with fellow workers
**with the supervisor and fellow workers
***with students working under guidance.

Preston Frazier Gott

Preston F. Gott, "Procedure of Simplified Stereophotography of Fossils," Jour. of Paleon. 19, 390 (1945).

Preston F. Gott, "A Set of Depth of Field Targets Subtending the Same Angle," Jour. Photo. Soc. Amer. 23, 44 (1957).

Preston F. Gott, "A Versatile Variable Voltage Power Control Unit for Photographic Work," Jour. Bio. Photo. Assn. 25, 140 (1957).

Preston F. Gott, "Film Characteristics Curves Using the Densichron and Gray Scale Chips Supplied with the Densichron Reflection Unit," Jour. Bio. Photo. Assn. 27, 19 (1959).

David Allen Howe

D. A. Howe and L. M. Langer, "Once-Forbidden Beta Spectrum of Tl^{206}," Phys. Rev. 124, 519 (1961).

D. A. Howe, L. M. Langer, and D. Wortman, "Search for a 9/2+ Level at 1.5 MeV in Y^{89}," Nuc. Phys. 37, 476 (1962).

D. A. Howe, L. M. Langer, E. H. Spejewski, and D. W. Wortman, "Beta Spectrum of Mn^{56}," Phys. Rev. 128, 2748 (1962).

Young Nok Kim

Y. N. Kim, The Atom (Published in Korea, 1950).

Y. N. Kim, Translation of "Mein Weltbilk" by A. Einstein (Published In Korea, 1952).

Y. N. Kim, Physics Textbook (Published in Korea, 1959, 3 vols.).

Y. N. Kim, Physics Textbook (Published in Korea, 1960, 3 vols.).

Y. N. Kim, "The Effects of the Nuclear Charge Polarization on the Elastic Scattering," Nuovo Cimento 22, 885 (1961).

Y. N. Kim, "Coulomb Disintegration of Mu-Mesonic Atoms," Phys. Letters 3, 33 (1962).

Y. N. Kim and H. C. Thomas, "Quadrupole Elastic Scattering of Alpha Particles by Polarized Nuclei," Phys. Rev. 148, 1083 (1966).

Y. N. Kim, "Quadrupole Effect of Polarized Nuclei on Elastic Scattering," Phys. Rev. 158, 984 (1967).

Y. N. Kim, "Quadrupole Effect on the Elastic Scattering of Alpha Particles by Polarized Nuclei," International Nuclear Physics Conference (Academic Press, 1967), p. 408.

Y. N. Kim, "Possibility of the Formation of the Muonium Water Molecule," Phys. Rev. Letters 20, 359 (1968).

Y. N. Kim, "Muonium and Mesonium Water Molecules," to appear in Nuovo Cimento.

Mohammad Arfin Khan Lodhi

M. A. K. Lodhi, "Configuration Mixing in ^{6}Li Wavefunction," Nuc. Phys. 66, 209 (1965).

M. A. K. Lodhi, "Elastic Electron Scattering by ^{6}Li," Nuc. Phys. 80, 125 (1966).

M. A. K. Lodhi, "Cluster Model Wavefunction of ^{6}Li," Nuc. Phys. A97, 449 (1967).

M. A. K. Lodhi, "Nucleon-Nucleon Interaction in ^{6}Li," Rev. Mod. Phys. 39, 593 (1967).

Glen Alan Mann

G. A. Mann and R. D. Spence, "Rotation of the Microwave Polarization in Liquid Crystals," Jour. of Appl. Phys. 25, 271 (1954).

G. A. Mann and C. D. Hause, "Magnetic Rotation Spectra of Nitric Oxide in the Near Infrared," J. Chem. Phys. 33, 1117 (1960).

Billy Jack Marshall

B. J. Marshall, "Specific Heat and Elastic Constants of NaI at Low Temperatures," Phys. Rev. 120, 332 (1960).

B. J. Marshall, "Elastic Constants of CsBr from 300°K to 4.2°K," Phys. Rev. 121, 72 (1961).

B. J. Marshall, "Ultrasonic Attenuation in Aluminum Ammonium Alum and Aluminum Potassium Alum," J. Appl. Phys. 38, 2116 (1967).

B. J. Marshall, "Elastic Constants of LiCl and RbCl from 300°K to 4.2°K," J. Phys. Chem. Solids 28, 1061 (1967).

B. J. Marshall, "Elastic Constants of KF from 300°K to 4.2°K," J. Appl. Phys. 38, 4749 (1967).

Raymond William Mires

R. W. Mires and C. C. Lin, "Effect of $_2$Electron Correlation and the Multiplet Structure of the $(3d)^2$ Configuration of Ti III and Cr V," Phys. Rev. 134, A332 (1964).

R. W. Mires, "Semi-Empirical Electron Correlation in the Carbon Atom," Phys. Rev. 155, 1 (1967).

R. W. Mires and D. J. Arnold, "High-Temperature Magnetic Susceptibility of Metallic V_2O_3 Single Crystals," J. Chem. Phys. 48, 2231 (1968).

R. W. Mires and A. R. Smith, "Low-Temperature Magnetic Anisotropy in $Al_2O_3:V^{3+}$," Phys. Rev. (accepted for publication).

R. W. Mires, "The Ground State of Helium-Like Atoms," Tex. J. Sci. 20 (June, 1968).

Charles Richard Quade

C. R. Quade, "A Numerical Solution for Hydrogen-Like Wave Equations," Proc. Okla. Acad. Sci. 41, 134 (1961).

C. R. Quade, "A Semi-Classical Derivation of the Contact Hyperfine Energy," Proc. Okla. Acad. Sci. 42, 186 (1962).

C. R. Quade, W. H. Brumage, and C. C. Lin, "Magnetic Susceptibilities of Vanadium-Doped Corundum Crystals," J. Chem. Phys. 37, 1368 (1962). Note.

C. R. Quade and C. C. Lin, "Internal Rotation in Completely Asymmetric Molecules. I. A General Theory and Analysis of the Microwave Spectrum of CH_2DCOH, CHD_2COH, and $CHOOCH_2D$," J. Chem. Phys. 38, 540 (1963).

C. R. Quade, W. H. Brumage, and C. C. Lin, "Magnetic Susceptibilities of Transition Elements in Host Crystals. I. V^{3+} in Corundum," Phys. Rev. 131, 949 (1963).

C. R. Quade, "Zeeman Effect in Molecules," Amer. J. Phys. 32, 634 (1964).

C. R. Quade, "Internal Rotation in Completely Asymmetric Molecules. II. Interactions between Vibration and Internal Rotation," J. Chem. Phys. 44, 2512 (1966).

C. R. Quade, T. H. E. Cottrell, and N. C. Andreadakis, "Magnetic Susceptibilities of Titanium-Doped Corundum Crystals," Phys. Letters 21, 7 (1966).

C. R. Quade, "Internal Rotation in Completely Asymmetric Molecules. III. Theory for Molecules with Two-Fold Barriers," J. Chem. Phys. 47, 1073 (1967).

C. R. Quade and J. V. Knopp, "Internal Rotation in Completely Asymmetric Molecules. IV. Energy Contributions from the α-Dependence of the Torsional Kinetic Energy," J. Chem. Phys. 48, 3317 (1968).

C. R. Quade, "Contributions of Internal Rotation to the Rotational Coefficients of Phenol," J. Chem. Phys. 48, 5490 (1968).

Billy Joe Sandlin

B. J. Sandlin and J. C. Thompson, "Precision Thermometer System for the Liquid Helium Region," Rev. Sci. Instr. 30, 659 (1959).

Henry Coffman Thomas

H. C. Thomas and Newton Underwood, "A Counter for Low Energy Ionizing Particles," Rev. Sci. Instr. 19, 637 (1948).

H. C. Thomas and S. K. Haynes, "The Use of Auger Electrons in Concidence Experiments," Phys. Rev. 74, 128 (1948).

H. C. Thomas and Newton Underwood, "A Counter for Low Energy Ionizing Particles," Phys. Rev. 74, 127 (1948).

D. A. Thomas, C. D. Broyles, S. K. Haynes, and H. C. Thomas, "The L to K Capture Ratio and Disintegration Energy of Sn 113," Phys. Rev. 82, 961 (1951).

H. C. Thomas, S. K. Haynes, and C. D. Broyles, "Absorption Studies of Sn 113 and In 113m," Phys. Rev. 83, 483 (1951).

Ernest D. Graves and H. C. Thomas, "A Proportional Counter for Auger Electrons," Phys. Rev. 95, 304 (1954).

A. Von Tienhoven, H. C. Thomas, and L. J. Dreesen, "The Effect of Sulfamethazine Feeding on the Thyroids, Combs, and Testes of Single Comb White Leghorn Cockerels," Poultry Science 35, 179 (1956).

B. H. Ketelle, H. C. Thomas, and A. R. Brosi, "Decay of the Cerium 139 Isomers," Phys. Rev. 103, 190 (1956).

A. R. Brosi, B. H. Ketelle, H. C. Thomas, and R. Kerr, "The Decay Schemes of Sm 145 and Pm 145," Phys. Rev. 113, 239 (1959).

H. C. Thomas, "The Electron Capture Ratio and the Conversion Coefficient of the 14.4 kev Gamma Ray in the Decay of Co 57," Nuc. Phys. 44, 268 (1963).

Y. N. Kim and H. C. Thomas, "Quadrupole Elastic Scattering of Alpha Particles by Polarized Nuclei," Phys. Rev. 148, 1083 (1966).

D. D. Armstrong, A. G. Blair, and H. C. Thomas, "(He^4,t) Reaction on Medium-Mass Nuclei," Phys. Rev. 155, 1254 (1967).

Lynn LaMar Hatfield

Lynn L. Hatfield, "Bolmer Emissions Induced by Proton Impact on Molecular Hydrogen," Phys. Rev. 130, 2318 (1963).

Lynn L. Hatfield, "Bolmer Emissions Induced by H_2^+ and H_3^+ Impact on Molecular Hydrogen," Phys. Rev. 131, 2556 (1963).

Lynn L. Hatfield, "Measurement of the Lamb Shift in the n = 4 Level of He^+: RF Spectroscopy Using Time Resolved Optical Detection," Phys. Rev. 156, 102 (1967).

Lynn L. Hatfield, "Polarized He^3-Ion Beam," Phys. Rev. Letters 20, 738 (1968).

APPENDIX III

GRANTS FOR RESEARCH IN PHYSICS SINCE 1963, EXCLUSIVE OF STATE-SUPPORTED RESEARCH

K. Das Gupta

AFOSR	May 1, 1967 through April 31, 1968	$30,000
AFOSR	May 1, 1968 through April 31, 1969	$30,000
Welch Foundation	May 1, 1968 through April 31, 1971	$60,000

D. A. Howe

Private	1967	$12,000

B. J. Marshall

Welch Foundation	May 1, 1965 through April 31, 1968	$60,000
Welch Foundation Supplement	May 1, 1966	$16,890
Welch Foundation	May 1, 1968 through April 31, 1971	$60,000

R. W. Mires

ARPA	Sept. 1, 1967 through Aug. 31, 1968	$34,026
ARPA	Sept. 1, 1968 through Aug. 31, 1969	$43,224

C. R. Quade

NSF	June 1, 1966 through May 31, 1968	$27,700
NSF	June 1, 1968 through May 31, 1970	$32,200
ARPA	Sept. 1, 1967 through Aug. 31, 1968	$21,834
Welch Foundation	May 1, 1968 through April 31, 1970	$24,000
ARPA	Sept. 1, 1968 through Aug. 31, 1969	$23,514

APPENDIX IV

FALL ENROLLMENTS FOR LAST ELEVEN YEARS

Year	Undergraduates	Graduates	Total Semester Hours
1967	1,083	108	4,486
1966	938	83	3,811
1965	1,124	78	4,582
1964	1,072	48	4,205
1963	963	25	3,561
1962	1,301	26	3,705
1961	1,237	27	3,165
1960	1,266	35	3,117
1959	1,641	30	4,005
1958	1,786	18	4,441
1957	1,939	4	4,696

APPENDIX V

BREAKDOWN OF ENROLLMENT IN 141, 142, 143, 241, 242

Physics Course	1967-68	1966-67	1965-66	1964-65	1963-64
242	125	137	204	185	127
241	396	400	525	405	389
143	614	422	700	610	572
142	313	270	244	225	205
141	437	394	332	315	282