

## NOTES

The following are among those who received doctorates in the mathematical sciences and related subjects from universities in the United States and Canada during 1956. In each case, the university, the month in which the degree was conferred, minor subjects (other than mathematics), and title of the dissertation are given.

Smbat Abian, Cincinnati, June, *Invariants and covariants of systems of linear differential and integro-differential equations.*

J. H. Ahlberg, Yale, June, *Algebraic properties of topological significance.*

F. E. Alzofon, California at Berkeley, September, *Multiple valued functions with two circles as branch curves and the Sommerfeld method.*

Douglas Anderson, California Institute of Technology, June, minor in aeronautics, *Invariant measures on groups.*

L. W. Anderson, Tulane, May, *Topological lattices.*

R. R. Archer, Massachusetts Institute of Technology, June, minor in electrical engineering, *Post buckling behavior of thin spherical shells.*

Steve Armentrout, Texas, June, Minor in physics, *On spirals in the plane.*

D. G. Aronson, Massachusetts Institute of Technology, February, minor in electrical engineering, *A boundary layer problem for a linear parabolic differential equation.*

R. L. Ashenurst, Harvard, June, *The structure of multiple-coincidence selection systems.*

R. P. Authement, Louisiana State, August, minor in physics, *Sums of irreducible polynomials with coefficients in  $GF(c)$ .*

George Bachman, New York, February, *Geometry in groups.*

J. L. Bagg, Michigan State, *A probability model for theory of organization of groups with multi-valued relations between persons.*

R. S. Ballance, Illinois, June, *Cauchy type representations for functions of a complex variable.*

L. C. Barrett, Utah, August, *Analytical solutions for the optimization of rocket trajectories.*

W. E. Baxter, Pennsylvania, June, *Lie simplicity of a special class of associative rings.*

Anatole Beck, Yale, June, *On the random ergodic theorem.*

H. F. Becksfort, Syracuse, September, *The solution of a functional equation arising from a fluid flow problem.*

Barry Bernstein, Indiana, June, minor in physics, *The differential equations of the stream lines for compressible flow of an ideal gas.*

A. A. Betser, Illinois Institute of Technology, June, *Studies in dynamic photoelasticity fringe values and beams under impact.*

R. E. Block, Chicago, August, *New classes of simple Lie algebras of characteristic  $p$ .*

R. M. Blumenthal, Cornell, September, *An extended Markov property.*

A. M. Bomberault, Carnegie Institute of Technology, September, *The application of variational methods to the flow of viscous fluids through elastic channels.*

G. W. Booth, New York, May, *A uniqueness theorem for the reduced plate equation.*

F. G. Brauer, Massachusetts Institute of Technology, June, minor in physics, *Singular self-adjoint boundary value problems for the differential equation  $Lx = \lambda Mx$ .*

C. F. Briggs, Michigan, February, *Semi-topological linear spaces.*

K. A. Brons, Illinois, June, minor in physics, *Groups, all of whose partials endomorphisms are extendable.*

F. P. Brooks, Jr., Harvard, June, *The analytic design of automatic data processing systems.*

Leon Brown, Minnesota, December, minor in physics, *Nonlinear equations in a Banach space.*

W. F. Brown, Indiana, June, minor in physics, *Certain problems related to pressure determination on two-dimensional supersonic airfoils.*

S. J. Bryant, Missouri, June, *Ordered rings.*

R. G. Buschman, Colorado, June, *Substitution theorems for integral transforms.*

G. C. Caldwell, North Carolina, August, *Application of method of successive approximations to the solution of functional equations.*

J. F. Carpenter, Jr., Oregon State, June, minor in physics, *On the Doppler frequency spectrum presented to a moving radar system by reflection from a rough plane earth.*

R. V. S. Chacon, Syracuse, June, *Some theorems on continuous parameter Markov chains.*

John Cocke, Duke, June, minor in physics, *The regular point.*

A. E. Danese, Rochester, June, *On Turan functions associated with the classical orthogonal polynomials, Bessel functions, and their derivatives.*

W. F. Davison, Virginia, June, *Mosaics.*

E. C. DeLand, California at Los Angeles, June, *On the separation of variables for Laplace's equation.*

A. P. Dempster, Princeton, June, *The two sample multivariate problem in the degenerate case.*

R. F. Dennemeyer, California at Los Angeles, June, *Quadratic forms in Hilbert space and second order elliptic differential equations.*

B. J. Derwort, St. Louis, June, *An extension of the theory of cumulative frequency functions.*

F. C. DeSua, Pittsburgh, June, *An extension of well-chainedness in metric spaces to Hausdorff spaces.*

Gus DiAntonio, Pittsburgh, June, *Summability of double series by abelian methods.*

Roberto Diaz-Fernandez, California at Berkeley, January, *Alternative rings and their regular ideals.*

Sylvain Ehrenfeld, Columbia, May, *Complete class theorems in design of experiments.* Part I. *Complete class theorems in experimental design.* Part II. *On the efficiency of experimental design.*

H. A. Eliopoulos, Toronto, November, *Methods of generalized metric geometry with applications to mathematical physics.*

T. A. Elkins, Carnegie Institute of Technology, June, *Conjugate harmonic functions in space.*

D. I. Epstein, New York, February, *Diffraction problems for the parabolic cylinder.*

I. J. Epstein, New York, February, *A study of integrals and integral equations arising in diffraction theory.*

C. C. Faith, Purdue, January, *Normal bases and Galois theory.*

E. H. Farr, Carnegie Institute of Technology, June, *On pseudo-analytic functions and elliptic equations.*

A. V. Fend, Illinois, June, *Unbiased estimation and admissibility and the treatment of ties in the sign test.*

T. S. Ferguson, California at Berkeley, June, Part I: *On the existence of linear regression in linear structural relations*; Part II: *A method of generating best asymptotically normal estimates with application to the estimation of bacterial densities.*

Barbara A. Foos, Notre Dame, July, *On the values of certain sets of modules.*

Marguerite J. S. Frank, Radcliffe, June, *New simple Lie algebras.*

Aubyn Freed, Illinois, June, minor in philosophy, *On the ergodic theorem in dynamical systems with variant measure.*

D. A. Gardiner, North Carolina State College, May, *Some third order rotatable designs.*

R. C. Gast, Carnegie Institute of Technology, June, I. *Half-plane diffraction with line source excitation.* II. *Diffraction by two parallel half-planes with line source excitation.*

D. P. Gaver, Jr., Princeton, June, *Some results in the theory of queues.*

Jesus Gil de Lamadrid, Michigan, February, *Topology of mappings in locally convex topological vector spaces, their differentiation and integration and application of gradient mappings.*

R. P. Goblirsch, Wisconsin, August, *Approximating the area of a surface with the area of a nearby polyhedral one.*

R. R. Goldberg, Harvard, June, *Generalized Lambert transforms.*

Lawrence Goldman, Columbia, May, *Specializations and Picard-Vessiot theory.*

Basil Gordon, California Institute of Technology, June, minor in physics, *Some Tauberian theorems connected with the prime number theorem.*

D. G. Gosslee, North Carolina State College, August, minor in climatology, *Level of significance and power of the unweighted means' test.*

E. E. Grace, North Carolina, August, *Certain properties of continua related to non-aposynthesis.*

Donald Greenspan, Maryland, June, *On vertices of space curves with respect to families of surfaces.*

H. P. Greenspan, Harvard, June, *Generation of edge waves by moving pressure distributions.*

R. M. Gundersen, Brown, June, *The flow of a compressible fluid with weak entropy changes.*

S. S. Gupta, North Carolina, August, *On a decision rule for a problem in ranking means.*

H. M. Gurk, Pennsylvania, February, *Extreme games, simple games, and finite solutions.*

Herman Hanish, New York, May, *On a certain class of Tauberian theorems.*

M. A. Hanhauser, St. Louis, June, minor in physics, *The generalized Bäcklund transformation.*

J. R. Hanna, Colorado, June, *The Dirichlet series transformation.*

Bruno Harris, Yale, June, *Galois theory of Jordan algebras.*

J. J. Harton, Jr., California at Berkeley, June, *Extremal problems for real star mappings.*

A. S. Hausner, Yale, June, *Group algebras of vector-valued functions.*

L. O. Heflinger, California at Berkeley, September, *Applications of the multiplication-interpolation method.*

L. L. Helms, Purdue, June, *Convergence properties of martingales indexed by directed sets.*

G. R. Herd, Iowa State, December, minor in economics, *Estimation of the parameters of a population from a multi-censored sample.*

W. A. Hijab, University of Florida, August, minor in civil engineering, *Application of Papkovitch functions to three-dimensional problems of elasticity.*

T. W. Hildebrandt, Michigan, June, I, *Iterative methods for the approximate solutions of linear algebraic systems*; II. *Self-adjointness in one-group multi-region diffusion problems.*

Harry Hochstadt, New York, February, *Addition theorem for and applications of functions of the paraboloid of revolution.*

K. M. Hoffman, California at Los Angeles, June, *Boundary behaviour of generalized analytic functions.*

Walter Hoffman, Michigan, June, *Group logics and restricted implication.*

V. E. Hoggatt, Jr., Oregon State, June, minor in physics, *The inverse Weierstrass  $p$ -function: numerical solution, related properties and applications.*

J. G. Horne, Jr., Tulane, August, *Concerning  $o$ -ideals.*

W. A. Howard, Chicago, December,  *$k$ -fold recursion and well-ordering.*

W. G. Howe, North Carolina, June, *Some contributions to factor analysis.*

Bernard Jacobson, Michigan State, August, *Sums of distinct divisors of rational integers and sums of distinct divisors of quadratic integers.*

Earl Janssen, California at Los Angeles, January, minor in engineering, I. *An analog method for solving the hydro-dynamic equations for two dimensional viscous flow.* II. *Application of the method to the case of flow past a flat plate.*

K. A. Johannes, Pittsburgh, February, *Plane anticollineations with distinct fixed or interchanging points and their representation in four space.*

M. V. Johns, Jr., Columbia, June, *Contributions to the theory of empirical Bayes procedures in statistics.*

G. P. Johnson, Minnesota, December, *Spaces of functions with values in a Banach algebra.*

R. D. Johnson, Jr., Virginia, June, *Homology regular convergence and local connectedness.*

R. W. Jollensten, Virginia, June, *Topological applications to functions of several complex variables.*

Meyer Jordan, New York, February, *A mixed boundary potential problem arising from a problem in ship motion.*

M. A. Kastenbaum, North Carolina State College, January, *Analysis of data in multiway contingency tables.*

C. L. Keller, Jr., Illinois, minor in philosophy, *Approximations of functions of several complex variables.*

R. R. D. Kemp, Massachusetts Institute of Technology, June, minor in physics, *The eigenvalue problem for a non-selfadjoint differential operator on the interval  $(-\infty, \infty)$ .*

O. M. Klose, University of Washington, June, *Topics in distribution-free statistics.*

Shochichi Kobayashi, University of Washington, June, *Theory of connections.*

E. E. Kohlbecker, Illinois, June, *Asymptotic properties of partitions.*

J. J. Kohn, Princeton, June, *A non-selfadjoint boundary value problem on pseudo-Kähler manifolds.*

Anthony Kooharian, Brown, June, *On a class of singular perturbations.*

W. E. Koss, Illinois, June, minor in philosophy, *On four parameter families of quadratic surfaces.*

Frank Kozin, Illinois Institute of Technology, June, *Probability measure and integration of functionals.*

A. H. Kruse, Chicago, June, *Introduction to the theory of block assemblages of and development in the theory of retraction.*

T. E. Kurtz, Princeton, June, *An extension of a multiple comparisons procedure.*

Anneli Lax, New York, June, *Cauchy's problem for a partial differential equation with real multiple characteristics.*

Walter Littman, New York, February, *On the existence of periodic waves near critical speed.*

T. P. G. Liverman, Pennsylvania, June, *Zeros of neighboring infinitely differentiable functions.*

Leo Lopidus, Michigan State, August, *Lattice metrized spaces.*

D. B. Lowdenslager, Virginia, June, *Duality in partially ordered vector spaces.*

R. A. Luebbe, Cincinnati, June, *Cesàro summability factors for  $L.P.$  spaces.*

E. J. Lytle, Jr., University of Florida, June, minor in economics, *The determination of some distributions for which the mid-range is an efficient estimator of the mean.*

W. S. McCulley, Texas, June, minor in physics, *Integration formulae and boundary conditions for the hyperbolic differential equation with three independent variables and regions interior to the cone.*

Edward McDowell, Illinois Institute of Technology, June, *On the steady-state thermoelastic problem.*

F. S. McFeely, Virginia Polytechnic Institute, June, *Decision procedures for the comparison of exponential and geometric populations.*

H. C. McKenzie, Colorado, August, *On the zeros of successive derivatives of an analytic function.*

Michel McKiernan, Illinois Institute of Technology, June, *The functional differential equation,  $Df^{-1}=f$ .*

R. C. MacCamy, California at Berkeley, January, *Linear boundary problems arising in the diffraction of waterwaves by surface obstacles.*

J. H. MacKay, North Carolina, June, *On the efficiency of certain tests for  $2 \times 2$  tables.*

T. A. Magness, California at Los Angeles, *The use of cumulants in the theory and applications of stochastic processes.*

Angelo Margaris, Cornell, September, *A problem of Rosser and Turquette in many-valued logic.*

C. E. Marshall, Iowa State, December, minor in economics, *Cost control of sample surveys by two-step design.*

Ceslovas Massaitis, Tennessee, June, *The complement of a dendrite in compactified 3-space.*

J. S. Maybee, Minnesota, December, minor in philosophy, *On some problems suggested by the mathematical theory of compressible flow.*

Z. A. Melzak, Massachusetts Institute of Technology, June, minor in physics, *Existence of the solutions of a scalar transport equation.*

Pinchas Mendelson, Princeton, June, *On isolated singularities of differential equations with one zero characteristic root.*

T. J. Mentel, Brown, June, *Some problems in the large plastic deformation of beams under dynamic loading.*

D. M. Mesner, Michigan State, June, *An investigation of certain combinatorial properties of partially balanced incomplete block experimental designs and associated schemes, with study of latin square and related types.*

Marshall Middleton, Jr., Pittsburgh, August, *A method for finding the characteristic roots and vectors of an arbitrary real symmetric matrix.*

Irwin Miller, Virginia Polytechnic Institute, June, *Tests of hypotheses involving desirability relations and some distribution theory connected with Gaussian processes.*

S. K. Mitra, North Carolina, June, *Contributions to the statistical analysis of categorical data.*

Barbara C. Morrison, Brown, June, *Stress-deformation relations for isotropic time-independent materials.*

J. A. Morrison, Brown, June, *Small, forced oscillations in an ideal, rotating liquid and the slow motion of a disc along the axis of a viscous rotating liquid.*

D. E. Moser, Pittsburgh, June, *Inclusion relations involving the circle method of summability.*

J. R. Munkres, Michigan, February, *Some applications of triangulation theorems.*

Isaac Namioka, California at Berkeley, June, *On partially ordered linear topological spaces.*

J. D. Neff, University of Florida, August, minor in electrical engineering, *A study of Heun's differential equation.*

Mary M. Neff, University of Florida, August, minor in philosophy, *On lattice-ordered rings.*

G. L. Neidhardt, Illinois Institute of Technology, January, *On the transmission of a concentrated load into the interior of an elastic body.*

A. R. S. Nerode, Chicago, June, *Composita, equations and recursive definitions.*

T. D. Oxley, Jr., Purdue, June, *A study of a generalized factorial series.*

R. S. Palais, Harvard, June, *A global formulation of the Lie theory of transformation groups.*

F. J. Palas, Oklahoma, June, Minor in physics, *The polynomials generated by  $f(t) \exp(p(x)u(\tau))$ .*

G. I. Paul, North Carolina State College, January, minor in genetics, *A method of estimating epistatic variance in random mating populations.*

W. H. Peirce, Wisconsin, August, *Numerical integration over planar regions.*

W. E. Perrault, St. Louis, June, *Contributions to distribution-free population comparisons.*

J. W. Pratt, Stanford, January, *Some results in the decision theory of one-parameter multivariate Pólya type distributions.*

R. W. Preisendorfer, California at Los Angeles, June, *A mathematical foundation for radiative transfer theory.*

J. J. Price, Pennsylvania, June, I. *Some duality theorems.* II. *On the characters of certain compact abelian groups.*

P. A. Puhach, McGill, May, *On the contributions of Mesen exchange currents to the radiative moments of nuclei.*

Ronald Pyke, University of Washington, August, *On one-sided distribution-free statistics.*

Roy Radner, Chicago, *Team decision problems.*

Mushfequr Rahman, McGill, October, *A statistical problem in the geometry of numbers (star-shaped domains of quadratic and hexagonal symmetry).*

L. B. Rall, Oregon State, June, minor in physics, *The quadratic formula in Banach space.*

Anthony Ralston, Massachusetts Institute of Technology, June,

minor in electrical engineering, *Two problems in the buckling of thin elastic shells.*

Elvira S. Rapaport, New York, February, *On the reduction of words in the free group on three generators.*

R. W. Rector, Maryland, June, *Coloring seven-rings.*

B. L. Reinhart, Princeton, June, *Harmonic integrals on almost product manifolds.*

P. D. Ritger, New York, February, *The evaporation of a drop of liquid in a confined glass.*

W. L. Roach, Jr., Oregon, June, *The application of the exponential distribution to a truncated stochastic process.*

H. L. Rolf, Vanderbilt, June, minor in physics, *Free lattices generated by a set of chains.*

F. E. Romie, California at Los Angeles, June, minor in engineering, *Heat transfer to fluids flowing with velocity pulsations in a pipe.*

N. J. Rose, New York, May, *Minimum time solutions of differential equations with a discontinuing forcing term.*

Joan R. Rosenblatt, North Carolina, June, minor in economics, *On a class of non-parametric tests.*

G. C. Rota, Yale, June, *Extension theory of differential operators.*

A. R. Roy, Stanford, April, *On  $\chi$  square statistics with variable intervals.*

J. S. Rustagi, Stanford, April, *On minimizing and maximizing a certain integral with statistical applications.*

Jerome Sacks, Cornell, September, *Asymptotic distribution of stochastic approximation procedures.*

E. M. Saleme, Illinois Institute of Technology, June, *Stress concentration around a circular inclusion in a semi-infinite elastic plate.*

S. C. Saunders, University of Washington, August, *Sequential and randomized distribution-free tolerance limits.*

N. W. Savage, Jr., California at Los Angeles, June, *Weak boundary components of an open Riemann surface.*

L. A. Schmittroth, Jr., Stanford, January, *Deformation classes of conformal mappings.*

D. E. W. Schumann, Virginia Polytechnic Institute, June, *The comparison of the sensitivities of experiments using different scales of measurement.*

Berthold Schweizer, Illinois Institute of Technology, June, *Jacobi series and the numerical solution of eigenvalue problems.*

R. C. Seber, State University of Iowa, February, *The development and organization of teaching materials in a collegiate mathematics program for students of the nonphysical sciences.*

C. F. Sebesta, Pittsburgh, February, *A quartic hypersurface invariant under the collineations of the simple group of order 660 in six variables.*

R. G. Segers, Purdue, January, minor in electrical engineering, *On the initial value problem for systems of partial differential equations with several time-like variables.*

J. A. Seiler, Brown, June, *Plastic deformation of a circular arch under dynamic loading.*

Lily H. Seshu, Illinois, October, minor in electrical engineering, *On the number of simultaneous representations of a given pair of integers as the sum of four integers and the sum of their squares.*

Arthur Shapiro, California at Berkeley, June, *Some conditions for the existence of similar regions.*

R. D. Sheffield, Tennessee, August, minor in physics, *On pseudo-inverses of linear transformations in Banach spaces.*

Abe Sklar, California Institute of Technology, June, minor in physics, *Summation formulas associated with a class of Dirichlet series.*

Paul Slepian, Brown, June, *Theory of Lebesgue area of continuous maps of 2-manifolds into  $n$ -space.*

A. H. Smith, University of Southern California, September, *Homology of spaces with operators.*

G. F. Smith, Brown, June, *The thermodynamic potential functions for anisotropic materials.*

L. A. Smith, McGill, October, *The ejection of  $K$ -electrons by Beta decay.*

R. T. Smith III, George Washington University, June, *A stochastic model for economic time series.*

Gustave Solomon, Massachusetts Institute of Technology, February, minor in music, *Noncommutative rings of valuation vectors.*

L. M. Sonneborn, California Institute of Technology, June, minor in physics, *Level sets on spheres.*

H. E. Speece, North Carolina, June, *Collineations in non-Riemannian spaces.*

R. A. Spinelli, New York, February, *Infinite dock of variable thickness in a running stream.*

Arthur Steger, California at Berkeley, January, *Idempotent matrices over commutative rings.*

Shlomo Sternberg, Johns Hopkins, November, *Some problems in discrete nonlinear transformations in one and two dimensions.*

Andrew Sterrett, Pittsburgh, June, *An efficient method for the detection of defective members of large populations.*

D. A. Storvick, Michigan, February, *The boundary behavior of*

*meromorphic and pseudo-meromorphic functions.*

G. R. Strohl, Jr., Maryland, June, *Strongly cyclic Peano spaces.*

C. A. Swanson, California Institute of Technology, June, minor in physics, *Asymptotic expansions of characteristic values and functions of a second order ordinary linear differential operator.*

H. C. Sweeny, Virginia Polytechnic Institute, June, *Analyses of experiments with correlated observations and heterogeneous variances.*

E. J. Taft, Yale, June, *Invariant Wedderburn factors.*

J. G. C. Templeton, Princeton, *A test for detecting single cell disturbances in contingency tables.*

Aram Thomasian, California at Berkeley, September, *On the magnitude of the sum of error probabilities.*

H. F. Trotter, Princeton, June, *Convergence of semi-groups of operators.*

D. R. Truax, Stanford, *Decision problems for the multivariate exponential family.*

B. M. Wall, Texas, January, *Some convergence sets for a continued fraction.*

C. J. Wallen, St. Louis, June, minor in physics, *A generalized Hansen series.*

M. W. Weaver, Texas, June, *The application of cosets and correspondences in the theory of semigroups.*

Guido Weiss, Chicago, December, *On certain classes of functions spaces and on the interpolation of sublinear operators.*

Irving Weiss, Stanford, *Limiting distributions in some occupancy problems.*

Oscar Wesler, Stanford, January, *A modified minimax principle.*

J. W. Wilkinson, North Carolina, June, *Analysis of paired comparison designs with incomplete repetitions.*

L. K. Williams, California at Berkeley, June, *On separating transcendency bases.*

M. J. Willis, Purdue, January, minors in education and psychology, *Generalizations in a certain class of non-linear regression problems.*

J. W. Woll, Jr., Princeton, June, *Homogeneous stochastic processes.*

E. T. W. Wong, Rochester, June, *The singular ideal and the maximal right quotient rings of a left faithful ring.*

R. C. Wrede, Indiana, September, minor in physics, *"n" dimensional considerations of basic principles A and B of the unified theory of relativity.*

Martin Wright, Rice, June, *Asymptotic Dirichlet series in a strip.*

Mishael Zedek, Harvard, June, *On generalized Tchebycheff polynomials.*

R. E. Zindler, Michigan State, June, *The qualitative behavior of integral curves of systems, their differential equations near a singular point.*

The following doctorates were conferred in 1955, but were not included in the list in the preceding volume of this Bulletin (vol. 62, pp. 278–290):

Robert Ackerson, Alabama Polytechnic Institute, August, *Properties of solutions of certain matrix equations of the type  $AX + XB$ .*

F. B. Sloss, Northwestern, August, *A self-adjoint boundary value problem with end conditions involving the characteristic parameter.*