

CALIFORNIA INSTITUTE OF TECHNOLOGY

*Seventy-Fourth
Annual Commencement
June 7, 1968*



CALIFORNIA INSTITUTE OF TECHNOLOGY

Seventy-Fourth
Annual
Commencement

FRIDAY AFTERNOON AT FOUR-THIRTY O'CLOCK
JUNE SEVENTH, NINETEEN SIXTY-EIGHT

Academic Procession

Chief Marshal, David S. Wood, Ph.D.

Assistant Marshals

William H. Corcoran, Ph.D. Richard A. Dean, Ph.D.
Wolfgang G. Knauss, Ph.D. David F. Welch, I.D.

MARCHING ORDER

Division I

CANDIDATES FOR THE DEGREE OF BACHELOR OF SCIENCE
CANDIDATES FOR THE DEGREE OF MASTER OF SCIENCE
CANDIDATES FOR THE DEGREE OF ENGINEER
CANDIDATES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Division II

THE FACULTY
THE CHAIRMEN OF DIVISIONS
THE DEANS
THE PROVOST
THE TRUSTEES
THE COMMENCEMENT CHAPLAIN
THE PRESIDENT
THE CHAIRMAN OF THE BOARD OF TRUSTEES

Program

CALIFORNIA INSTITUTE OF TECHNOLOGY
SEVENTY-FOURTH
ANNUAL COMMENCEMENT

PRESIDING: ARNOLD O. BECKMAN, Ph.D., LL.D.

Chairman of the Board of Trustees

PRELUDE AND PROCESSIONAL

Organist: James H. Shearer, A.R.C.M., A.R.C.O.

INVOCATION . Rabbi Maurice T. Galpert, M.A., M.H.L.

Pasadena Jewish Temple and Center

COMMENCEMENT ADDRESS

"Science and Society"

Frederick Seitz, Ph.D., D.Sc.

President, National Academy of Sciences

Program—continued

CONFERRING OF DEGREES . . . Lee A. DuBridge, Ph.D., Sc.D.

President of the California Institute of Technology

PRESENTATION OF CANDIDATES FOR DEGREES

For the degree of Bachelor of Science . . . Foster Strong, M.S.

*Dean of Freshmen
representing the Dean of Students*

For the degree of Master of Science . . . Harold Lurie, Ph.D.

Associate Dean of Graduate Studies

For the degree of Engineer . . . H. Frederic Bohnenblust, Ph.D.

Dean of Graduate Studies

For the degree of Doctor of Philosophy . . . Dean Bohnenblust

CONCLUDING REMARKS President DuBridge

BENEDICTION Rabbi Galpert

RECESSIONAL Mr. Shearer

*The audience is requested to remain standing until
the end of the Recessional*

Candidates for Degrees

BACHELOR OF SCIENCE

- Bruce W. Baillie, *Canton, Ohio*. English.
Robert Lee Bell, *Glendale, California*. Physics.
Peter Bernard Bendix, *Portland, Oregon*. Physics.
Richard Wayne Bild, *Placitas, New Mexico*. Chemistry.
William George Bloom, *Prairie Village, Kansas*. Chemical Engineering.
Peter Samuel Bloomfield, *Winthrop, Massachusetts*. Economics.
Kellogg Speed Booth, *Portuguese Bend, California*. Mathematics.
Jacques Gregori Bourque, *Babylon, New York*. Astronomy.
Paul S. Brandon, *Kent, Washington*. Economics.
Gregory John Brewer, *Malibu, California*. Biology.
Johan Michael Brinch, *Oslo, Norway*. Engineering.
Larry Robert Brown, *Portville, New York*. Chemistry.
Charles Joseph Bruce, *Savannah, Georgia*. Mathematics.
Terry Ronald Bruns, *La Puente, California*. Geophysics.
Douglas Lee Brutlag, *Albuquerque, New Mexico*. Biology.
James Edward Burns, *Atlanta, Georgia*. Mathematics.
Robert Duncan Campbell, *Downey, California*. Chemistry.
Bruce Alan Carter, *Hydesville, California*. Geology.
Michael Alan Casteel, *Auburn, Washington*. Physics.
Robert Nai-Young Chan, *Hong Kong*. Physics.
Daniel Pan Yih Chang, *Los Angeles, California*. Engineering.
David Chang, *Silver Spring, Maryland*. Physics.
Edward Jay Chapyak, *Montrose, New York*. Engineering.
Randall Bramston Cook, *Long Beach, California*. Chemistry.
Peter Stanley Cross, *North Hollywood, California*. Engineering.
Thomas Mills Dailey III, *Panama City, Florida*. Physics.
John Stanley Dancz, *Clifton, New Jersey*. Chemistry.
Erno Scipiades Daniel, *Santa Barbara, California*. Chemistry.
Roger Alvernaz Davidheiser, *Lodi, California*. Physics.
Charles Edward Dean, Jr., *Olympia, Washington*. Mathematics.
Henry Koch Dewitt, *Oakland, California*. Mathematics.
Paul Emmanuel Dimotakis, *Athens, Greece*. Physics.
Philip Doberne, *North Hollywood, California*. Mathematics.
James Eugene Downum, *Denver, Colorado*. Physics.

Students whose names appear in boldface type are being graduated with honor in accordance with a vote of the Faculty.

BACHELOR OF SCIENCE—continued

- Richard Edwin Drews**, *Brielle, New Jersey*. English.
- Ronald Phillip Drucker**, *Roseville, California*. Chemistry.
- Denis Anthony Elliott, *San Gabriel, California*. Astronomy.
- Leonard Ardel Erickson, Jr., *Tacoma, Washington*. Biology.
- David Charles Erlich, *Los Angeles, California*. Physics.
- Aaron Louis Felder, *Jeannette, Pennsylvania*. Mathematics.
- Frederic Arthur Ferdman**, *Studio City, California*. Mathematics.
- Lester Alan Fetting, *Glendale, Brooklyn, New York*. Engineering.
- Robert Steven Firestone, *Sepulveda, California*. Biology.
- Leslie Gary Fishbone**, *Elizabeth, New Jersey*. Physics.
- Richard Alan Flammang**, *Encino, California*. Physics & Economics.
- Martin Richard Flannery, *Granby, Connecticut*. Physics.
- William G. Fowler, *Suffern, New York*. Mathematics.
- Curtis L. Frank, Jr., *Evansville, Indiana*. Engineering.
- John Allen Frazzini, *Denver, Colorado*. Physics.
- Jay Reynolds Freeman**, *Burlington, Vermont*. Physics.
- Carl A. Friedlander, *North Bellmore, New York*. English.
- Kenneth Douglas Garbade**, *New Hyde Park, New York*. Physics & History.
- Eric Robert Garen**, *Rancho Cordova, California*. Engineering.
- Walter Christian Gish**, *Colton, California*. Physics.
- Gary Lunt Godfrey**, *San Francisco, California*. Physics.
- Stuart Robert Goodgold**, *Torrance, California*. Mathematics.
- Donald Robert Goral**, *Los Angeles, California*. Mathematics.
- Barton Joel Gordon**, *Malden, Massachusetts*. Engineering.
- Edward John Groth III**, *Scottsdale, Arizona*. Physics.
- Gregory Scott Harkness**, *Tampa, Florida*. Physics.
- Ulli Georg Hartmann, *Mountain View, California*. Engineering.
- Jon Robert Haviland, *Radnor, Pennsylvania*. Engineering.
- Brad Lee Holian**, *Worland, Wyoming*. Chemistry.
- Frederick John Hollander**, *Pacific Palisades, California*. Chemistry.
- James William Howell, *Sheridan, Wyoming*. Biology.
- James Charles Hunter**, *Los Angeles, California*. Chemistry.
- David Lee Isaman**, *San Jose, California*. Engineering.
- Nathan Gerald Isgur**, *South Houston, Texas*. Physics.
- Clayton William Jacobsen**, *Littleton, Colorado*. Chemistry.
- Walter Joseph Jaffe**, *Granada Hills, California*. Astronomy.
- Vincent Robinson Johns, *Pottstown, Pennsylvania*. Mathematics.
- Delmar Lee Johnson, *Brownsburg, Indiana*. Engineering.
- Herbert Jubin, *Hayward, California*. Economics.
- Lawrence Joseph Karr, *Torrance, California*. Economics & Engineering.
- Raymond Robert Kawal, *Sepulveda, California*. Engineering.

BACHELOR OF SCIENCE—continued

- Ralph Frederick Kimbrell, *Montgomery, Alabama*. Engineering.
Jules Michael Kline, *Chicago, Illinois*. Chemistry.
David Allen Kolb, *St. Joseph, Illinois*. Chemistry.
Gregory Nicolas Kourilsky, *Los Angeles, California*. Mathematics.
Kermit Rudolph Kubitz, *Janesville, Wisconsin*. Economics.
Steven Barry Landy, *Los Angeles, California*. Physics.
Allen Donald Lee, *Norwalk, California*. Engineering.
John Marquardt Lehman, *Portland, Oregon*. Engineering.
Jeffrey Samuel Leon, *Sacramento, California*. Mathematics.
Simon Rock Levinson, *New City, New York*. Biology.
Barry Richard Lieberman, *Gardena, California*. Physics.
Richard Glenn Ligon, *Almont, Michigan*. Mathematics & Economics.
Wayne Anthony Lobb, *Bedford, New Hampshire*. English.
Robert Shelley Logan, *Clinton, Iowa*. Engineering.
Samuel Ernest Logan, *Woodland Hills, California*. Physics.
Sali Gee-Chung Ma, *Monterey Park, California*. Engineering.
David Michael MacKenzie, *La Crescenta, California*. Engineering.
David Frantz Macy, *Austin, Minnesota*. Engineering.
James Anthony Maiorana, *Boonsboro, Maryland*. Mathematics.
Willard Graham Manning, Jr., *Aurora, Colorado*. Economics.
Robert Marcel Mattheyses, *North Hollywood, California*. Engineering.
Walter William Matyskiela, Jr., *Farmington, Connecticut*. Chemistry.
Craig Darryl Maxwell, *Arcadia, California*. Physics.
Craig James McAllister, *Trumbull, Connecticut*. Chemistry.
David Bruce McKay, *Waterville, Washington*. Physics.
John W. McKenzie, *Duluth, Minnesota*. Physics.
James Cyrus McWilliams, *Tulsa, Oklahoma*. Engineering.
John Middleditch, *Tucson, Arizona*. Physics.
Stanley Craig Nelson, *El Paso, Texas*. Physics.
Gary Stephen Nix, *Palm Springs, California*. Physics.
Richard Alan Norman, *Los Altos, California*. Engineering.
Donald Paul Olshove, *Glenwood Springs, Colorado*. Engineering.
Peter Dorrington Orsburn, *Pasadena, California*. Mathematics.
William Franklin Pate, *Phoenix, Arizona*. Economics.
Spencer Gordon Pearson, *Wyckoff, New Jersey*. Engineering.
Luther B. Perry, *Watsonville, California*. Physics.
Dean Edwin Peterson, *Des Moines, Iowa*. Engineering.
Harold L. Petrie, *Arcadia, California*. Engineering.
Phillip Roy Pfaffman, *Savannah, Georgia*. Mathematics.
Gregory George Pihos, *Sacramento, California*. Physics.

BACHELOR OF SCIENCE—continued

- Sanford Mark Pokras**, *Encino, California*. Chemistry.
Steven Edward Poltrock, *Seattle, Washington*. Engineering.
Wally Ewald Rippel, *Hollywood, California*. Physics.
Peter Alan Rumsey, *Berkeley, California*. Mathematics.
Walter Lawrence Ruzzo, *Marion, Ohio*. Mathematics.
Craig L. San Pietro, *Forest Hills, New York*. Engineering.
Norman Jensen Schofield, Jr., *Morris Plains, New Jersey*. Physics.
Marshall I. Schor, *Visalia, California*. Engineering.
Allen John Schwenk, *Milwaukee, Wisconsin*. Mathematics.
Edward Stephen Seguine, *Montebello, California*. Chemical Engineering.
David John Shirley, *Mobile, Alabama*. Mathematics.
Baruch Thomas Soifer, *Los Angeles, California*. Physics.
Craig Spencer, *Albany, Oregon*. Physics.
James Hammons Stanley, *Northridge, California*. Physics.
Robert Ernest Starrett, *Atlanta, Georgia*. Engineering.
Bruce Allen Stern, *Los Angeles, California*. Chemistry.
John Charles Stevens, *Pasadena, California*. Physics.
William Van Dover Stoecker, *St. Louis, Missouri*. Mathematics.
Robert Bruce Stokes, *San Jose, California*. Engineering.
Harry Brown Thacker, Jr., *Tucson, Arizona*. Physics.
Edward Floyd Thompson, *Sacramento, California*. Engineering.
Gregory Allan Thompson, *Los Angeles, California*. Chemistry.
Joseph David Titlow, *Tacoma, Washington*. Engineering.
George Kenton Tucker, *Grand Junction, Colorado*. Engineering.
Raymond Lloyd Wakefield, *Turlock, California*. Engineering.
John Franklin Walters, *Riverside, California*. Biology.
Dennis Miles Weaver, *Sacramento, California*. Astronomy.
Earl Glen Whitehead, Jr., *Rancho Santa Fe, California*. Mathematics.
Norman McKee Whiteley, *Portland, Oregon*. Chemistry.
Eric Wickstrom, *Evanston, Illinois*. Biology.
John Richard Wilschke, *Horsham, Pennsylvania*. Engineering.
Charles Allan Wolfe, *North Hollywood, California*. Engineering.
William Stephen Woodward, *Los Angeles, California*. Engineering.
Rufus Woody III, *Clovis, New Mexico*. Physics.
Neil Richard Wright, *Cincinnati, Ohio*. Economics.
Richard Weston Wright, *Midland, Texas*. Engineering.
William Allen Wright, *Phoenix, Arizona*. Geology.
Kenneth Teiji Yano, *Hilo, Hawaii*. Engineering.
Charles Peretz Zeller, *San Antonio, Texas*. Engineering.

MASTER OF SCIENCE

- Bernard Ikecukwu Afoeju (*Mechanical Engineering*). B.S., Yale University, 1967.
- Pomalai Vijayan Anandamohan (*Aeronautics*). B.E., Coimbatore Institute of Technology, 1967.
- Vijay Hanumappa Arakeri (*Mechanical Engineering*). B.S., Utah State University, 1967.
- Alain Adrien Artaud (*Electrical Engineering*). Ing., Ecole Polytechnique (Paris), 1964; Ing., Ecole Nationale Supérieure de l'Aéronautique (Paris), 1967.
- Jerome Martin Auerbach (*Mechanical Engineering*). Sc.B., Brown University, 1967.
- Christopher Henry Bajorek (*Electrical Engineering*). A.A., Pasadena City College, 1964; B.S., California Institute of Technology, 1967.
- George Nick Balanis (*Electrical Engineering*). B.S., California Institute of Technology, 1967.
- Stephen Joseph Barker (*Engineering Science*). B.S., Harvey Mudd College, 1967.
- Ricardo Pablo Belloni (*Aeronautics*). B.S., Northrop Institute of Technology, 1967.
- Edward Francis Bernard (*Physics*). B.S., Oregon State University, 1966.
- Roland Charles Binst (*Mechanical Engineering*). Ing. Civ., Ing. Mech., Université de Louvain, 1965; Dipl. Nuclear Sc., 1967.
- Donald Campbell Brabston, Jr. (*Applied Mathematics*). B.S., Georgia Institute of Technology, 1967.
- Leonard William Brownlow, Jr. (*Electrical Engineering*). B.A., Pomona College, 1966; M.S., University of Arizona, 1967.
- Jeffrey Allen Burke (*Electrical Engineering*). B.S.E.E., University of Michigan, 1967.
- Tim Jay Burns (*Mechanical Engineering*). B.S., University of Redlands, 1967.
- Michael Akylas Caloyannides (*Electrical Engineering*). B.S., California Institute of Technology, 1967.
- Frank Udo Canis (*Mechanical Engineering*). B.Eng., McGill University, 1967.
- Douglas Arthur Carne (*Applied Mechanics*). A.B., Occidental College, 1965; B.S., California Institute of Technology, 1967.
- Lucian Carlton Carter III (*Physics*). B.A., University of Texas, 1960; B.S. (Chem), 1960; B.S. (Ph.), 1961.
- Sung Jen Chen (*Chemical Engineering*). B.S., National Taiwan University, 1962; M.S., Kansas State University, 1965.
- John Pierce Classen (*Aeronautics*). B.S.E., Princeton University, 1966.
- Barry Michael Cohen (*Mechanical Engineering*). B.S., Northeastern University, 1967.
- Russel Elliot Cole (*Electrical Engineering*). B.S., University of California (Berkeley), 1967.
- Nolan Gerald Core (*Engineering Science*). A.B., Harvard University, 1967.

MASTER OF SCIENCE—*continued*

- Gerald Michael Cotreau (*Electrical Engineering*). A.A., Pensacola Junior College, 1964; B.S., University of Florida, 1967.
- Luc Philippe Marie Cyrot (*Electrical Engineering*). Ing., Ecole Nationale Supérieure de l'Aéronautique, 1967.
- John Charles Dean (*Electrical Engineering*). B.S., University of California (Santa Barbara), 1967.
- Paul Maurice Debrule (*Engineering Science*). Ing. Physicien, Université de Liège, 1967.
- Terry Joseph Delph (*Aeronautics*). B.A.E., Georgia Institute of Technology, 1967.
- William Michael Denny (*Physics*). B.S., St. Louis University, 1964.
- Samuel Digirolamo (*Aeronautics*). B.S., St. Louis University, 1967.
- Charles Joseph Dixon (*Electrical Engineering*). B.S., University of Washington, 1967.
- Robert Joseph D'Orazio (*Electrical Engineering*). B.S., Drexel Institute of Technology, 1967.
- William Jack Driskell (*Biology*). B.S., University of Georgia, 1967.
- Robert George Dunlap (*Aeronautics*). S.B., Massachusetts Institute of Technology, 1967.
- Joseph Daniel Dupcak (*Aeronautics*). B.S.E., Princeton University, 1967.
- Paul Marie Dupont (*Aeronautics*). Ing., Université de Louvain, 1967.
- Edward Norton Evans (*Electrical Engineering*). B.S., University of California (Berkeley), 1967.
- James Edward Fisher (*Geology*). B.S., Villanova University, 1966.
- Jacques Pierre Fleuret (*Electrical Engineering*). Ing., Ecole Nationale Supérieure des Télécommunications, 1967.
- Michael Glen Foley (*Aeronautics*). B.S., California Institute of Technology, 1967.
- Blair Allen Folsom (*Mechanical Engineering*). B.S., California State College at Long Beach, 1967.
- Kirby William Fong (*Applied Mathematics*). B.S., University of California (Berkeley), 1967.
- Dennis Masato Furuike (*Applied Mechanics*). A.B., Occidental College, 1967; B.S., California Institute of Technology, 1967.
- Detlef Hain Garbrecht (*Civil Engineering*). Diplom-Ingenieur, Technische Hochschule Karlsruhe, 1967.
- Philip Wayne Garrison (*Aeronautics*). B.S.Ae.E., Auburn University, 1965.
- Norton Robert Greenfeld (*Engineering Science*). B.S., California Institute of Technology, 1967.
- Ryusuke Hasegawa (*Electrical Engineering*). B.E., Nagoya University, 1962; M.E., 1964.
- Jimmy Lee Held (*Mechanical Engineering*). B.S., California Institute of Technology, 1967.
- John Anthony Hoef, Jr. (*Aeronautics*). B.S., St. Louis University, 1967.

MASTER OF SCIENCE—continued

- Bruce Lynn Hopper (*Mechanical Engineering*). B.S., Texas A & M University, 1967.
- Duane Thomas Hove (*Aeronautics*). B.S., University of Minnesota, 1967.
- Myung Kyu Hwang (*Chemical Engineering*). B.S., Seoul National University, 1965.
- Michael Stephen Hyland (*Civil Engineering*). B.C.E., Manhattan College, 1967.
- James Gregory Jerrell (*Electrical Engineering*). S.B., Massachusetts Institute of Technology, 1967.
- Ender Mustafa Kaya (*Civil Engineering*). B.S., C. W. Post College, 1967.
- Ronald Harrison Knapp (*Mechanical Engineering*). B.S., University of Hawaii, 1967.
- Gary Don Knott (*Engineering Science*). B.A., American University (Washington, D.C.), 1964.
- Toby Martin Kolstad, Jr. (*Applied Mechanics*). B.S., Tulane University, 1967.
- James Anthony Komarek (*Electrical Engineering*). B.S., Iowa State University, 1967.
- Jacques Jean Lerau (*Civil Engineering*). Dipl., Institut National Des Sciences Appliquées (Toulouse), 1967.
- Lucien Benjamin Levy (*Mathematics*). B.A., University of California (Los Angeles), 1966.
- Michael Jay Lineberry (*Mechanical Engineering*). B.S., University of California (Los Angeles), 1967.
- Richard Elmer Lowe (*Civil Engineering*). B.E., University of Southern California, 1951.
- Michael Majteles (*Engineering Science*). B.S., University of California (Berkeley), 1967.
- Dean Anthony Malencik (*Biology*). B.S., University of Notre Dame, 1965.
- Ernesto R. Martin (*Mechanical Engineering*). B.S., University of Florida, 1967.
- Wallace William Martin (*Mechanical Engineering*). B.A.Sc., University of Toronto, 1967.
- Mario Martínez-García (*Physics*). Lic. Ciencias Físicas, Instituto Tecnológico y de Estudios Superiores de Monterrey, 1965.
- Warren Louis McBride (*Chemical Engineering*). B.S., Purdue University, 1967.
- William Keith McClary (*Physics*). B.Sc., University of Alberta, 1966.
- Robert Leonard McDonald (*Electrical Engineering*). B.S., Iowa State University, 1967.
- Harold Finley McFarlane (*Engineering Science*). B.S., University of Texas, 1967.
- Michael Herbert McLaughlin (*Mechanical Engineering*). B.M.E., Cornell University, 1965.
- Alan Noel Meier (*Aeronautics*). B.S., Northrop Institute of Technology, 1966.
- Dale Loy Miller (*Engineering Science*). B.S., Arlington State College, 1965.
- Ralph Edward Miller (*Chemistry*). B.S., Washington State University, 1964.

MASTER OF SCIENCE—*continued*

- Robert Sanford Mitcham (*Mechanical Engineering*). B.S., United States Air Force Academy, 1967.
- Charles Loyd Moore (*Mechanical Engineering*). B.S., United States Military Academy, 1966.
- John Daryl Moore (*Mechanical Engineering*). B.S., University of California (Berkeley), 1967.
- Wayne Meredith Moore (*Engineering Science*). B.S., University of California (Los Angeles), 1967.
- Ronald Carl Moran (*Aeronautics*). B.S., University of Notre Dame, 1967.
- Francois Marie Michel Morel (*Civil Engineering*). Dipl., Institut Polytechnique de Grenoble, 1967.
- Jean-Pierre Georges Morel (*Aeronautics*). Ing., Ecole Centrale des Arts et Manufactures, 1965; Dr. Ing., Université de Paris, 1967.
- Martin Yasuyuki Oiye (*Aeronautics*). B.S., California Institute of Technology, 1967.
- John Edwin O'Pray (*Aeronautics*). B.S., California Institute of Technology, 1967.
- Alan Harold Osterheim (*Mechanical Engineering*). B.S., University of Hawaii, 1967.
- Adelbert Owyong (*Electrical Engineering*). B.S., University of California (Berkeley), 1967.
- Paul David Patent (*Mathematics*). B.A., Oakland University, 1965; M.A., 1966.
- James Edward Pearson (*Electrical Engineering*). B.S., California Institute of Technology, 1967.
- Philip Reed Perry (*Geology*). B.S., Cornell University, 1967.
- Jay Cee Pigg, Jr. (*Astronomy*). B.S., Loyola University (New Orleans), 1966.
- Jaime Podolsky (*Electrical Engineering*). B.S., National University of Mexico, 1966.
- George Harber Purcell, Jr. (*Astronomy*). S.B., Massachusetts Institute of Technology, 1966.
- Carl Frithjof Rasmussen (*Electrical Engineering*). A.A., Los Angeles City College, 1941; B.S., California Institute of Technology, 1947.
- Gary Herbert Ratekin (*Aeronautics*). A.A., Bakersfield College, 1965; B.S., University of California (Berkeley), 1967.
- Arakali Lakshminarayan Ravimohan (*Chemical Engineering*). B. Tech., Indian Institute of Technology (Bombay), 1967.
- Edward Albert Rinderle, Jr. (*Applied Mathematics*). B.S., Louisiana State University, 1966.
- Richard Stephen Rose (*Mechanical Engineering*). B.M.E., Rensselaer Polytechnic Institute, 1967.
- James Edward Rumbaugh (*Astronomy*). S.B., Massachusetts Institute of Technology, 1967.
- Charles George Sammis (*Geology*). Sc.B., Brown University, 1965.

MASTER OF SCIENCE—*continued*

- Thomas Peter Santoro (*Electrical Engineering*). B.S., University of Rhode Island, 1967.
- Jeffrey Lee Saperstein (*Aeronautics*). B.S., Columbia University, 1967.
- Brian Morris Schaefer (*Engineering Science*). B.A.Sc., University of Waterloo, 1967.
- Melvin Herbert Scott, Jr. (*Mechanical Engineering*). B.S., Purdue University, 1966.
- Allen Curtis Shallbetter (*Electrical Engineering*). B.S., Washington State University, 1967.
- Carl Alvin Shollenberger (*Aeronautics*). B.S., Pennsylvania State University, 1967.
- James Dow Smith (*Aeronautics*). B.A.E., University of Minnesota, 1967.
- Martin Leo Smith (*Geology*). B.S., California Institute of Technology, 1967.
- Ira Robert Snyder (*Aeronautics*). B.S., Cornell University, 1967.
- William Arthur Stinger (*Aeronautics*). B.S.E., Princeton University, 1967.
- Erik Storm (*Aeronautics*). B.S., California Institute of Technology, 1967.
- Arthur Dewey Struble III (*Aeronautics*). B.S., United States Naval Academy, 1967.
- Frank Thomas Surber (*Aeronautics*). B.S., University of Nebraska, 1967.
- Conrad Melton Swartz (*Chemical Engineering*). B.ChE., The Cooper Union, 1966.
- Brian Hyman Tabak (*Electrical Engineering*). B.Eng. (Hons.), McGill University, 1967.
- Robert Wofford Tate (*Electrical Engineering*). B.E., Yale University, 1963; M.E., 1963.
- Bernard Tiegerman (*Aeronautics*). B.S., Polytechnic Institute of Brooklyn, 1967.
- Ralph Christopher Tisdale (*Electrical Engineering*). B.S., Stanford University, 1967.
- Clark John Tomita (*Electrical Engineering*). B.S., Illinois Institute of Technology, 1967.
- Richard Martin Traci (*Aeronautics*). B.S., Carnegie Institute of Technology, 1967.
- Eugene Ward Wester (*Electrical Engineering*). B.S., University of Kansas, 1967.
- James Edward Westmoreland III (*Physics*). B.S., Georgia Institute of Technology, 1966.
- Richard Jay Williams (*Electrical Engineering*). B.S., California Institute of Technology, 1967.
- Eran Zaidel (*Engineering Science*). A.B., Columbia University, 1966.
- Kenneth Allan Zuckerman (*Civil Engineering*). B.S.E., Princeton University, 1967.
- Craig ZumBrunnen (*Geology*). B.A., University of Minnesota, 1966.

ENGINEER

Chia-Chun Chao (*Aeronautical Engineer*). B.Sc., Taiwan Provincial Cheng Kung University, 1962; M.S., California Institute of Technology, 1964.

Raymond Benedict Dirling, Jr. (*Aeronautical Engineer*). B.S., Virginia Polytechnic Institute, 1964; M.S., 1965.

Saurindranath Majumdar (*Aeronautical Engineer*). B.E., University of Calcutta, 1963; M.E., McGill University, 1965.

Michael Herbert McLaughlin (*Mechanical Engineer*). B.M.E., Cornell University, 1965.

Patrick Dan Weidman (*Aeronautical Engineer*). B.S., California State Polytechnic College, 1963; M.S., California Institute of Technology, 1964.

DOCTOR OF PHILOSOPHY

- Nawal Abd El-Hay Ahmed (*Neurophysiology*). B.Sc. (Hons.), Ain Shams University (Egypt), 1959; B.Sc. (Hons.), 1961.
Thesis: The Iodide Space in Rabbit Brain.
- Christopher Marlowe Anderson (*Astronomy*). B.S., University of Arizona, 1963.
Thesis: The Interstellar Extinction of Stars in H II Regions.
- Johann Arbocz (*Aeronautics*). B.S., Northrop Institute of Technology, 1963; M.S., California Institute of Technology, 1964.
Thesis: The Effect of General Imperfections on the Buckling of Cylindrical Shells.
- Luc-Olivier Edouard Bauer (*Engineering Science*). Dipl., Ecole Polytechnique Lausanne, 1962; M.S., California Institute of Technology, 1964.
Thesis: Experimental Study of Upper Hybrid Echo in Plasmas.
- William Robert Bauer (*Chemistry*). B.S., California Institute of Technology, 1961; B.A., Oxford University, 1963.
Thesis: I. The Structure and Properties of Closed Circular Duplex DNA.
II. Chemically Interacting Systems at Equilibrium in a Buoyant Density Gradient.
- Eric Edward Becklin (*Physics*). B.S., University of Minnesota, 1963.
Thesis: Infrared Observations of the Galactic Center.
- Lon Edward Bell (*Mechanical Engineering*). B.S., California Institute of Technology, 1962; M.S., 1963.
Thesis: Energy Transport by Combined Radiation and Conduction.
- David Bernard Benson (*Engineering Science and Mathematics*). B.S., California Institute of Technology, 1962; M.S., 1963.
Thesis: Formal Languages, Part Theory and Change.
- Elliot R. Bernstein (*Chemistry and Physics*). A.B., Princeton University, 1963.
Thesis: I. Site Effects and Exciton Structure in Molecular Crystals-Benzene.
II. The First and Second Triplet States of Solid Benzene.
- Fred Andrew Blum, Jr. (*Physics*). B.S., University of Texas, 1962; M.S., California Institute of Technology, 1964.
Thesis: Echoes and Scattering From Plasma in a Magnetic Field.
- George Wallace Bluman (*Applied Mathematics*). B.Sc., University of British Columbia, 1964.
Thesis: Construction of Solutions to Partial Differential Equations by the Use of Transformation Groups.
- Kenneth Paul Bogart (*Mathematics*). B.S., Marietta College, 1965.
Thesis: Structure Theorems for Local Noether Lattices.

DOCTOR OF PHILOSOPHY—*continued*

- Charles LaMonte Borders, Jr. (*Chemistry*). B.A., Bellarmine College, 1964.
Thesis: I. Purification and Partial Characterization of Testicular Hyaluronidase.
II. Mechanistic Studies of Human Lysozyme.
- James David Bowman (*Physics and Mathematics*). B.S., California Institute of Technology, 1961.
Thesis: The Measurement of Nuclear Gyromagnetic Ratios of Short Lived States Using Internal Fields.
- Richard Runyon Brock (*Civil Engineering*). B.S., University of California (Berkeley), 1961; M.S., 1962.
Thesis: Development of Roll Waves in Open Channels.
- Robert Jay Buck (*Mathematics*). B.A., University of Buffalo, 1963.
Thesis: A Generalized Hausdorff Dimension for Functions and Sets.
- David Chapman Cartwright (*Chemical Physics and Physics*). B.S., Hamline University, 1962; M.S., California Institute of Technology, 1963.
Thesis: The Exchange Excitation of Helium and the Hydrogen Molecule by Low Energy Electrons.
- Ronald Sinclair Cole (*Chemistry*). A.B., University of California (Riverside), 1962.
Thesis: I. Photodimerizations of Coumarin.
II. Asymmetric Induction During Energy Transfer.
- Steven Douglas Colson (*Chemistry*). B.S., Utah State University, 1963.
Thesis: Excitons in Crystalline Benzene.
- Robert William Conn (*Engineering Science*). B.Ch.E., Pratt Institute, 1964; M.S., California Institute of Technology, 1965.
Thesis: The Theory of Pulsed Neutron Experiments in Polycrystalline Moderators.
- Antonio Crespo-Martínez (*Aeronautics*). Ing., Escuela Técnica Superior de Ingenieros Aeronáuticos (Madrid), 1964; M.S., California Institute of Technology, 1965.
Thesis: I. Theoretical Investigation of the Reflection of Ionizing Shocks.
II. Theoretical Study of Sound and Shock Waves in a Two-Phase Flow.
- Michael Edward Dahmus (*Biochemistry and Chemistry*). B.S., Iowa State University, 1963.
Thesis: I. Studies on Chromosomal RNA.
II. Effect of Hydrocortisone on the Template Activity of Liver Chromatin.
- Charles Newbold David (*Biophysics and Chemistry*). A.B., Harvard College, 1962.
Thesis: Ferritin in the Fungus *Phycomyces*.

DOCTOR OF PHILOSOPHY—*continued*

- Guy DeBalbine (*Engineering Science*). Dipl. Ing., Ecole Centrale des Arts et Manufactures (Paris), 1963; M.S., California Institute of Technology, 1964.
Thesis: Computational Analysis of the Random Components Induced by a Binary Equivalence Relation.
- Raymond Kay DeLong (*Mechanical Engineering*). B.S., Kansas State University, 1962; M.S., California Institute of Technology, 1965.
Thesis: The Unsteady Forces on Slender Delta Wing Hydrofoils Oscillating in Heave.
- Andrea DeMari (*Electrical Engineering and Physics*). Ing., Politécnico di Torino, 1962; M.S., California Institute of Technology, 1964.
Thesis: Accurate Numerical Steady-State and Transient One-Dimensional Solutions of Semiconductor Devices.
- Dennis Jon Diestler (*Chemistry*). B.S., Harvey Mudd College, 1964.
Thesis: I. Quantum Mechanics of One-Dimensional Two-Particle Models.
II. A Quantum Mechanical Treatment of Inelastic Collisions.
- James Johnson Duderstadt (*Engineering Science and Physics*). B.E., Yale University, 1964; M.S., California Institute of Technology, 1965.
Thesis: The Theory of Neutron Wave Propagation.
- Richard Timothy Eakin (*Biochemistry and Chemistry*). B.S., University of Texas, 1963.
Thesis: Mitochondrial Oxidase Systems in *Neurospora*.
- David Albert Evans (*Chemistry*). A.B., Oberlin College, 1963.
Thesis: A Stereoselective Approach Toward the Synthesis of Some Pentacyclic Triterpenes.
- Douglas McIntosh Fambrough, Jr. (*Biochemistry and Chemistry*). B.A., University of North Carolina, 1963.
Thesis: Studies on Plant and Animal Histones.
- Steven Mark Farber (*Electrical Engineering and Mathematics*). B.S., California Institute of Technology, 1964; M.S., Stanford University, 1965.
Thesis: On the Signal Selection Problem for Phase Coherent and Incoherent Communication Channels.
- Renata Scher Fersht (*Aeronautics*). B.Sc., Israel Institute of Technology (Haifa), 1962; M.Sc., 1964.
Thesis: Buckling of Cylindrical Shells with Random Imperfections.
- Douglas Gun Fong (*Physics*). A.B., Princeton University, 1961.
Thesis: Experimental Study of Antiproton-Proton Annihilation into a Pair of Charged Pi-Mesons or K-Mesons for Incident Antiproton Momenta in the Range from 0.72 GeV/c to 2.62 GeV/c.
- David Scott Gilbert (*Neurophysiology*). A.B., Harvard College, 1963.
Thesis: Visual Acuity and Eye Movements.

DOCTOR OF PHILOSOPHY—*continued*

- Robert Ridgeway Gilpin (*Engineering Science and Physics*). B.Sc., University of Alberta, 1964; M.S., California Institute of Technology, 1965.
Thesis: An Electrothermal Instability in a Nonequilibrium Plasma.
- Stuart Frederick Goldstein (*Cell Biology*). B.A., University of Minnesota, 1962.
Thesis: Local Activation and Inactivation Experiments on Flagella.
- Jeffrey Archibald Gorman (*Engineering Science*). B.C.E., Cornell University, 1958; M.S., California Institute of Technology, 1966.
Thesis: The Mobility of Dislocations in High Purity Aluminum.
- David Henry Griffel (*Physics*). B. Sc. (Hons.), Birmingham University (England), 1961.
Thesis: Kinetic Theory of the Solar Wind and its Interaction with the Moon.
- William Paul Gruber (*Mechanical Engineering*). B.S., University of Washington, 1962; M.S., California Institute of Technology, 1963.
Thesis: Formation of Jets by Impulsive Acceleration of a Curved Free Surface.
- Thomas Arthur Halgren (*Chemistry*). A.B., Wabash College, 1963.
Thesis: Nature of the Radical Intermediates in a Cyclopropylcarbinyll-Allylcarbinyll System.
- Roy Woodrow Harding, Jr. (*Biochemistry and Chemistry*). B.S., George Washington University, 1962.
Thesis: Carotenoid Biosynthesis in *Neurospora Crassa*.
- Robert Jack Hemstead (*Mathematics and Philosophy*). B.S., Stanford University, 1964.
Thesis: Stationary Absolute Distributions for Chains of Infinite Order.
- Thomas Louis Henyey (*Geophysics*). A.B., University of California (Berkeley), 1962.
Thesis: Heat Flow Near Major Strike-slip Faults in Central and Southern California.
- Chee Leung Ho (*Applied Mechanics*). B.Sc., Queen's University (Canada), 1963; M.S., California Institute of Technology, 1964.
Thesis: Energy Inequalities and Error Estimates for Axisymmetric Torsion of Thin Elastic Shells of Revolution.
- Leroy Edward Hood (*Biochemistry*). B.S., California Institute of Technology, 1960; M.D., Johns Hopkins University, 1964.
Thesis: Antibodies: Structure, Genetics and Evolution.
- Joel Anthony Huberman (*Biochemistry and Chemistry*). A.B., Harvard College, 1963.
Thesis: Studies on the Structure and Function of Mammalian Chromosomes.

DOCTOR OF PHILOSOPHY—*continued*

- Robert John Huskey (*Genetics and Biophysics*). B.S., University of Oklahoma, 1960; M.S., 1962.
Thesis: Isolation and Characterization of Deletion Mutants of Bacteriophage Lambda.
- Harry Lester Hyndman (*Chemistry*). B.S., University of Illinois, 1962.
Thesis: The Excited State Geometry of Conjugated Dienes and Characterization of a Quantum Chain-Transfer Mechanism of Energy Transfer.
- Lorella Margaret Jones (*Physics*). B.A., Radcliffe College, 1964; M.S., California Institute of Technology, 1966.
Thesis: Reggeization of Some Unequal Mass Processes Involving Higher Spins: The Reactions $\pi N \rightarrow VN$, $\pi N \rightarrow V$, and $\gamma_p \rightarrow \pi^+_n$.
- John Joseph Kenny (*Electrical Engineering*). B.S., University of Rhode Island, 1963; M.S., California Institute of Technology, 1964.
Thesis: Electric Dipole Radiation in Isotropic and Uniaxial Plasmas.
- Hugh Hartman Kieffer (*Planetary Science*). B.S., California Institute of Technology, 1961.
Thesis: Near Infrared Spectral Reflectance of Simulated Martian Frosts.
- John Andrew Kiger, Jr. (*Biophysics and Chemistry*). B.S., California Institute of Technology, 1963.
Thesis: I. The Transcription of Simple and Complex DNAs by the RNA Polymerase of *Escherichia coli*.
II. The Structure and Replication of Intracellular Bacteriophage Lambda DNA.
- Jonathan Alan King (*Genetics and Chemistry*). B.S., Yale University, 1962.
Thesis: Steps in the Assembly of Bacteriophage T4.
- Ronald Brian Kirk (*Mathematics*). B.A., University of Colorado, 1963.
Thesis: Measures in Topological Spaces.
- John Michael Klineberg (*Aeronautics and Political Science*). B.S.E., Princeton University, 1960; M.S., California Institute of Technology, 1962.
Thesis: Theory of Laminar Viscous-Inviscid Interactions in Supersonic Flow.
- Daniel Julius Krause (*Materials Science and Physics*). B.Met.E., Ohio State University, 1958; M.S., California Institute of Technology, 1959.
Thesis: Discontinuous Yielding and Fracture Initiation Near a Notch in Mild Steel.
- Mitsuru Kurosaka (*Mechanical Engineering*). B.S., University of Tokyo, 1959; M.S., 1961.
Thesis: Approximate Theory for the Flow Through a Cascade of Cambered Airfoils.

DOCTOR OF PHILOSOPHY—*continued*

- Theodore Willis Laetsch (*Applied Mathematics*). B.S., Washington University, 1961; S.M., Massachusetts Institute of Technology, 1962.
Thesis: Eigenvalue Problems for Nonlinear Operators.
- Ernest Yee Yeung Lam (*Chemistry*). B.Sc., University of Hong Kong, 1959; B.Sc.Sp. (Hons.), 1960.
Thesis: I. Photodimerization of Cyclohexenone.
II. Radiation Chemistry of Benzophenone in Cyclohexene Solution.
- Richard Neil Lane (*Mathematics and English*). B.S., California Institute of Technology, 1965.
Thesis: Normal Structures and Automorphism Groups of t -Designs.
- Richard Bondo Larson (*Astronomy and Physics*). B.Sc., University of Toronto, 1962; M.A., 1963.
Thesis: Dynamics of a Collapsing Protostar.
- Raymond Walter Latham (*Electrical Engineering*). B.Eng., McGill University, 1958; M.S., California Institute of Technology, 1959.
Thesis: Electromagnetic Scattering From Cylindrically and Spherically Stratified Bodies.
- Joseph Po-keung Lau (*Engineering Science and Applied Mathematics*). B.Sc., Purdue University, 1962; M.S., California Institute of Technology, 1963.
Thesis: Steady Surface Wave Pattern in Shear Flow.
- Stephen Stuart Lavenberg (*Electrical Engineering*). B.E.E., Rensselaer Polytechnic Institute, 1963; M.S., California Institute of Technology, 1964.
Thesis: Feedback Communication Using Orthogonal Signals.
- Leroy Chi-tsun Lin (*Chemistry and Physics*). B.S., Tunghai University (China), 1960; M.S., Texas Christian University, 1963.
Thesis: I. The Crystal Structure of Potassium Bis-(Tricyanovinyl) Amine.
II. NMR Studies of Alkali Halide Solutions.
III. Elucidation of the Intramolecular Hydrogen Bond in Acetylacetone by the Deuterium Isotope Effect on the Chemical Shift of the Bridge Hydrogen.
- Stephen Chung-Hsiung Lin (*Materials Science*). B.S., National Taiwan University, 1963; M.S., California Institute of Technology, 1965.
Thesis: Structure and Properties of an Amorphous Ferromagnetic Alloy.
- Kau-un Lu (*Mathematics*). B.S., National Taiwan University, 1961.
Thesis: Some Properties of the Coefficients of Cyclotomic Polynomials.
- Thomas William MacDowell (*Applied Mathematics*). B.S., California Institute of Technology, 1964.
Thesis: Boundary Value Problems for Stochastic Differential Equations.

DOCTOR OF PHILOSOPHY—*continued*

- James Andrew Magnuson (*Chemistry*). B.S., Stanford University, 1964.
Thesis: I. The Effect of N,N,N¹,N¹ - Tetramethylethylenediamine on the Schlenk Equilibrium.
II. The Nature of the Di-Grignard Reagent.
- Thomas Bard McCord (*Planetary Science and Astronomy*). B.S., Pennsylvania State University, 1964; M.S., California Institute of Technology, 1966.
Thesis: Color Differences on the Lunar Surface.
- Thomas Richard McGetchin (*Geology and Planetary Science*). A.B., Occidental, 1959; Sc.M., Brown University, 1961.
Thesis: The Moses Rock Dike: Geology, Petrology and Mode of Emplacement of a Kimberlite-Bearing Breccia Dike, San Juan County, Utah.
- William Walter Miller (*Chemistry*). B.S., University of California (Berkeley), 1963.
Thesis: The Role of Coenzyme B₁₂ in the Isomerization of Methylmalonyl Coenzyme A.
- Michael Philip Mortell (*Applied Mathematics*). B.S., University College (Cork), 1961; M.S., 1963; M.S., California Institute of Technology, 1964.
Thesis: Some Approximate Solutions of Dynamic Problems in the Linear Theory of Thin Elastic Shells.
- Calvin Elroy Moss (*Physics*). B.S., University of Virginia, 1961; M.S., California Institute of Technology, 1963.
Thesis: Nuclear Energy Levels of ³¹S and ³³Cl.
- Adolph Vincent Mrstik, Jr. (*Electrical Engineering*). B.S., University of Illinois, 1964; M.S., 1965.
Thesis: The Resolution of the Thermodynamic Paradox and the Theory of Guided Wave Propagation in Anisotropic Media.
- Hans-Karl Christian Alfred Mueller (*Aeronautics*). Dipl., Technische Hochschule Aachen, 1963; M.S., California Institute of Technology, 1964.
Thesis: Stable Crack Propagation in a Viscoelastic Strip.
- Michael John O'Sullivan (*Applied Mechanics and Mathematics*). B.E., University of Auckland, 1962; B.Sc., 1963.
Thesis: On the Dynamic Behavior of Thin Elastic Plates.
- Martin Lawrence Pall (*Biochemistry and Genetics*). B.A., Johns Hopkins University, 1962.
Thesis: I. Tyrosinase Induction by Antimetabolites in Neurospora.
II. Amino Acid Transport in Neurospora.
- Albert Bernard Pincince (*Civil Engineering*). B.S., Northeastern University, 1963; M.S., California Institute of Technology, 1965.
Thesis: Oxygen Relationships in Intermittent Sand Filtration of Wastewaters.

DOCTOR OF PHILOSOPHY—*continued*

- Hugo de Oliveira Piva (*Aeronautics and Applied Mathematics*). Ae.E., Instituto Tecnológico de Aeronáutica (Brazil), 1958; M.S., California Institute of Technology, 1965.
Thesis: Electron Beam Measurements of Density in Shock Waves Reflecting From a Cold Wall.
- Roger James Radloff (*Biophysics and Chemistry*). B.S., Iowa State University, 1962.
Thesis: Structure and Properties of Closed Circular DNA.
- Merle Eugene Riley (*Chemistry*). B.S., Marietta College, 1963.
Thesis: Energy Transfer in Molecular Collisions.
- Leon S. Rochester (*Physics*). A.B., University of Chicago, 1962.
Thesis: Photoproduction of ETA Mesons from Hydrogen at Photon Energies Between 0.8 and 1.45 GeV.
- Anil Sadgopal (*Biochemistry and Chemistry*). B.Sc. (Hons.), University of Delhi, 1960; M.Sc., Indian Agricultural Research Institute, 1962.
Thesis: I. Synchronization of the Cell Division Cycle of HeLa Cells in Suspension Cultures.
II. Studies on Chromosomal Proteins of HeLa Cells During the Cell Division Cycle.
- Jeffrey Drexel Scargle (*Astronomy*). B.A., Pomona College, 1963.
Thesis: Activity in the Crab Nebula.
- Charles Albert Schaffner (*Electrical Engineering*). B.S., Drexel Institute of Technology, 1961; M.S., University of Southern California, 1963.
Thesis: The Global Optimization of Phase-incoherent Signals.
- Robert Jay Schmulian (*Applied Mathematics*). B.S., California Institute of Technology, 1963.
Thesis: Nearly Free Molecular Heat Transfer from a Sphere.
- William Addison Scott (*Biochemistry and Chemistry*). B.S., University of Illinois, 1962.
Thesis: Cytochrome c Synthesis in *Neurospora Crassa*.
- Robert L. Seliger (*Applied Mathematics*). B.S., Polytechnic Institute of Brooklyn, 1963.
Thesis: I. On the Breaking of Nonlinear Dispersive Waves.
II. Variational Principles in Continuum Mechanics.
- Pattamadai Narasimhan Shankar (*Engineering Science and Physics*). B.Sc., Imperial College of Science and Technology (London), 1964; M.S., California Institute of Technology, 1967.
Thesis: I. The Effect of Droplet Solidification Upon Two-Phase Flow in a Rocket Nozzle.
II. A Kinetic Theory Investigation of Some Condensation-Evaporation Phenomena by a Moment Method.

DOCTOR OF PHILOSOPHY—*continued*

- Wesley Loren Shanks (*Physics*). B.S., California Institute of Technology, 1960; M.S., 1964.
Thesis: The Photoproduction of Charged Pions from Hydrogen at Photon Energies Between 800 and 1500 MeV.
- Cheng-chung Shen (*Engineering Science*). B.S., National Taiwan University, 1959; M.S., Massachusetts Institute of Technology, 1964.
Thesis: I. Stokes Flow Past a Thin Screen.
II. Viscous Flows Past Porous Bodies of Finite Size.
- Arnold Louis Shugarman (*Chemistry*). B.Sc., California State College at Los Angeles, 1964.
Thesis: I. Autoxidation of Manganese (II) β -Diketonates.
II. Synthesis of Dipivaloylmethane Chelates of Manganese (II).
- Leonard Merriman Stephenson, Jr. (*Chemistry*). B.S., University of North Carolina, 1964.
Thesis: The Mechanism and Effect of the Quenching of Aromatic Hydrocarbon Singlet Excited States by Conjugated Dienes.
- Richard Forsythe Taylor (*Mathematics*). A.B., University of Kansas, 1964.
Thesis: Invariant Subspaces in Hilbert and Normed Spaces.
- Richard King Teague (*Chemical Engineering and Chemistry*). B.S., Washington University, 1963; M.S., California Institute of Technology, 1965.
Thesis: The Refractive Index and the Lorentz-Lorenz Function of Fluid Argon.
- Ansel Frederick Thompson, Jr. (*Civil Engineering*). B.S., Pennsylvania State University, 1963; M.S., California Institute of Technology, 1965.
Thesis: The Ultrafiltration of Salt-Polyelectrolyte Solutions.
- Dino Sabatino Tinti (*Chemistry*). B.A., University of California (Riverside), 1962.
Thesis: I. Spectroscopic Evidence for Slow Vibrational Relaxation in Excited Electronic States of Diatomics in Rare Gas Solids.
II. Static Crystal Field Effects in the Electronic Spectra of Isotopically Mixed Benzene Crystals.
- Virginia Louise Trimble (*Astronomy*). B.A., University of California (Los Angeles), 1964; M.S., California Institute of Technology, 1965.
Thesis: Motions and Structure of the Filamentary Envelope of the Crab Nebula.
- Matias Jose Turteltaub (*Applied Mechanics*). Ing., University of Chile, 1961; M.S., California Institute of Technology, 1965.
Thesis: On Concentrated Loads and Green's Functions in Elastostatics.
- Athanassios Demetrius Varvatsis (*Electrical Engineering and Physics*). Dipl., National Technical University (Greece), 1960; M.S., California Institute of Technology, 1965.
Thesis: A Multiple Scattering Problem.

DOCTOR OF PHILOSOPHY—*continued*

- George Francis Vesley, Jr. (*Chemistry*). A.B., Ripon College, 1962; M.A., Wesleyan University, 1964.
Thesis: Complications in the Systematic Study of Photochemical Mechanisms.
- Pax Samuel Pin Wei (*Chemistry*). B.S., National Taiwan University, 1960; M.S., University of Illinois, 1963.
Thesis: Determination of Electronic Energy Levels of Molecules by 90° Low Energy Electron Scattering.
- Frank Julian Weigert (*Chemistry*). S.B., Massachusetts Institute of Technology, 1965.
Thesis: Carbon-13 Magnetic Resonance Spectroscopy.
- Martin Eric Weiner (*Materials Science and Applied Mathematics*). B.S., California Institute of Technology, 1964; M.S., 1965.
Thesis: Magnetic Moments In Amorphous Palladium-Cobalt-Silicon Alloys.
- Larry Gale Williams (*Biochemistry and Chemistry*). B.S., University of Nebraska, 1961; M.S., 1963.
Thesis: Thymidine Metabolism in *Neurospora crassa*.
- Franklin Bruce Wolverton (*Physics*). B.S., University of Michigan, 1961.
Thesis: Pi Zero Photoproduction from Hydrogen Between 574 and 1211 MeV.
- Tyan Yeh (*Applied Mathematics*). B.S., National Taiwan University, 1959; M.S., Cornell University, 1963.
Thesis: I. Nonexistence of Looping Trajectories in Hydromagnetic Waves of Finite Amplitude.
II. Breaking of Waves in a Cold Collision-free Plasma in a Magnetic Field.
III. On Stability of Periodic Waves in a Cold Collision-free Plasma in a Magnetic Field.
- Peter John Andrew Zoutendyk (*Engineering Science*). B.S., University of Washington, 1959; M.S., University of California (Los Angeles), 1961.
Thesis: Spontaneous and Stimulated Light Emission Due to Radiative Recombination in Forward Biased Lead Telluride P-N Junctions.

Prizes and Awards

GEORGE W. GREEN MEMORIAL AWARD

Awarded to the undergraduate student who, in the opinion of the Division Chairmen, has shown outstanding ability and achievement in the field of creative scholarship.

(Recipient to be announced)

FREDERIC W. HINRICHS, JR., MEMORIAL AWARD

Awarded to the senior who, in the opinion of the Undergraduate Deans, has throughout his years at the Institute made the greatest contribution to the welfare of the student body and whose qualities of leadership, character and responsibility have been outstanding.

(Recipient to be announced)