

CALIFORNIA INSTITUTE OF TECHNOLOGY

SIXTY-SIXTH ANNUAL

COMMENCEMENT EXERCISES



FRIDAY AFTERNOON AT FOUR-THIRTY O'CLOCK

JUNE TENTH, NINETEEN SIXTY

ACADEMIC PROCESSION

Chief Marshal: HARVEY EAGLESON, Ph.D.

Assistant Marshals: DONALD S. CLARK, Ph.D.

GEORGE P. MAYHEW, Ph.D.

RODMAN W. PAUL, Ph.D.

Division I

CANDIDATES FOR THE DEGREE OF BACHELOR OF SCIENCE

CANDIDATES FOR THE DEGREE OF
MASTER OF SCIENCE IN SCIENCE

CANDIDATES FOR THE DEGREE OF
MASTER OF SCIENCE IN ENGINEERING

CANDIDATES FOR THE ENGINEER'S DEGREE

CANDIDATES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Division II

THE FACULTY OF THE CALIFORNIA INSTITUTE

THE CHAIRMEN OF DIVISIONS
AND DIRECTORS OF LABORATORIES

THE TRUSTEES OF THE CALIFORNIA INSTITUTE

THE REPRESENTATIVE OF THE UNITED STATES AIR FORCE

THE COMMENCEMENT CHAPLAIN

THE PRESIDENT OF THE CALIFORNIA INSTITUTE

THE COMMENCEMENT SPEAKER

THE CHAIRMAN OF THE BOARD OF TRUSTEES

PROGRAM

Presiding: ALBERT B. RUDDOCK, B.A., M.A.

Chairman of the Board of Trustees

PRELUDE AND PROCESSIONAL MARCH

Organist: JAMES H. SHEARER, A.R.C.M., A.R.C.O.

INVOCATION

RABBI EDGAR F. MAGNIN, D.D., L.H.D., S.T.D.

Wilshire Boulevard Temple, Los Angeles

COMMENCEMENT ADDRESS

“Judge Not, That Ye Be Not Judged”

BARNABY CONRAD KEENEY, Ph.D., LL.D.

President, Brown University

PROGRAM—*continued*

CONFERRING OF DEGREES

BY

PRESIDENT DuBRIDGE

PRESENTATION OF CANDIDATES FOR DEGREES

For the degree of Bachelor of Science, by

PAUL CONANT EATON, A.M.

Dean of Students

For the degree of Master of Science in Science, by

WILLIAM R. SMYTHE, Ph.D.

Chairman of the Committee on the Course in Science

For the degree of Master of Science in Engineering, by

DAVID S. WOOD, Ph.D.

Chairman of the Committee on the Course in Engineering

For the Engineer's degree, by

FREDERIC BOHNENBLUST, Ph.D.

Dean of Graduate Studies

For the degree of Doctor of Philosophy, by

DEAN BOHNENBLUST

PROGRAM—*continued*

COMMISSIONING OF AIR FORCE RESERVE OFFICERS

Presentation of Cadets, by

MAJOR FRANCIS R. MACKENZIE, B.S., M.B.A.

Professor of Air Science

Oath of Office and award of Certificate of Commission as

Second Lieutenant in the Air Force Reserve, by

BRIGADIER GENERAL WILLIAM G. HIPPS

United States Air Force

CONCLUDING REMARKS

PRESIDENT DUBRIDGE

BENEDICTION

RABBI MAGNIN

The audience is requested to remain standing until

the end of the Recessional March

RECESSIONAL MARCH

Candidates for Degrees

BACHELOR OF SCIENCE IN SCIENCE

Eric George Adelberger, Arlington, Virginia. *Physics*.
Donald Werner Anderson, Van Nuys, California. *Mathematics*.
Dean Wesley Anschultz, Lakewood, California. *Physics*.
Charles Edward Antoniak, San Diego, California. *Physics*.
William Barnes Arveson, San Gabriel, California. *Mathematics*.
David Saal Bailey, Denver, Colorado. *Physics*.
John Andress Bard, Winnetka, Illinois. *Mathematics*.
Alan Paul Berg, Los Angeles, California. *Biology*.
Thomas Karl Bergstresser, Los Alamos, New Mexico. *Physics*.
Thomas Kieth Bjorklund, Phoenix, Arizona. *Geology*.
Neville Anthony Black, Hollywood, California. *Physics*.
Graeme Arden Blake, Portland, Oregon. *Physics*.
David Jordan Blakemore, Napa, California. *Physics*.
Pedro Bolsaitis, Caracas, Venezuela. *Chemical Engineering*.
Philip Russell Brooks, Hazel Crest, Illinois. *Chemistry*.
David William Butterfield, East Tawas, Michigan. *Physics*.
John Howland Campbell, Monrovia, California. *Biology*.
David Giske Cassel, Ainsworth, Nebraska. *Physics*.
Joseph Michael Cauley, Pasadena, California. *Physics*.
John Neale Cooper, San Antonio, Texas. *Chemistry*.
Lawrence Everett Curfman, III, Wichita, Kansas. *Chemistry*.
Douglas James Dunham, La Canada, California. *Physics*.
Bradley Efron, St. Paul, Minnesota. *Mathematics*.
Michael Burt Engelberg, Los Angeles, California. *Astronomy*.
Dennis Charles Evans, Whittier, California. *Geology*.
James Lee Farmer, South Gate, California. *Chemistry*.
Jonathan Francis, Rochester, New York. *Chemistry*.
Robert Allen Fuller, Temple City, California. *Physics*.
Gary Charles Goodman, Mount Vernon, New York. *Astronomy*.
Walter Carl Gottschall, Jr., Pittsburgh, Pennsylvania. *Chemistry*.
Fletcher Ivan Gross, La Canada, California. *Mathematics*.
Alfred Washington Hales, Pasadena, California. *Mathematics*.
Lester Larsen Hirst, Jr., Morgantown, West Virginia. *Physics*.
Leroy Edward Hood, Great Falls, Montana. *Biology*.
Ernest Alan Isaacs, Detroit, Michigan. *Physics*.
Gerald Roy Jantscher, Fontana, California. *Physics*.
David Kenoss Jefferson, Oakland, California. *Mathematics*.
Anthony Earl Johnson, Denver, Colorado. *Chemistry*.
Thomas Michael Jovin, Mexico City, Mexico. *Biology*.
Donald J. Krotser, Santa Cruz, California. *Geophysics*.
Allan Laderman, Los Angeles, California. *Physics*.

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

BACHELOR OF SCIENCE IN SCIENCE

Ronald George Lawler, Seattle, Washington. *Chemistry*.
Michael Alfred Levine, Silver Spring, Maryland. *Physics*.
Erick LeRoy Lindman, Jr., Los Angeles, California. *Physics*.
Norman Ewen Maclean, San Marino, California. *Physics*.
Jarold Alan Meyer, Glendale, Arizona. *Chemical Engineering*.
William Leo Mock, Santa Ana, California. *Chemistry*.
Loren Cameron Mosher, Santa Barbara, California. *Geology*.
John Herbert Munson, Burbank, California. *Physics*.
James Carr Nearing, Hawthorne, California. *Physics*.
James Kent Neeland, Silver Spring, Maryland. *Physics*.
Melvin King Neville, Tucson, Arizona. *Chemistry*.
Richard Allan Newcomer, La Verne, California. *Mathematics*.
Fred Luther Newman, Santa Monica, California. *Chemistry*.
David Harlan Nissen, Arcadia, California. *Chemistry*.
Jerald Vawer Parker, Portland, Oregon. *Physics*.
Gerald Albert Pearson, Redondo Beach, California. *Chemistry*.
Walter Eugene Pelton, Great Valley, New York. *Physics*.
Garnett Howell Pessel, Washington, D. C. *Geology*.
David Allen Resnik, Kenmore, New York. *Mathematics*.
John Robert Rix, Bay Village, Ohio. *Physics*.
Peter Roland Rony, Los Angeles, California. *Chemical Engineering*.
Daniel Ross, Tujunga, California. *Mathematics*.
Sidney Ronald Roth, Milwaukee, Wisconsin. *Biology*.
Stanley Arthur Sawyer, Seattle, Washington. *Mathematics*.
William Randall Schmus, Naperville, Illinois. *Geology*.
Wesley Loren Shanks, Northlake, Illinois. *Physics*.
Neil Rolfson Sheeley, Jr., Ridgewood, New Jersey. *Physics*.
John Shouse Shier, Golden, Colorado. *Physics*.
Paul Bundesen Skov, Lancaster, California. *Physics*.
James Christian Sorensen, Portland, Oregon. *Chemical Engineering*.
John Frederick South, Carlsbad, New Mexico. *Physics*.
Stephen Vinson Stephens, Falls Church, Virginia. *Physics*.
Thomas Henry Tebben, Whittier, California. *Chemistry*.
Robert Campbell Thompson, Larchmont, New York. *Biology*.
Michael Raymond Thomson, Pueblo, Colorado. *Physics*.
Laurence Munro Trafton, Los Angeles, California. *Astronomy*.
David Lawell Tucker, Jr., Long Beach, California. *Chemistry*.
John P. Van Dyke, Medford, Oregon. *Physics*.
Donald Herman Voet, Borger, Texas. *Chemistry*.
John Bradstreet Walsh, Tucson, Arizona. *Physics*.
Robert Thomas Walsh, Tucson, Arizona. *Physics*.
Robert LeRoy Wax, Berkeley, California. *Physics*.
Howard Louis Weisberg, Cleveland, Ohio. *Physics*.
Paul Richard Widess, Ft. Worth, Texas. *Physics*.
Stanley Gill Williamson, Santa Barbara, California. *Mathematics*.
John Marlin Wright, Mill Valley, California. *Chemistry*.
Gary Alan Zimmerman, Seattle, Washington. *Chemistry*.

BACHELOR OF SCIENCE IN ENGINEERING

Ronald Barthold Arps, Dallas, Texas. *Electrical Engineering.*
Brent Banta, Rolling Hills, California. *Civil Engineering.*
Stephen Michael Barro, Bronx, New York. *Electrical Engineering.*
Samuel Bergman, New York City, New York. *Electrical Engineering.*
Thomas Eugene Bowman, Burlingame, California. *Mechanical Engineering.*
Paul Robert Calaway, Pasadena, California. *Electrical Engineering.*
Martin Carnoy, Mexico City, Mexico. *Electrical Engineering.*
Robert Glenn Chamberlain, Los Altos, California. *Mechanical Engineering.*
Lowell Eugene Clark, Fort Collins, Colorado. *Electrical Engineering.*
Joseph Delma Cointment, III, Plaquemine, Louisiana. *Electrical Engineering.*
Frank Howard Cormia, Colorado Springs, Colorado. *Civil Engineering.*
William Keith Davis, Long Beach, California. *Electrical Engineering.*
George Allen Davison, Jr., San Bernardino, California. *Electrical Engineering.*
Kendall Lochridge Dinwiddie, San Rafael, California. *Mechanical Engineering.*
Robert Bruce Eglinton, South Pasadena, California. *Mechanical Engineering.*
Albert T. Funada, Silver Spring, Maryland. *Mechanical Engineering.*
Harold Lee Gier, Manhattan, Kansas. *Mechanical Engineering.*
Samuel Ginsburg, Tujunga, California. *Electrical Engineering.*
David Leonard Goff, Denver, Colorado. *Electrical Engineering.*
Robert Ray Golden, Phoenix, Arizona. *Mechanical Engineering.*
Anthony Paul Grande, San Pedro, California. *Electrical Engineering.*
William Franklin Greenman, Omaha, Nebraska. *Mechanical Engineering.*
Herman Guenther Hartung, Burbank, California. *Mechanical Engineering.*
Melvin E. Holland, Chino, California. *Civil Engineering.*
Richard Jenson, Berkeley, California. *Mechanical Engineering.*
Peter A. Johanson, Coon Rapids, Minnesota. *Electrical Engineering.*
Gerald Bryce Johnston, North Bend, Oregon. *Mechanical Engineering.*
Martin Alan Kaplan, Kansas City, Missouri. *Civil Engineering.*
Robert Ching-Yee Koh, Hong Kong. *Mechanical Engineering.*
Ronald Charles Kunzelman, Pasadena, California. *Electrical Engineering.*
Kelvin Shun Hung Lee, Hong Kong. *Electrical Engineering.*
Gordon David Long, Portland, Oregon. *Electrical Engineering.*
Michael Martin Mann, San Jose, California. *Electrical Engineering.*
Douglas Richard McLane, Hilo, Hawaii. *Mechanical Engineering.*
David Lee Mitchell, Seattle, Washington. *Mechanical Engineering.*
Meredith Burton Mitchell, Los Angeles, California. *Electrical Engineering.*
Carl Neracher Morris, San Diego, California. *Mechanical Engineering.*
Robert Lawrence Norton, Placerville, California. *Mechanical Engineering.*
Michael Holmes O'Malley, Agoura, California. *Electrical Engineering.*
John George Price, Van Nuys, California. *Electrical Engineering.*
Lannes S. Purnell, Ellensburg, Washington. *Electrical Engineering.*
Jan Rampacek, Omaha, Nebraska. *Electrical Engineering.*
Herman Lee Renger, Hermosa Beach, California. *Electrical Engineering.*
Arthur Myron Rubin, Chicago, Illinois. *Electrical Engineering.*
Kenneth Philip Scholtz, Ventura, California. *Electrical Engineering.*
William Alex Sinoff, Los Angeles, California. *Electrical Engineering.*

BACHELOR OF SCIENCE IN ENGINEERING

Keith Alan Taylor, Portland, Oregon. *Electrical Engineering.*
Louis Edmund Toth, Easton, Connecticut. *Mechanical Engineering.*
Samuel Banks Trotter, Darien, Connecticut. *Electrical Engineering.*
Gustav Nicholas Wassel, Alhambra, California. *Electrical Engineering.*
Frank Wight Weber, Pasadena, California. *Electrical Engineering.*
Lawrence Randolph Weill, Long Beach, California. *Electrical Engineering.*
Malcolm Lee Whitt, San Diego, California. *Civil Engineering.*
Gerald Gordon Wilhelmy, Los Angeles, California. *Electrical Engineering.*
Donald Clark Wilson, Jr., San Francisco, California. *Electrical Engineering.*
Martin Wolff, Downey, California. *Mechanical Engineering.*
James Alfred Wooster, Bartlesville, Oklahoma. *Mechanical Engineering.*

MASTER OF SCIENCE IN SCIENCE

Astronomy

Dimitri Manuel Mihalas. *B.A., University of California, 1959.*

Chemistry

William Phillip Helman. *B.S., California Institute of Technology, 1958.*

William Wendell Porterfield. *B.S., University of North Carolina, 1957.*

Chemical Engineering

Gerald Jack Arenson. *B.S., California Institute of Technology, 1959.*

Noundas Cocoltchos. *B.S., Worcester Polytechnic Institute, 1959.*

Robert Fredrick Cuffel. *B.S., Iowa State University, 1959.*

Edward Rae Held McDowell. *B.Ch.E., Cornell University, 1955.*

Eugene Byrd Nebeker. *B.S., Stanford University, 1959.*

Max Cotner Richardson. *B.S., University of Missouri, 1956.*

Stephen George Sawochka. *B.S., Purdue University, 1959.*

Irving George Snyder, Jr. *B.E., Yale University, 1959.*

William Frederick Wagner. *Ch.E., University of Cincinnati, 1959.*

Geology

Norman Sam Farha. *B.S., University of Kansas, 1958.*

Bevan Meredith French. *A.B., Dartmouth College, 1958.*

Richard Leroy Mauger. *B.S., Franklin and Marshall College, 1958.*

Garnett Howell Pessel. *B.S., California Institute of Technology, 1960.*

Fred Glenn Rueter. *B.S., University of Kansas, 1958.*

Christian Claude Weber. *Baccalauréat, Sciences Experimentales, Lycée Michelet, 1954;
Lic. Sciences, Sorbonne, 1957.*

Geochemistry

Noel William Hinners. *B.Sc., Rutgers University, 1958.*

Geophysics

Armando Cisternas. *I.C. de M., Universidad de Chile, 1958.*

Stéphane Dopp. *Dipl. d'Ing. Civil Electricien, 1955; Lic. Sciences Géologiques
et Minéralogiques, Université Catholique de Louvain, 1959.*

Guy Emile Fayet, *Lic. Sciences Mathématiques, Université de Marseille, 1957;
Dipl. d'Ing., École Nationale Supérieure du Pétrole et des Moteurs, 1959.*

Clint Wellington Frasier. *B.S., California Institute of Technology, 1959.*

Jimmy Carl Larsen. *B.A., University of California, 1958.*

Mehmet Nafi Toksöz. *Gp.E., Colorado School of Mines, 1958.*

MASTER OF SCIENCE IN SCIENCE

Mathematics

William Dean Squire. *B.S., California Institute of Technology, 1950.*

Physics

Thomas Mark Bieniewski. *B.S., University of Detroit, 1958.*
Richard Edwin Bradbury. *B.A., Johns Hopkins University, 1957.*
Berken Chang. *B.S., California Institute of Technology, 1958.*
Robert Ernest Diebold. *B.S., University of New Mexico, 1958.*
Howard Burt Greenstein. *Sc.B., Brown University, 1956.*
Ralph Fraley Miles, Jr. *B.S., California Institute of Technology, 1955.*
John Carl Nickel. *B.A., University of California, 1958.*

MASTER OF SCIENCE IN ENGINEERING

Aeronautics

Bruce Allesina. *B.S., California Institute of Technology, 1959.*
Louis Joseph Alpinieri. *B.Ae.E., Polytechnic Institute of Brooklyn, 1957.*
William Leland Anderson, Jr. *B.A., 1958, B.S., University of Notre Dame, 1959.*
Vladimir Vadim Baicher. *B.S., California Institute of Technology, 1959.*
Woody Brofman. *B.Ae.E., Polytechnic Institute of Brooklyn, 1957.*
Thomas Safrit Davis. *B.M.E., 1957, M.S., North Carolina State College, 1960.*
Douglas Dean Duhon. *B.S., Louisiana State University, 1958.*
Kenneth Norman Easley. *B.S., University of Illinois, 1959.*
David Arthur Evensen. *B.S., Worcester Polytechnic Institute, 1959.*
Vittorio Fiorini. *Laurea in Ing. Industriale, Università di Bologna, 1954;*
Laurea in Ing. Aeronautica, Politecnico di Torino, 1955.
Gary Arnold Flandro. *B.S., University of Utah, 1957.*
James Joseph Geiger. *B.S., Purdue University, 1959.*
Matthew Morgan Grogan. *B.S., University of Notre Dame, 1958.*
Kenneth Edwin Harwell. *B.S., University of Alabama, 1959.*
Gilbert Arthur Hegemier. *B.E.S., Brigham Young University, 1959.*
Anthony Joseph Iorillo. *B.S., California Institute of Technology, 1959.*
Delbert Harold Jacobs. *B.S., United States Military Academy, 1955.*
Walter Adrian Johnson, Jr. *B.S., California Institute of Technology, 1959.*
Louis Kingsland, Jr. *B.S., United States Air Force Academy, 1959.*
James Howard Mauldin. *B.S., 1953, M.S., Georgia Institute of Technology, 1955.*
Maurice Mizrahi. *Dipl. d'Ing., École Nationale Supérieure de l'Aéronautique, 1959.*
Peter Ernest Oettinger. *B.Agr.E., Cornell University, 1959.*
Ralph Bailey Owen. *B.A., Whitman College, 1959; B.S., California Institute of Technology, 1959.*
James Sibley Petty. *B.S., California Institute of Technology, 1959.*
Peter G. Simpkins. *Dipl., Northampton College of Advanced Technology, 1957;*
Dipl., Training Center for Experimental Aerodynamics, 1959.
Timothy Lay Sullivan. *B.Ae.E., University of Detroit, 1959.*
Evan Otto Weiner. *B.S., California Institute of Technology, 1959.*

MASTER OF SCIENCE IN ENGINEERING

Civil Engineering

- Eduardo Basso. *Ing. Civil, Universidad de Chile, 1953.*
Charles Edward Brockway. *B.S., University of Idaho, 1959.*
Henry Thomas Falvey. *B.C.E., Georgia Institute of Technology, 1958.*
Paul Christian Jennings. *B.S., Colorado State University, 1958.*
Richard Alvin Johnson. *B.S., California Institute of Technology, 1956.*
Jean Maurice Meuris. *Ing. Civil des Constructions, Université Libre de Bruxelles, 1957.*
Raymond Pittman, Jr. *B.S., University of Illinois, 1959.*
Allan Ray Porush. *B.S., California Institute of Technology, 1959.*
Wai Keung Tso. *B.Sc., University of London, 1959.*

Electrical Engineering

- Tracy Leon Atherton, Jr. *B.S., California Institute of Technology, 1958.*
Gordon Edward Baird. *B.S., California Institute of Technology, 1959.*
Thomas Brooke Ballard. *B.E.E., Rensselaer Polytechnic Institute, 1959.*
Richard Alan Baugh. *B.S., California Institute of Technology, 1959.*
Billy Rae Blanchard. *B.S., Louisiana Polytechnic Institute, 1959.*
Robert Eugene Chandos. *B.S., California Institute of Technology, 1959.*
René Clément Collette. *Ing. Civil A.I.Lg., 1957, Ing. Civil A.I.M., Université de Liège, 1958.*
Mert Cramer. *B.A., University of California, 1954; B.S., California Institute of Technology, 1959.*
Jacques de Barbeyrac Saint-Maurice. *Dipl. d'Ing., École Nationale Supérieure de l'Aéronautique, 1959.*
Narsingh Deo. *B.Sc., Patna University, 1956; Dipl. I.I.Sc., Indian Institute of Science, 1959.*
Solomon De Picciotto. *B.S., California Institute of Technology, 1959.*
Harry Dym. *B.E.E., The Cooper Union, 1959.*
Ronald Alvin Forbess. *B.S., California Institute of Technology, 1959.*
Alain Nestor Genko. *Bachelier de l'enseignement secondaire, Université de Paris, 1955; Dipl. Ing., École Supérieure d'Electricité, 1959.*
Egbert Graeve. *Dipl. Ing., Technische Hochschule Aachen, 1955.*
L. Dale Green. *B.S., California Institute of Technology, 1959.*
Rogers Wyman Harder. *B.S., California State Polytechnic College, 1959.*
Andres Oliver Holdo. *Ing. en Telecomunicaciones, Universidad de Buenos Aires, 1952.*
Gordon Frierson Hughes. *B.S., California Institute of Technology, 1959.*
William Norris Huse. *B.S., California Institute of Technology, 1959.*
Vladimir A. Khvostchinsky. *Ing. Dipl., École Polytechnique de l'Université de Lausanne, 1954.*
Murray Arnold Koerner. *B.S., California Institute of Technology, 1959.*
Dennis Wayne Kuli. *B.S., California Institute of Technology, 1959.*
Jean Bernard Lagarde. *Dipl. d'Ing. Arts et Métiers, École Nationale d'Ingénieurs Arts et Métiers, 1959.*
Robert Mark Lebovitz. *B.S., California Institute of Technology, 1959.*
Lanny Louis Lewyn. *B.S., California Institute of Technology, 1959.*
Richard Bruce MacAnally. *B.S., California Institute of Technology, 1959.*
Raymond Edward Magdaleno. *B.S., California Institute of Technology, 1959.*

MASTER OF SCIENCE IN ENGINEERING

Electrical Engineering—continued

Donald MacMurray Malone. *B.E.E., Cornell University, 1959.*
William Thomas Peters. *B.S., Duke University, 1959.*
Edward Richard Petersen. *B.Sc., University of Alberta, 1959.*
James Rodney Pousson. *B.S., Southwestern Louisiana Institute, 1959.*
Ira Richer. *B.E.E., Rensselaer Polytechnic Institute, 1959.*
James Gordon Robins. *B.S., California Institute of Technology, 1955.*
William George Scheerer. *B.S., Syracuse University, 1959.*
John Joseph Schuster. *B.S., California Institute of Technology, 1959.*
Ivan Edward Sutherland. *B.S., Carnegie Institute of Technology, 1959.*
Terry Olin Teigen. *B.S., California Institute of Technology, 1959.*
Roger Allen Urban. *B.S., Carnegie Institute of Technology, 1959.*
William Louis Waggoner. *B.S., California Institute of Technology, 1959.*
William Yuh Wong. *B.S., California Institute of Technology, 1959.*

Engineering Science

Gordon Kramer. *B.M.E., The Cooper Union, 1959.*

Mechanical Engineering

Kenneth Hoyt Adams. *B.S., California Institute of Technology, 1959.*
Edward Raymond Bate, Jr. *B.S., California Institute of Technology, 1959.*
David Hastings Crimmins, Jr. *B.E.E., University of Detroit, 1957.*
Robert Dewey dePencier. *B.Sc., Queen's University, 1959.*
Edward George Gibson. *B.S., University of Rochester, 1959.*
Robert Goldstein. *A.B., Columbia College, 1958; B.S., Columbia School of Engineering, 1959.*
Pierre Eugène Joffres. *Dipl. d'Ing., École Centrale des Arts et Manufactures, 1958.*
Charles Richard Johnson. *B.S., California Institute of Technology, 1959.*
Gerhard Joachim Klose. *B.S., California Institute of Technology, 1959.*
Karl Kent Knapp. *B.S., California Institute of Technology, 1959.*
Donald Arthur Kugath. *B.E.S., Brigham Young University, 1959.*
Richard Frederick Long. *B.S., California Institute of Technology, 1959.*
Thomas J. McGean. *B.M.E., New York University, 1959.*
Karl Louis Meier. *B.S., Washington University, 1959.*
Michael Edmond James O'Kelly. *B.E., National University of Ireland, 1958.*
John William Porter, Jr. *B.A., The Rice Institute, 1959.*
William Lewis Shackelford. *B.E., Yale University, 1959.*
Roy T. Stake. *B.S., California Institute of Technology, 1957.*
Alfred Henry Sturtevant, III. *B.S., California Institute of Technology, 1953.*
Lovic Pierce Thomas, III. *B.S., Clemson College, 1957.*
Harry Warren Townes. *Sc.B., Brown University, 1959.*
Donald Martin Wiberg. *B.S., California Institute of Technology, 1959.*
Jack Wireman. *B.S., University of Kentucky, 1958.*

ENGINEER'S DEGREE

Aeronautical Engineer

David Ellsworth Anderson, *B.S.A.E., West Virginia University, 1954;*
M.S., California Institute of Technology, 1958.

David Max Wadsworth Lindquist, Lt. Col., U.S.A.F. *A.B., Grove City College, 1938.*

William Mohlenhoff, Lt. Cdr., U.S.N. *B.S., United States Naval Postgraduate School, 1959.*

Louis Robert Sarosdy, Lt., U.S.N. *B.S., United States Naval Academy, 1951;*
B.S.Ae., United States Naval Postgraduate School, 1959.

Paul Wilson Utterback, Lt., U.S.N. *B.S., United States Naval Academy, 1951;*
B.S.Ae., United States Naval Postgraduate School, 1959.

Allen Dean Williams, Lt., U.S.N. *B.S., United States Naval Academy, 1951;*
B.S.Ae., United States Naval Postgraduate School, 1959.

Mechanical Engineer

Jerry Dice Griffith. *B.S., Michigan State University, 1955; M.S., 1957.*

Hans-Dieter Linhardt, *Dipl. Ing., Technische Hochschule (Munich), 1955.*

DOCTOR OF PHILOSOPHY

- Carl S. Benson (Geology). *B.A., University of Minnesota, 1950; M.S., 1955.*
Thesis: Stratigraphic Studies in the Snow and Firn of the Greenland Ice Sheet.
- Harry Hobart Bingham, Jr. (Physics). *A.B., Princeton University, 1952.*
Thesis: π^0 Photoproduction from Deuterium in the Energy Range $\frac{1}{2}$ to 1 Bev.
- Thomas Kelman Boehme (Mathematics). *B.S., University of Oklahoma, 1952;*
M.S., Oklahoma Agricultural and Mechanical College, 1957.
Thesis: Operation Calculus and the Finite Part of Divergent Integrals.
- Henry Hursell Dearman (Chemistry). *B.S., University of North Carolina, 1956.*
Thesis: I. Studies of the Spin Distribution in Aromatic Radicals.
II. Electron Resonance Studies of Some Sandwich Compounds.
- William Edwin Dibble (Physics). *B.S., California Institute of Technology, 1954.*
Thesis: Design and Construction of a Point-Focusing Berreman Type Single Crystal X-Ray Monochromator and Its Application to Low-Angle Scattering Studies of Biological Specimens.
- Franklin Painter Dixon (Physics). *B.S., University of Texas, 1954;*
M.S., California Institute of Technology, 1957.
Thesis: Photoproduction of Positive Pions from Hydrogen in the 600 to 1000 Mev Region.
- Bruce Roger Doe (Geology). *B.S., University of Minnesota, 1954; B.Geol.E., 1954;*
M.S., Missouri School of Mines, 1956.
Thesis: The Distribution and Composition of Sulfide Minerals at Balmat, New York.
- William Farrell Edwards (Physics). *B.S., University of Utah, 1955;*
M.S., California Institute of Technology, 1957.
Thesis: Experimental Studies of Conversion Coefficients in Some Deformed Nuclei.
- Edward Richard Fleming (Aeronautics). *B.S., University of Notre Dame, 1949;*
M.S., 1950.
Thesis: Non-linear Flutter.
- Edward Ambrose Flinn, III (Geophysics). *S.B., Massachusetts Institute of Technology, 1953.*
Thesis: Exact Transient Solution of Some Problems of Elastic Wave Propagation.
- Donald Charles Forster (Electrical Engineering). *B.S., University of Southern California, 1955; M.S., California Institute of Technology, 1957.*
Thesis: Theory of Parametrically-Pumped Longitudinal-Field Electron Beams.
- Herbert Seymour Glick (Aeronautics). *B.E.Ph., Cornell University, 1951; M.Ae.E., 1953.*
Thesis: Modified Crocco-Lees Mixing Theory for Supersonic Separated and Re-attaching Flows.
- Jacek Piotr Gorecki (Aeronautics). *Dipl. Ing., Ecole Centrale des Arts et Manufactures (Paris, France), 1940.*
Thesis: An Investigation of Temperature Fluctuations on Bluff Bodies.
- Meredith Charles Gouridine (Engineering Science). *B.S., Cornell University, 1953.*
Thesis: On Magnetohydrodynamic Flow over Solids.

DOCTOR OF PHILOSOPHY

Henry Hoyt Hilton (Physics). *B.S., Yale University, 1952; M.S., 1952.*

Thesis: Comparison of the Beta-Spectra of Boron 12 and Nitrogen 12.

Charles Ray Hobby (Mathematics). *B.S., University of California, 1951; M.S., University of Houston, 1957.*

Thesis: The Derived Series of a P-Group.

Din-Yu Hsieh (Engineering Science). *B.Sc., National Taiwan University, 1954; M.Sc., Brown University, 1957.*

Thesis: Theory of Gas Bubble Dynamics in Oscillating Pressure Fields.

Herbert Erwin Hunter (Aeronautics). *B.S., University of Maryland, 1956; M.S., California Institute of Technology, 1957.*

Thesis: Application of Asymptotic Expansion Procedures to Low Reynolds Number Flows about Infinite Bodies of Revolution.

William Day Hutchinson (Chemistry). *B.S., Morehouse College, 1955; M.S., California Institute of Technology, 1957.*

Thesis: Physical Chemical Studies of Reactions of Human Hemoglobins.

Carl Kenneth Iddings (Physics). *B.A., Harvard College, 1955.*

Thesis: Nuclear Size Corrections to the Hyperfine Structure of Hydrogen.

Theodore Alan Jacobs (Engineering Science). *A.B., Emory University, 1950; M.S., University of Southern California, 1954.*

Thesis: I. An Investigation of Relaxation Processes. II. Studies in Combustion.

Peter M. Kelly (Electrical Engineering). *B.S., Union College, 1950; M.S., California Institute of Technology, 1952.*

Thesis: A Unified Approach to Two-Terminal Network Synthesis.

John Fisher Kennedy (Civil Engineering). *B.S., University of Notre Dame, 1955; M.S., California Institute of Technology, 1956.*

Thesis: Stationary Waves and Antidunes in Alluvial Channels.

Thomas Richard Koehler (Physics). *B.S., Seattle University, 1954.*

Thesis: Rayleigh Disk Measurements in Pure Superflow.

Abraham Nathan Kurtz (Chemistry). *B.A., Brooklyn College, 1937; M.A., 1943.*

Thesis: I. Structural Analogs of Typical Substrates of *alpha*-Chymotrypsin.

II. 1-Acetyl-2-[L-Tyrosyl] Hydrazine: An Inhibitor of *alpha*-Chymotrypsin.

III. Binuclear Aromatics as Inhibitors of *alpha*-Chymotrypsin Catalyzed Hydrolyses.

IV. Applicability of the pH-Stat to *alpha*-Chymotrypsin Catalyzed Hydrolyses that Produce a Buffer.

Marshall Lapp (Engineering Science). *B.Eng.Ph., Cornell University, 1955.*

Thesis: I. Emissivity Calculations for CO₂. II. Shock Tube f-Number Measurement for OH.

Ronald Michael Lloyd (Geology). *B.S., University of Illinois, 1952; M.S., 1953.*

Thesis: The Shell Chemistry of Some Recent and Pleistocene Mollusks and its Environmental Significance.

DOCTOR OF PHILOSOPHY

- Dean MacGillivray (Aeronautics). *B.A.Sc., University of British Columbia, 1955; M.A.Sc., 1956; M.S., California Institute of Technology, 1957.*
Thesis: Asymptotic Solutions for a Problem in Low Conductivity Magnetohydrodynamics.
- Jacob Valentine Maizel, Jr. (Biology). *B.S., Pennsylvania State University, 1955; M.S., 1957.*
Thesis: Isolation and Partial Characterization of Avenacin, an Antibiotic-like Substance from Oats.
- Carver A. Mead (Electrical Engineering). *B.S., California Institute of Technology, 1956; M.S., 1957.*
Thesis: Transistor Switching Analysis.
- John Jay Merrill (Physics). *B.S., California Institute of Technology, 1955; M.S., 1956.*
Thesis: Precision Measurement of X-Ray Spectra with Application to the L X-Ray Spectra of Uranium, Neptunium, Plutonium, and Americium.
- Carleton Bryant Moore (Chemistry). *B.S., Alfred University, 1954.*
Thesis: I. Kinetics of the Reactions of Silver, Lead and Thallium with Thioacetamide in Solution. II. The Distribution of Barium, Titanium, Manganese, Iron, Nickel, Cobalt and Chromium in Stony Meteorites.
- Arthur H. Muir, Jr. (Physics). *A.B., Williams College, 1953; M.S., California Institute of Technology, 1955.*
Thesis: An Investigation of the Ta^{181} Nucleus.
- Henry Richard Myers (Physics). *S.B., Massachusetts Institute of Technology, 1954; M.S., California Institute of Technology, 1955.*
Thesis: Photodisintegration of the Deuteron from 500 to 900 Mev.
- Charl François Naudé (Mechanical Engineering). *B.S., University of Stellerbosch, 1955; M.S., California Institute of Technology, 1957.*
Thesis: On the Mechanism of Cavitation Damage by Non-Hemispherical Cavities Collapsing in Contact with a Solid Boundary.
- Gerry Neugebauer (Physics). *B.A., Cornell University, 1954.*
Thesis: The Ratio of Negative to Positive Pion Photoproduction from Deuterium by Photons with Energies between 500 and 1000 Mev.
- Peter David Noerdlinger (Physics). *A.B., Harvard College, 1956.*
Thesis: Stability of Uniform Plasmas.
- Daniel Burrhus Olfe (Engineering Science). *B.S.E., Princeton University, 1957.*
Thesis: Gas Emissivities and Radiative Transfer Studies.
- Philip Moss Platzman (Physics). *S.B., Massachusetts Institute of Technology, 1956; M.S., California Institute of Technology, 1957.*
Thesis: Meson-Theoretical Origin of the Two Body Spin Orbit Force.
- Bimalendu Raychaudhuri (Geology). *B.Sc., Presidency College (Calcutta, India), 1948; M.Sc., 1951; M.S., California Institute of Technology, 1955.*
Thesis: Studies of Amphibolites and Constituent Hornblendes from an Area of Progressive Metamorphism near Lead, South Dakota.
- David Francis Rearick (Mathematics). *B.S., University of Florida, 1950; M.S., Adelphi College, 1956.*
Thesis: Some Visibility Problems in Point Lattices.

DOCTOR OF PHILOSOPHY

- Roy Earl Reichenbach (Mechanical Engineering). *B.M.E., Ohio State University, 1956; M.S., 1956.*
Thesis: Combustion Research.
- Eli Reshotko (Aeronautics). *B.M.E., The Cooper Union, 1950; M.M.E., Cornell University, 1951.*
Thesis: Stability of the Compressible Laminar Boundary Layer.
- Richard Earl Robertson (Chemistry). *B.A., Occidental College, 1955.*
Thesis: I. Isotropic Nuclear Resonance Shifts. II. The Magnetic Resonance Properties of Some Sandwich Molecules.
- Robert Dean Ryan (Mathematics). *B.S., California Institute of Technology, 1954.*
Thesis: Fourier Transforms of Certain Classes of Integrable Functions.
- Roy Ryosuke Sakaida (Chemical Engineering). *B.S., University of California at Los Angeles, 1953; M.S., California Institute of Technology, 1957.*
Thesis: I. A Study of the Catalytic Decomposition of Nitric Oxide. II. A Chromatographic Apparatus and Technique for the Analysis of Nitric Oxide in Nitrogen. III. Kinetics and Mechanism of the Air Oxidation of the Dithionite Ion ($S_2O_4^{2-}$) in Aqueous Solution.
- Bertrand Alva Schoomer, Jr. (Chemistry). *B.S., Louisiana Polytechnic Institute, 1955.*
Thesis: I. The Crystal Structure of Cyclohex-1-enylcyclobutenedione. II. The Crystal Structure of 3,6-dimethylpiperazine-2,5-dione. III. Programs for the Burroughs Model 205 Computer.
- Henry Philip Schwarcz (Geology). *B.A., University of Chicago, 1952; M.S., California Institute of Technology, 1955.*
Thesis: I. Geology of the Winchester-Hemet Area, Riverside County, California. II. Geochemical Investigations of an Arkosic Quartzite of the Winchester-Hemet Area, California.
- John Robert Simmons (Biology). *B.S., Utah State Agricultural College, 1955; M.S., 1956.*
Thesis: Studies on Amino Acid Incorporation in the Larvae of *Drosophila Melanogaster*.
- Edward Harvey Simon (Biology). *B.S., Rutgers University, 1956.*
Thesis: I. Transfer of DNA from Parent to Progeny Cell. II. A Study of the Possible Role of DNA in Viral RNA Synthesis during the Multiplication of an Animal Virus.
- Dale Rodekohr Simpson (Geology). *B.S., Pennsylvania State University, 1956; M.S., California Institute of Technology, 1958.*
Thesis: Geology of the Ramona Pegmatites, San Diego County, California.
- Robert James Stanton, Jr. (Geology). *B.S., California Institute of Technology, 1953; M.A., Harvard University, 1956.*
Thesis: Paleogeology of the Upper Miocene Castaic Formation, Los Angeles County, California.
- William Albert Steyert, Jr. (Physics). *S.B., Massachusetts Institute of Technology, 1954; M.S., California Institute of Technology, 1956.*
Thesis: Effects of Ionic Couplings on Nuclear Alignment of Co^{58} in $(Zn, Ni) SiF_6 \cdot 6H_2O$.

DOCTOR OF PHILOSOPHY

- William Allen Strohl (Biology). *B.A., Lehigh University, 1955.*
Thesis: Studies on the Modification, by Various Agents, of the Heat Sensitivity of Poliovirus.
- Henry John Stumpf (Mechanical Engineering). *B.S., Newark College of Engineering, 1951; M.S., California Institute of Technology, 1957.*
Thesis: Response of Mechanical Systems to Random Excitation.
- Bradford Sturtevant (Aeronautics). *B.E., Yale University, 1955; M.S., California Institute of Technology, 1956.*
Thesis: The Effusion of Charged Particles from a Shock Heated Gas.
- Salvatore Philip Sutura (Mechanical Engineering). *B.M.E., Johns Hopkins University, 1954; M.S., California Institute of Technology, 1955.*
Thesis: Streaming Birefringence as a Hydrodynamic Research Tool.
- Raymond Leonard Taylor (Chemistry). *B.S., Brown University, 1955.*
Thesis: I. A Study of Vibrational Relaxation in Carbon Monoxide by Shock-Waves and Infra-Red Emission. II. A Study of the Effect of a Resonant Transfer of Energy on the Vibrational Relaxation of Gas Mixtures.
- Howard M. Temin (Biology). *B.A., Swarthmore College, 1955.*
Thesis: The interaction of Rous Sarcoma Virus and Cells *in Vitro*.
- Don Dean Thompson (Chemistry). *B.A., University of California at Riverside, 1956.*
Thesis: I. Molecular Transfer of Non-equilibrium Nuclear Spin Magnetization. II. Electron Resonance of an Organic Free Radical in Zero Field.
- Robert Charles Thompson (Mathematics). *B.A., University of British Columbia, 1954; M.A., 1956.*
Thesis: Commutators in the Special and General Linear Groups.
- Ben Robert Turner (Physics). *B.S., State College of Washington, 1955.*
Thesis: A Study of Exploding Wires.
- Walter D. Wales (Physics). *B.A., Carleton College, 1954; M.S., California Institute of Technology, 1955.*
Thesis: Charged Photopion Production from Deuterium for Photon Energies Between 500 and 1000 Mev.
- Paul Morris Weichsel (Mathematics). *B.S., The City College of New York, 1953; M.S., New York University, 1954.*
Thesis: A Decomposition Theory for Finite Groups with Applications to P-Groups.
- Tetsuo Yamane (Chemistry). *B.S., California Institute of Technology, 1956.*
Thesis: I. Complexes of Mercury (I) with Polyphosphate and Dicarboxylate Anions and Mercury (II) Pyrophosphate Complexes. II. The Interaction of Mercuric Chloride with Deoxyribonucleic Acid.

CANDIDATES FOR COMMISSIONS
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Prizes and Awards

FREDERIC W. HINRICHS, JR., MEMORIAL AWARD

Awarded annually 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)

DON BAXTER, INC. PRIZES IN CHEMISTRY

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First Prize: PHILIP R. BROOKS

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CONGER PEACE PRIZE ORATION

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Awarded to the student member of the I.A.S. attaining the best scholastic record in engineering or the physical sciences.

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MARY A. EARLE MCKINNEY PRIZE IN ENGLISH

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First Prize: LESTER LARSEN HIRST, JR.

Second Prize: DAVID K. EDWARDS

Third Prize: RAY C. BARGLOW

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