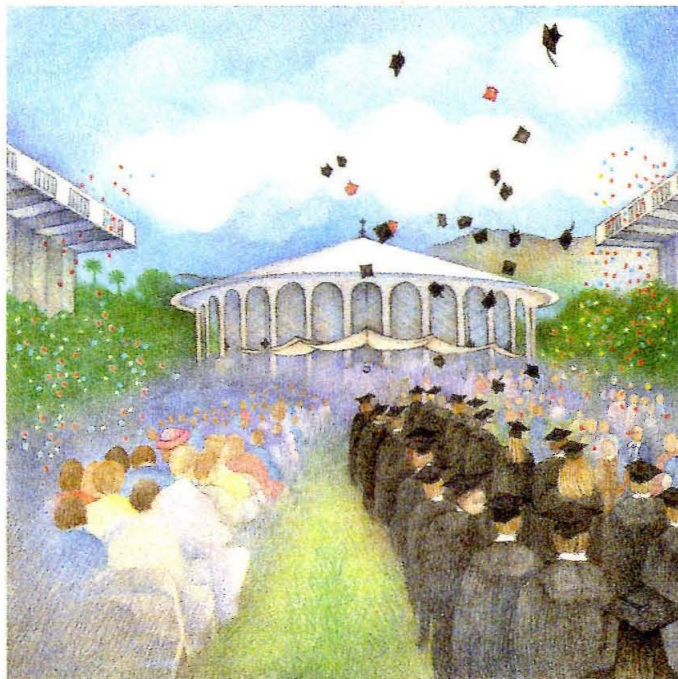


*Ninety-Ninth
Annual Commencement*

June 11, 1993



CALIFORNIA INSTITUTE
of TECHNOLOGY

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Ninety-Ninth
Annual
Commencement

FRIDAY MORNING AT TEN O'CLOCK
JUNE ELEVENTH, NINETEEN NINETY-THREE

About Caltech

In his diary entry of September 1, 1891, Pasadena philanthropist Amos Throop wrote, "Planted potatoes, cleaned a water pipe, husked the corn . . . In afternoon, saw Mr. Wooster and rented his block for five years . . . and hope I have made no mistake." Were he here today, Throop could rest assured in his decision. For the building of which he wrote, the Wooster Block, was rented for the purpose of establishing Throop University—the forerunner of Caltech.

In November of that year, Throop opened its doors to 31 students and a six-member faculty. Could anyone have imagined then that the school would become a world center for science and engineering research and education? Perhaps . . . for in the first year, the board of trustees began to reconsider the mission of the school. In 1892, they decided to emphasize industrial training, and in 1893, reflecting this new focus, renamed the school Throop Polytechnic Institute.

Throop might have remained just a good local school had it not been for the arrival in Pasadena of George Ellery Hale. A faculty member at the University of Chicago and a noted astronomer, Hale settled here in 1903. From that time until his death in 1938, he made significant contributions to Pasadena and Southern California: he established the Mount Wilson Observatory, raised funds for Palomar Observatory and its 200-inch telescope, participated in the creation of the Huntington Library and Art Gallery, helped design the Civic Center in downtown Pasadena, and—perhaps his single greatest achievement—set the course for the development of Throop into the California Institute of Technology, a school he envisioned as a scientific institution of the highest rank.

In 1913, Hale convinced Arthur Amos Noyes, professor of chemistry and former president of the Massachusetts Institute of Technology, to join him in Pasadena. With the arrival in 1917 of Robert Andrews Millikan, professor of physics at the University of Chicago, Hale had assembled the founders of the new institution. The world center of scientific and engineering research and education he had imagined soon took shape under a new name, the California Institute of Technology, administered by Millikan and enriched with the scientific talents of Noyes and his faculty colleagues.

Caltech today has a 124-acre campus and operates seven off-campus astronomical, seismological, and marine biological facilities, and administers NASA's Jet Propulsion Laboratory as well. At present, the Institute has an enrollment of some 2,000 students, more than half of whom are in graduate studies, and a faculty of about 275 professorial members, including four Nobel laureates, and more than 370 research members. Today, Caltech will award degrees to 542 graduates—quite a leap from the one man and one woman who constituted the first collegiate graduating class of Throop University.

About the Speaker

The Institute is honored to have Jewel Plummer Cobb as the speaker at its 99th annual commencement. Dr. Cobb is president emerita of California State University at Fullerton, and Trustee Professor at California State University at Los Angeles. She earned her bachelor's degree in biology from Talladega College, in Alabama, in 1944 and her Ph.D. in cell physiology from New York University in 1950. After two years of post-doctoral research and two as an instructor at the University of Illinois, she became a faculty member in the Department of Surgery in the NYU Postgraduate Medical School. In 1960, she joined Sarah Lawrence College as professor of biology. Her research has focused on how normal and cancer pigment cells grow, and their morphology and genetic expression. She is the author of 36 papers.

Dr. Cobb joined the ranks of university administrators in 1969 when she became dean of Connecticut College. In 1971, she went to Rutgers University's Douglass College as dean and professor of biology, a position she left in 1981 to assume the presidency of Cal State Fullerton.

Since she retired from that post in 1990, Dr. Cobb has been active in promoting the advancement of women and minorities in scientific fields and has authored a number of publications on issues relating to women in science. A fellow of the American Association for the Advancement of Science, she holds 18 honorary doctorates and serves on the boards of many companies, universities, and public-service groups.



The Commencement Ceremony

These tribal rites have a very long history. They go back to the ceremony of initiation for new university teachers in mediaeval Europe. It was then customary for students, after an appropriate apprenticeship to learning and the presentation of a thesis as their masterpiece, to be admitted to the Guild of Masters of Arts and granted the license to teach. In the ancient University of Bologna this right was granted by authority of the Pope and in the name of the Holy Trinity. We do not this day claim such high authority.

As in any other guild, whether craft or merchant, the master's status was crucial. In theory at least, it separated the men from the boys, the competent from the incompetent. On the way to his master's degree, a student might collect a bachelor's degree in recognition of the fact that he was half-trained, or partially equipped. The doctor's degree was somewhat different. Originally indistinguishable from the master's, the doctor's gradually emerged by a process of escalation into a supermagisterial role—first of all in the higher faculties of theology, law, and medicine. It will come as no surprise that the lawyers had a particular and early yen for this special distinction.

These graduations and distinctions are reflected in the quaint and colorful niceties of academic dress.

Of particular interest is the cap or mortarboard. In the form of the biretta it was the peculiar sign of the master. Its use has now spread far beyond that highly select group to school girls and choir boys and even to the nursery school. *Sic transit* . . .

The gown, of course, is the basic livery of the scholar, with its clear marks of rank and status—the pointed sleeves of the bachelor, the oblong sleeves of the master, the full sleeves and velvet trimmings of the doctor. The doctors, too, may depart from basic black and break out into many colors—Harvard crimson or Yale blue or the scarlet splash of Oxford.

Color is the very essence of the hood: color in the main body to identify the university; color perhaps in the binding to proclaim the subject of the degree—orange for engineering, gold for science, the baser copper for economics, white for arts and letters, green for medicine, purple for law, scarlet for theology, and so on. Size is a further variable, as the hoods tend to lengthen from the three feet of the bachelor to the four of the doctor. So the birds are known by their plumage.

With this color and symbolism, which is mediaeval though mutated, we stage our brief moment of pageantry, paying homage to that ancient community of scholars in whose shadow we stand, and acknowledging our debt to the university as one of the great institutional constructs of the Middle Ages. While looking back, however, we also celebrate the achievements of this present generation of students and look forward to the future of these our younger colleagues, whom we now welcome to our midst.

David C. Elliot
Professor of History, Emeritus

Academic Procession

Chief Marshal, Judith R. Goodstein, Ph.D.

Marshals

Arden L. Albee, Ph.D.

Christopher E. Brennen, D.Phil.

D. Roderick Kiewiet, Ph.D.

Ward Whaling, Ph.D.

David S. Wood, Ph.D.

Faculty Officers

John H. Richards, Ph.D.

Mary E. Lidstrom, Ph.D.

Ward Whaling, Ph.D.

MARCHING ORDER

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

FACULTY OFFICERS

THE FACULTY

THE CHAIRMEN OF THE DIVISIONS

THE DEANS

THE PROVOST

THE TRUSTEES

THE COMMENCEMENT CHAPLAIN

THE COMMENCEMENT SPEAKER

THE PRESIDENT

THE CHAIRMAN OF THE BOARD OF TRUSTEES

Program

ORGAN PRELUDE Leslie J. Deutsch, Ph.D.

PROCESSIONAL The Caltech Convocations Brass and
Percussion Ensemble
William Bing, M.M., Conductor

PRESIDING Ruben F. Mettler, Ph.D.
*Chairman of the Board of Trustees
California Institute of Technology*

INVOCATION..... Reverend Brandoch Lovely
Neighborhood Church

COMMENCEMENT ADDRESS Jewel Plummer Cobb, Ph.D.
*President Emerita
California State University at Fullerton*

"Choices and Chances in the 21st Century"

CHORAL SELECTION..... The Caltech Glee Clubs
Donald G. Caldwell, D.M.A., Conductor

*"Hallelujah" from Messiah
George Frederick Handel
(The audience will please rise during the singing of the "Hallelujah" chorus.)*

CONFERRING OF DEGREES Thomas E. Everhart, Ph.D.
*President
California Institute of Technology*

PRESENTATION OF CANDIDATES FOR DEGREES

For the Degree of Bachelor of Science D. Roderick Kiewiet, Ph.D.
Dean of Students

For the Degree of Master of Science Gary A. Lorden, Ph.D.
Vice President for Student Affairs

For the Degree of Engineer Arden L. Albee, Ph.D.
Dean of Graduate Studies

For the Degree of Doctor of Philosophy Dr. Albee
Biology John Abelson, Ph.D.
Division Chairman

Chemistry and Chemical Engineering Fred C. Anson, Ph.D.
Division Chairman

Engineering and Applied Science John H. Seinfeld, Ph.D.
Division Chairman

Geological and Planetary Sciences David J. Stevenson, Ph.D.
Division Chairman

Humanities and Social Sciences John O. Ledyard, Ph.D.
Division Chairman

Physics, Mathematics and Astronomy. . . Gerry Neugebauer, Ph.D.
Division Chairman

ANNOUNCEMENT OF AWARDS AND

CONCLUDING REMARKS President Everhart

ALMA MATER The Caltech Glee Clubs,
The Caltech Convocations Brass and
Percussion Ensemble, and Organ
(The audience may join in; lyrics are found on page 40.)

BENEDICTION Reverend Lovely

RECESSIONAL The Caltech Convocations Brass
and Percussion Ensemble

ORGAN POSTLUDE Dr. Deutsch

Candidates for Degrees

BACHELOR OF SCIENCE

B. Thomas Adler *New York, New York* Engineering and Applied Science
Snehal Surendra Adodra* *La Habra, California* Biology
Christopher Nicholas Alexander* *Woodland Hills, California* Biology
Shantanu Prasad Ambastha* *New Delhi, India* Engineering and Applied Science
Glenn S. Ammons *Annapolis, Maryland* Mathematics
Steven Charles Anderson* *St. Louis Park, Minnesota* Mathematics
Matthew Howard Ashton *Orange, California* Electrical Engineering
Melinda Jennifer Au *Fremont, California* Biology
Walker Garret Aumann *Palmdale, California* Engineering and Applied Science
Richard Allen Baltzersen *Farmingdale, New York* Chemistry
David Alexander Banks *Winchester, Massachusetts* Engineering and Applied Science
George Richard Benzinger III* *Swissvale, Pennsylvania* Biology
Michelle Ann Berteig *Monrovia, California* Chemistry
Rajesh Bilimoria *Lubbock, Texas* Engineering and Applied Science
Brooks Bishofberger *Fair Oaks, California* Engineering and Applied Science
Kristen Jeanne Blouke *Beaverton, Oregon* Geology
Ina Elizabeth Brenneise *Phoenix, Arizona* Biology
Jonathan Peter Briggs* *Brunswick, Maine* Engineering and Applied Science
John Joseph Brodoff *New York, New York* Engineering and Applied Science
Selaka Bandara Bulumulla* *Kandy, Sri Lanka* Electrical Engineering
Claudine Butcher *Boulder, Colorado* Geophysics
Lawrence Stephen Canino, Jr.* *Torrance, California* Physics
Thomas Matthew Capellari *Allen Park, Michigan* Engineering and Applied Science
Peter Jon Gerhardt Caylor *Fairfax Station, Virginia* Electrical Engineering
Winston Douglas Chamberlain* *La Cañada Flintridge, California* Biology
Alice Liu Chan *El Monte, California* Electrical Engineering
Antony Ming-Kyong Chan *Carrollton, Texas* Engineering and Applied Science
Stephen Szu-chien Chang *Racine, Wisconsin* Engineering and Applied Science
Jing-Tying Chao *La Crescenta, California* Engineering and Applied Science
Julian C. Chen *Aloha, Oregon* Chemistry
Richard Chiu* *Los Altos, California* Electrical Engineering
Francis Fu Shin Chong* *Seragoon Gardens, Republic of Singapore* Chemistry

Students whose names are followed by an asterisk are being graduated with honor in accordance with a vote of the faculty.

BACHELOR OF SCIENCE — *Continued*

Ingrid Chiaing Choong *Los Altos Hills, California* Chemistry
Danny Chu* *Alhambra, California* Engineering and Applied Science
Samuel Joseph Clark *Pendleton, Oregon* Biology and Engineering and Applied Science
Aaron Ray Clements *Lubbock, Texas* Chemistry
Douglas Ian Clowe *Colleyville, Texas* Physics
Philip David Cofield *New Monmouth, New Jersey* Mathematics and Economics
Timothy Russell Crowder *Klamath Falls, Oregon* Engineering and Applied Science
Khurram Dastgir-Khan *Gujranwala, Pakistan* Engineering and Applied Science
Tasshi Dennis *Port Townsend, Washington* Electrical Engineering
Taletha Mae Derrington *Aspen, Colorado* Biology
Brian Michael Donning *Portland, Oregon* Engineering and Applied Science
Jennifer Ann Dooley *Escondido, California* Applied Physics
Roanna Noriko Doty* *Mililani, Hawaii* Engineering and Applied Science
Brian I. Duchovnay *Jacksonville, Florida* Engineering and Applied Science
Gregory Lee Dudey* *Gainesville, Florida* Engineering and Applied Science
Christopher Robert Dunn* *Pasadena, California* Physics
Oscar Alfredo Duran *Guatemala City, Guatemala* Biology
Matthew David Durasoff *Edmonds, Washington* Engineering and Applied Science
Fatima Husein Jaffer Ebrahim* *Dubai, United Arab Emirates* Physics
Erik Andrew Edelberg* *Jacksonville, Florida* Chemical Engineering
Ernesto José Escorcía-Aparicio *Cali, Colombia* Engineering and Applied Science
Vicken Rostom Etyemezian* *Boston, Massachusetts* Engineering and Applied Science
Scot Steven Fagerland* *Rapid City, South Dakota* Applied Mathematics
Carl Thomas Feierabend *Houston, Texas* Engineering and Applied Science
Yanga Rolando Fernández* *Cape Coral, Florida* Astronomy
Timothy Kemp Firman *Yakima, Washington* Chemistry
Jeffrey Alan Foust* *Council Bluffs, Iowa* Geophysics
George Louis Fox* *Sterling Heights, Michigan* Biology
Nathan Albert Frei* *Pocatello, Idaho* Chemistry
Dan Yoel Frumin *Salisbury, Maryland* Engineering and Applied Science
Truxton King Fulton II *Fort Wayne, Indiana* Engineering and Applied Science
Swathi Ganaraj *Tylertown, Mississippi* Biology
Anna Melissa George* *Federal Way, Washington* Geochemistry
Timothy J. Gerk* *Osage, Iowa* Engineering and Applied Science
Kimberly Gin *Millbrae, California* Engineering and Applied Science
Balasubramanian Girish* *Madras, India* Physics
Keow Lin (Lindee) Goh* *Penang, Malaysia* Biology

BACHELOR OF SCIENCE — *Continued*

Francisco Gustavo Gomez *Willows, California* Geology
John Daniel Grade* *Wausaukee, Wisconsin* Engineering and Applied Science
Michael David Guadarrama *San Antonio, Texas* Physics
Korhan Gürkan* *Istanbul, Turkey* Electrical Engineering
Todd Lyndell Gustavson *Los Altos, California* Physics
Catherine Irene Hafer *Whitewater, Wisconsin* Economics
Atiya Yasmeen Hakeem* *Marine, Illinois* Biology
Jessie Gwendolynn Haldeman* *Zanesville, Ohio* Chemistry
Amy Therese Hansen *Minnetonka, Minnesota* Engineering and Applied Science
Stephen Charles Heise *St. Louis Park, Minnesota* Engineering and Applied Science
Francisco Herrero Jimenez *Madrid, Spain* Electrical Engineering
Karen Tristam Hong *Walnut, California* Engineering and Applied Science
Mark Shiuhseng Horng* *Pasadena, California* Biology
Hoyt Emmet Hudson *Winnetka, Illinois* Applied Physics
Mark Rough Humphreys *Irvine, Scotland* Engineering and Applied Science
Neena Imam *Dhaka, Bangladesh* Electrical Engineering
Valerie Michele Jacox *Sandy, Utah* Chemical Engineering
Mansoor Akhtar Jafri* *Karachi, Pakistan* Electrical Engineering
Anup Jatia *Kobe, Japan* Engineering and Applied Science and Economics
David Michael Jeitner *Philadelphia, Pennsylvania* Engineering and Applied Science
Jennifer Lee Johnson *Bellevue, Nebraska* Biology
Jennifer Lynn Jungkuntz *Colgate, Wisconsin* Engineering and Applied Science
Kevin Shiu Hao Kan *Glendale, Arizona* Engineering and Applied Science
Tarun Mohan Kapoor* *Calcutta, India* Chemistry and Biology
Osman Kibar* *Izmir, Turkey* Electrical Engineering
Tristania Kibbey *Lake Oswego, Oregon* Geology
Daniel Lee Kim* *Deerfield, Illinois* Engineering and Applied Science
Nitya Ranjan Kitchloo* *Bombay, India* Mathematics
Michael Edward Klitzke *Oshkosh, Wisconsin* Engineering and Applied Science
Jeffrey Mitsuru Koshi* *St. Louis, Missouri* Physics
Jean-Paul Kovalik* *Montreal, Canada* Biology
David Wayne Krider* *Danville, California* Engineering and Applied Science
and Economics
John Carson Krowas *Sturgeon Bay, Wisconsin* Engineering and Applied Science
Alan Eugene Kulawik* *Anchorage, Alaska* Electrical Engineering
Yu-Chien Kuo* *San Dimas, California* Biology
Brian Michael Kurkoski *Portland, Oregon* Engineering and Applied Science
Choong Oh Kwon *Houston, Texas* Physics

BACHELOR OF SCIENCE — *Continued*

Jae H. Kyung *Castle Rock, Colorado* Physics
David Lande* *Paris, France* Physics
Walter Joseph Landry, Jr. *Lafayette, Louisiana* Astronomy
Jonathan E. Lange *St. Paul, Minnesota* Engineering and Applied Science
Wa-To Lau* *Hong Kong, Hong Kong* Chemistry
Joseph Paul Lauer *Pittsburgh, Pennsylvania* Electrical Engineering
Andrew John Lavin *Milmont Park, Pennsylvania* Mathematics and Engineering and Applied Science
Albert Niels Lee *Atherton, California* Engineering and Applied Science
Jong Won Lee* *Seoul, Republic of Korea* Applied Physics
Owen Webster Lee* *Honolulu, Hawaii* Electrical Engineering
Roy Kang Lee *Los Angeles, California* Mathematics and Physics
Victor Soo Lee* *Mountain View, California* Electrical Engineering
Marcia Joyce Li* *Hillsborough, California* Biology
Melissa Yan-Yee Li* *San Jose, California* Electrical Engineering
Martin Wei-Min Lin* *Sugar Land, Texas* Electrical Engineering
Hsiu-Hsien Ling* *Hacienda Heights, California* Biology
Nye Tse-Yao Liu *Los Angeles, California* Engineering and Applied Science
Yvonne Yue Liu* *Hong Kong, Hong Kong* Chemical Engineering
James Alan Low *Upland, California* Engineering and Applied Science
Whye-Kei Lye* *Singapore, Republic of Singapore* Physics
Jason Dorian Macleod *Baltimore, Maryland* Chemical Engineering
Rohan Mahadevan* *Bangalore, India* Physics
Gabriela Mallén-Ornelas *Mexico City, Mexico* Astronomy
Beth Michelle Mammini *Novato, California* Applied Physics
Jesús Mancilla Cisneros *Tonaya, Mexico* Chemical Engineering
Steve Aaron Marschke* *Bismarck, North Dakota* Engineering and Applied Science
Mark Eugene Mazurek *Littleton, Colorado* Biology
Peter James McCann *Memphis, Tennessee* Engineering and Applied Science
Todd Robert McLaughlin *Rosemount, Minnesota* Biology
Diana Therese McMahon *Scranton, Pennsylvania* Chemistry
Amitabh Mehra* *Green Bay, Wisconsin* Electrical Engineering
Audra Hsien-I Meng* *Sterling Heights, Michigan* Electrical Engineering
Adrienne Pauline Miller* *Bremerton, Washington* Engineering and Applied Science
Theresa Kathleen Miller *Bremerton, Washington* Engineering and Applied Science
Areez Mino Mody* *Bombay, India* Mathematics
Erika Elizabeth Moilanen *Chula Vista, California* Biology
Mark David Montague *Menlo Park, California* Engineering and Applied Science

BACHELOR OF SCIENCE — *Continued*

Allen Brady Montz *Urbana, Illinois* Engineering and Applied Science
Thayer Miller Morris III *Salem, Virginia* Applied Mathematics
Ali Mortazavi *Pasadena, California* Engineering and Applied Science
Jennifer Ann Mullin* *Coronado, California* Applied Physics
Michael Andrew Nassir *La Jolla, California* Physics
Joyce Chin Chin Ng* *Singapore, Republic of Singapore* Chemistry
Jessica Anne Philomena Nichols *National City, California* Engineering and Applied Science
Monica Oei* *Nanuet, New York* Biology
Christopher Michael Orth *Levittown, Pennsylvania* Physics
Keith Edward Oslakovic *Oak Lawn, Illinois* Engineering and Applied Science
Ritankar Pal* *Calcutta, India* Engineering and Applied Science
Theodore Harry Palmatier, Jr.* *Yakima, Washington* Electrical Engineering
Kevin N. Park* *Montebello, California* Engineering and Applied Science
Michael Pejic* *Redwood City, California* Physics
José Pérez González de Apodaca* *Madrid, Spain* Biology
Preston Manly Pfarnner *Hudson, New Hampshire* Engineering and Applied Science
Tzanetos Philippakos *New York, New York* Engineering and Applied Science
Teerachai Nicholas Pornsinsirak* *Bangkok, Thailand* Physics and Electrical Engineering
Katherine Jane Quinn* *Adelaide, Australia* Geophysics
James Edward Radford* *Fountain Valley, California* Engineering and Applied Science
Antonio Rangel* *Madrid, Spain* Economics
Jennifer Sarah Remine* *South Dennis, Massachusetts* Engineering and Applied Science
Miran So Young Rhee *Palos Park, Illinois* Chemistry
Karen Eileen Ross* *Upper Nyack, New York* Biology and History
Jennifer Messenger Rosser *Granger, Indiana* Biology and Chemistry
Dirk P. Runge *Fair Haven, New Jersey* Electrical Engineering
Behnam Sadeghi *Tehran, Iran* Electrical Engineering
Maneesh Sahani *High Wycombe, United Kingdom* Physics
Daniel Anthony Sandoval* *Santa Paula, California* Engineering and Applied Science
Shane H. Sauby *La Crescenta, California* Biology
Mark David Savellano* *Scottsdale, Arizona* Applied Physics
Rachel Mara Schwartz *St. Louis Park, Minnesota* Engineering and Applied Science and Literature
Mimi Sengupta* *Duarte, California* Biology
Ahmed A. Serag* *West Chester, Pennsylvania* Chemistry
Susan Shuyan Sheu* *San Marino, California* Biology

BACHELOR OF SCIENCE — *Continued*

Douglas G. Shiels* *Madison, Connecticut* Engineering and Applied Science
Aimée Louise Smith* *Catonsville, Maryland* Engineering and Applied Science
Jared L. Smith* *Boulder, Colorado* Engineering and Applied Science
Michael John Smith *South Pasadena, California* Engineering and Applied Science
Steven Milner Sobelman *Culver City, California* Engineering and Applied Science
Jill Amy Soha* *Pasadena, California* Biology
Mark Myong Je Son *Flushing, New York* Physics and Mathematics
John David Stamm *Lindstrom, Minnesota* Physics
Peter Sturdza *Bethesda, Maryland* Engineering and Applied Science
Ting Kin Tam* *Hong Kong, Hong Kong* Electrical Engineering
Erik Dannel Taylor* *Riverton, Utah* Applied Physics
Maggie Elizabeth Taylor* *Peoria, Illinois* Physics
Paul Piya Thienprasit *Minneapolis, Minnesota* Engineering and Applied Science and Economics
Stephen Craig Thompson *Omaha, Nebraska* Geology
Maria Diana Toronto *Stony Brook, New York* Applied Physics
Chon David Torres *Pasadena, California* Physics
Patty Bihguang Tsai* *Arcadia, California* Biology and Chemistry
Matthew Keoni Tucker* *Kailua-Kona, Hawaii* Electrical Engineering
Yuan Tsung Tung* *Taipei, Taiwan* Electrical Engineering
Debra Louise Tuttle* *Brick, New Jersey* Literature
Chris Thad Ulmer *Weiser, Idaho* Electrical Engineering
Robert Douglas Underwood *Moreno Valley, California* Electrical Engineering
Frederick Scott Upton *Los Angeles, California* Mathematics
Andreja Volenec* *Zagreb, Croatia* Biology and Independent Studies Program
Nathan Simon Wallach* *Flushing, New York* Mathematics
Xiaohui Kevin Wang* *Gainesville, Florida* Electrical Engineering
Gregory William Wardle* *Galveston, Texas* Electrical Engineering
Atsuhiko Watanabe* *Pasadena, California* Engineering and Applied Science
Sean Michael Wetterer *Livingston, New Jersey* Chemistry and Engineering and Applied Science
Robert Jennings Whiteley, Jr. *Lakenheath, England* Physics
Kenneth Copeland Wiberg *Sepulveda, California* Engineering and Applied Science
Geoffrey Sean Wiersema *Houston, Texas* Chemical Engineering
Joanna Marie Wills *Denville, New Jersey* Geochemistry
Diane Kristin Wong* *Seal Beach, California* Chemistry
Jennifer Ann Wright* *Sacramento, California* Literature
Ren Wu* *Shanghai, China* Electrical Engineering

BACHELOR OF SCIENCE — *Continued*

Julius Chen-Huan Yang *St. Louis, Missouri* Applied Physics

Andre Teikboon Yew *Honolulu, Hawaii* Engineering and Applied Science

Yuka Yonebayashi* *Fullerton, California* Biology

Jennifer S. Yu *Williamsburg, Virginia* Engineering and Applied Science

Feng Yuan* *Beijing, China* Physics

Yair Zadik *Huntington Beach, California* Engineering and Applied Science

MASTER OF SCIENCE

- Philippe H. Adam (*Aeronautics*) B.S. (*Applied Mathematics*), B.S. (*Aerospace Engineering*), Polytechnic University 1992.
- Gilad Almogy (*Applied Physics*) B.Sc., Hebrew University of Jerusalem 1987.
- Jean Marie Andino (*Chemical Engineering*) B.S., Harvard College 1988.
- Lawrence Anthony (*Materials Science*) California Institute of Technology.
- John Apostolakis (*Physics*) Ptychio, National and Kapodistrian University of Athens 1985.
- Barbara Helen Arendt (*Physics*) B.A., The University of Chicago 1990.
- Valerie Felice Arst (*Applied Mathematics*) B.S., University of California, Santa Barbara 1991.
- Paul David Asimow (*Geology*) A.B., Harvard College 1991.
- David Scott Babcock (*Electrical Engineering*) B.S., The Pennsylvania State University 1992.
- Helen Banava (*Chemistry*) S.B., Massachusetts Institute of Technology 1991.
- Robert Louis Behnken (*Mechanical Engineering*) B.S. (*Physics*), B.S. (*Mechanical Engineering*), Washington University 1992.
- Hervé Francis Bodin (*Electrical Engineering*) Diplôme d'Ingénieur, École Supérieure d'Ingénieurs en Electrotechnique et Electronique 1993.
- Steven Andrew Bowers (*Aeronautics*) B.S., Cornell University 1992.
- Kent Butler Bradford (*Physics*) B.S., Colorado School of Mines 1991.
- Fabienne Anne Breton (*Mechanical Engineering*) Licence de Mécanique, Université Pierre et Marie Curie 1991; Maîtrise de Mécanique, 1992.
- Martin Walter John Burmeister (*Chemical Engineering*) B.S., University of California, Davis 1991.
- Geoffrey William Burr (*Electrical Engineering*) B.A., B.S., State University of New York at Buffalo 1991.
- Lee James Burrows (*Applied Physics*) B.S., California Institute of Technology 1992.
- Shun Chan (*Physics*) B.Sc., University of Hong Kong 1991.
- Jai Sig Choi (*Engineering Science*) B.S., Seoul National University 1987; M.S., 1989.
- Chi-Keung Chow (*Physics*) B.Sc., The Chinese University of Hong Kong 1991.
- Ernest Yee-Wei Chuang (*Electrical Engineering*) B.S., University of California, Berkeley 1992.
- Brian Cook (*Physics*) B.S., Yale University 1991.
- James Neal Cook (*Computer Science*) B.A., University of California, San Diego 1992.
- Robert Joseph Cull (*Social Science*) B.A., Northwestern University 1988.
- Danial Dwayne Daley (*Applied Mathematics*) B.A., Occidental College 1990.
- Christopher Bruce Dartt (*Chemical Engineering*) B.S.E., Princeton University 1991.
- Jean-Paul Davis (*Aeronautics*) B.S., Cornell University 1992.
- Douglas David Dawn (*Chemistry*) B.S., University of Miami 1984.

MASTER OF SCIENCE — *Continued*

- Sanjeev Kumar Deora (*Electrical Engineering*) B.Tech., Indian Institute of Technology, Madras 1992.
- John Richard Duggan (*Social Science*) B.A., Whitman College 1987; M.A., Claremont Graduate School 1990.
- John Kenneth Elwood (*Physics*) A.B. (*Chemistry*), A.B. (*Physics*), Cornell University 1991.
- Doruk Engin (*Applied Physics*) B.S., California Institute of Technology 1992.
- Bahadır Erimli (*Electrical Engineering*) B.S., Middle East Technical University 1992.
- Hali Janine Lana Forstner (*Chemical Engineering*) B.Sc., University of Calgary 1991.
- Matthew Paul Fraser (*Environmental Engineering Science*) B.S., Carnegie Mellon University 1991.
- Colin Raymond Fry (*Electrical Engineering*) B.S., University of Canterbury 1984; M.E., 1988.
- Nikos Photakis Georgiades (*Physics*) B.A., University of Pennsylvania 1991; M.S., 1991.
- Mohammad Reza Gharib (*Mechanical Engineering*) B.S., California Institute of Technology 1992.
- John William Goodwine, Jr. (*Applied Mechanics*) B.S., University of Notre Dame 1988; J.D., Harvard University 1991.
- Mark S. Graf (*Social Science*) B.A. (*Economics*), B.A. (*Political Science*), University of Kansas 1987.
- Peter Armand Grognaard (*Aeronautics*) Electrotechnisch Ingenieur, Vrije Universiteit Brussel 1988; Bijzonder Licentiaat Informatica, 1991.
- Vinay Kumar Gupta (*Chemical Engineering*) B.Tech., Indian Institute of Technology, Bombay 1990.
- Nils William Halverson (*Applied Physics*) B.S., Stanford University 1991.
- John Walter Hartman (*Physics*) B.S., The University of Texas at Austin 1991.
- Gang He (*Physics*) B.S., Peking University 1991.
- Robert Laird Herman (*Geochemistry*) B.A., The University of Chicago 1991.
- Jon Nestor Hodowany-Stone (*Aeronautics*) B.S., University of California, San Diego 1992.
- Monica Jocelyn Holboke (*Civil Engineering*) A.B., Occidental College 1992; B.S., California Institute of Technology 1992.
- John William Holt (*Geology*) B.S., Rice University 1988.
- Liubo Hong (*Materials Science*) B.S., Peking University 1990.
- Jean Chia-Chin Hsieh (*Geology*) B.Sc., Carleton University 1991.
- Yun Huang (*Electrical Engineering*) B.E., Tsinghua University 1992.
- Todd Russell Hunter (*Astronomy*) B.S., The Pennsylvania State University 1991.
- Gregory Huyer (*Biology*) B.Sc., University of Alberta 1990.
- Adrian Cezar Ionescu (*Electrical Engineering*) B.S., Columbia University 1981.
- Michihiro Izumi (*Electrical Engineering*) B.S., The University of Tokyo 1987.

MASTER OF SCIENCE — *Continued*

- Yonggang Jin (*Mathematics*) B.S., Zhejiang University 1987; M.S., University of Science and Technology of China 1990.
- Milan M. Jovicic (*Computation and Neural Systems*) B.S., University of Belgrade 1987; M.S. (*Electrical Engineering*), California Institute of Technology 1990.
- Michael James Kantner (*Electrical Engineering*) B.S., Rensselaer Polytechnic Institute 1992.
- Kaoru Kato (*Social Science*) A.A., San Bernardino Valley College 1983; B.A., University of Arizona 1989; B.S., 1990.
- Paul Brendan Kavanagh (*Electrical Engineering*) S.B., Massachusetts Institute of Technology 1990.
- Laszlo Peter Keszthelyi (*Planetary Science*) B.A., The University of Texas at Austin 1986; B.S. (*Mathematics*), 1987; B.S. (*Geological Sciences*), 1988.
- Anthony Stephen Kewitsch (*Applied Physics*) B.S., Stanford University 1991.
- Vittu Khanna (*Physics*) B.Sc., Panjab University 1991.
- Charles Budiana Khouw (*Chemical Engineering*) B.S., University of Wisconsin-Madison 1990.
- David Lande (*Physics*) B.S., California Institute of Technology 1993.
- John Paul Latz (*Aeronautics*) B.S.E., Princeton University 1991.
- William Sauway Law (*Mechanical Engineering*) B.A., Oxford University 1991.
- Michelle Lazovich (*Social Science*) B.S., Arizona State University 1988.
- Maritza Muguira Lecavalier (*Electrical Engineering*) B.S., Texas A&M University 1992.
- David Soong-hua Lee (*Applied Physics*) B.S.E., Princeton University 1986.
- Kelvin Hao-Hua Lee (*Chemical Engineering*) B.S.E., Princeton University 1991.
- Thomas Sooyoung Lee (*Mechanical Engineering*) A.B., Occidental College 1984; M.S., University of California, Santa Barbara 1986.
- Stephanie Diane Leifer (*Applied Physics*) B.A. (*Mathematics*), B.A. (*Physics*), University of Pennsylvania 1989.
- K. Rustan M. Leino (*Computer Science*) B.A., The University of Texas at Austin 1989.
- Hoi Ming Leung (*Mathematics*) B.Sc., The Chinese University of Hong Kong 1990.
- John Edwin Lewis, Jr. (*Chemical Engineering*) B.S., Texas A&M University 1991.
- Shijie Li (*Electrical Engineering*) B.S., Tsinghua University 1988; M.S., 1991.
- Bih-Jwo Lin (*Biology*) B.S., National Taiwan University 1986; M.S., 1991.
- Yuan-Pei Lin (*Electrical Engineering*) B.S., National Chiao Tung University 1992.
- Yuhua Lin (*Electrical Engineering*) Diploma, Beijing University of Aeronautics and Astronautics 1980; M.E., 1988.
- Raul Francisco Lobo (*Chemical Engineering*) Licenciatura en Ingeniería, Universidad de Costa Rica 1989.
- Changhong Luo (*Materials Science*) B.S., Wuhan University 1985; M.S., 1988.
- Patrice Michel Maheo (*Aeronautics*) Diplôme d'Ingénieur, École Centrale de Lille 1993.

MASTER OF SCIENCE — *Continued*

- Berna Linda Massingill (*Computer Science*) B.A., B.S., The University of Texas at Austin 1977.
- Julien André Massol (*Electrical Engineering*) B.S., Lycée Renoir 1988; Diplôme d'Ingénieur, 1993.
- Rolf Mauermann (*Civil Engineering*) B.S., University of Illinois at Urbana-Champaign 1992.
- Todd Alan McAdams (*Chemical Engineering*) B.S., University of Colorado at Boulder 1991.
- Stefan McDonough (*Biology*) Sc.B., Brown University 1990.
- Ruthann Kimberly Melbourne (*Electrical Engineering*) B.A., University of California, Santa Cruz 1989.
- Andrea Carlo Mennucci (*Electrical Engineering*) Laurea, Università degli Studi di Pisa 1992; Diploma, Scuola Normale Superiore 1992.
- Sherrill Lynn Minch (*Chemical Engineering*) S.B. (*Chemical Engineering*), S.B. (*Life Sciences*), Massachusetts Institute of Technology 1990.
- Kimberly Ann Mislick (*Chemical Engineering*) S.B., Massachusetts Institute of Technology 1991.
- Karina Luciel Montilla (*Aeronautics*) B.S., University of Rhode Island 1992.
- John Frederick Nagel (*Chemical Engineering*) B.S., Stanford University 1991.
- Bruce James Nairn (*Environmental Engineering Science*) B.A.Sc., University of Toronto 1992.
- Robert Lloyd Navin (*Physics*) B.Sc., University of Leeds 1987.
- Thomas Ross Nichols (*Environmental Engineering Science*) B.S., Carnegie Mellon 1991; M.S., 1991.
- John David O'Brien (*Applied Physics*) B.S., Iowa State University of Science and Technology 1991.
- Sergei Stanislavovich Orlov (*Electrical Engineering*) Diploma, Moscow Institute of Physics and Technology 1991.
- Toshiro Ozawa (*Electrical Engineering*) B.E., Waseda University 1984; M.E., 1986.
- Steven Leslie Palm (*Aeronautics*) B.S., California Institute of Technology 1991.
- James Harvey Panetta (*Physics*) B.S., Drexel University 1991.
- Szilvia Papai (*Social Science*) Diploma, University of Economics, Budapest 1989.
- Miltiadis Vassilios Papalexandris (*Aeronautics*) Diploma, National Technical University of Athens 1991.
- Susan Catherine Paulsen (*Civil Engineering*) B.S., Stanford University 1991.
- Joel M. Pedlikin (*Aeronautics*) Sc.B., Brown University 1992.
- Nicola Joy Peill (*Environmental Engineering Science*) B.E., Manhattan College 1987.
- Tracy Lynn Peters (*Aeronautics*) B.S.E., The University of Michigan 1990.
- Per-Olov Pettersson (*Applied Physics*) B.A., Swarthmore College 1991.
- Tzanetos Philippakos (*Aeronautics*) B.S., California Institute of Technology 1993.

MASTER OF SCIENCE — *Continued*

- Hongyu Piao (*Electrical Engineering*) B.S., University of Science and Technology of China 1989.
- Sean Drummond Plunkett (*Chemical Engineering*) B.S., University of Maryland at College Park 1988.
- David Charles Polidori (*Applied Mechanics*) B.S., University of Wisconsin-Madison 1992.
- Kent Allen Potter (*Electrical Engineering*) A.A., Pasadena City College 1974; B.S., California State University, Long Beach 1976.
- Anoop Prasad (*Physics*) B.Sc., St. Xavier's College 1991.
- Thomas Jay Prins (*Chemistry*) B.S., Hope College 1990.
- Allen Pu (*Electrical Engineering*) B.E., The Cooper Union 1992.
- James Edward Radford (*Mechanical Engineering*) B.S., California Institute of Technology 1993.
- Terrill Wylie Ray (*Planetary Science*) B.S., Colorado School of Mines 1990.
- Lucy Regan (*Chemical Engineering*) B.E., University College Dublin 1988.
- David Anthony Reich (*Applied Physics*) B.Sc., University of Manitoba 1991.
- Adam Roff (*Applied Mechanics*) B.Sc., University of Cape Town 1990.
- Susan Felicia Rubin (*Chemical Engineering*) S.B., Massachusetts Institute of Technology 1991.
- Lynn Monica Russell (*Chemical Engineering*) A.B., B.S., Stanford University 1991.
- Steven Jay Sanders (*Applied Physics*) B.S., University of California, Berkeley 1991.
- Jason Lee Saving (*Social Science*) B.A., Rice University 1991.
- Craig William Scrivner (*Geophysics*) B.S., University of California, San Diego 1989.
- Fernando Javier Selman (*Astronomy*) Bachillerato, Universidad de Chile 1981; Magister, 1982.
- Shaun S. Shariff (*Aeronautics*) B.S. (*Aerospace Engineering*), B.S. (*Ocean Engineering*), Virginia Polytechnic Institute and State University 1992.
- Katerina Vladislavna Sherstyuk (*Social Science*) B.S., Novosibirsk State University 1989.
- Olga Vitalievna Shvetsova (*Social Science*) Diploma, Moscow State Lomonosov's University 1989.
- Paolo Alberto Gregorio Sivilotti (*Computer Science*) B.Sc., Queen's University 1991.
- Michael David Slessor (*Aeronautics*) B.A.Sc., University of British Columbia 1992.
- Edward Sleva (*Chemistry*) B.S. (*Chemistry*), B.S. (*Physics*), North Carolina State University 1992.
- Stefano Soatto (*Electrical Engineering*) Laurea in Ingegneria Elettronica, Università degli Studi di Padova 1992.
- Glenn Eric Soberman (*Physics*) B.S., State University of New York at Stony Brook 1991.
- Christopher Daniel Springfield (*Applied Physics*) B.S., Colorado School of Mines 1991.

MASTER OF SCIENCE — Continued

- Adam Franklin Strassberg (*Computation and Neural Systems*) A.B., Harvard College 1990.
- Xin Sun (*Physics*) Peking University.
- Akira Takahashi (*Electrical Engineering*) B.S., Hokkaido University 1988.
- Tao Tan (*Electrical Engineering*) B.S., University of Science and Technology Beijing 1991.
- Alexander Vyacheslav Teplyaev (*Mathematics*) Diploma, Leningrad State University 1990.
- John William Thornley (*Computer Science*) B.Sc., University of Auckland 1982; M.Sc., 1985.
- Charles Michael Tierney (*Aeronautics*) B.S., University of Colorado at Boulder 1989.
- Thomas Rocco Tsao (*Electrical Engineering*) B.S., University of California, Berkeley 1992.
- Quentin A. Turchette (*Physics*) S.B., Massachusetts Institute of Technology 1991.
- Dimitrios Vlassopoulos (*Geochemistry*) B.Sc., Concordia University 1986; M.Sc., McGill University 1988.
- Serge Volkoff (*Electrical Engineering*) Diploma, Moscow Institute of Physics and Technology 1986.
- Alycia J. Weinberger (*Physics*) B.A., University of Pennsylvania 1991.
- Eric Wolfgang Weisstein (*Planetary Science*) B.A., Cornell University 1990.
- Matthew Everett Werner (*Mechanical Engineering*) B.S., Rensselaer Polytechnic Institute 1992.
- Daniel LeRoy Williams (*Physics*) B.S., Louisiana State University 1991.
- Katherine Ann Winters (*Biology*) B.S., The University of Michigan 1989.
- John A. Wright (*Electrical Engineering*) A.B., Dartmouth College 1991; B.E., Thayer School of Engineering 1992.
- Jimmy Yee (*Applied Physics*) B.S., Cornell University 1991.
- Judith Zachariasen (*Geology*) A.B., Harvard College 1986; M.A., University of California, Berkeley 1991.
- Blair Zajac, Jr. (*Geophysics*) B.S., University of Washington 1990.
- José Roberto Zenit-Camacho (*Mechanical Engineering*) Ingeniero, Universidad Nacional Autónoma de México 1992.

ENGINEER

- Susan Marie Beatty (*Mechanical Engineering*) B.S. California State University, Northridge 1978; M.S., 1983.
- Kenji Togami (*Aeronautics*) B.E., The University of Tokyo 1987; M.S., California Institute of Technology 1992.
- Richard Mikio Tsuyuki (*Aeronautics*) B.Sc., The University of Manitoba 1990; M.S., California Institute of Technology 1991.
- Moon-Tai Yeung (*Aeronautics*) B.S., California Institute of Technology 1987; M.S., 1988.

DOCTOR OF PHILOSOPHY

DIVISION OF BIOLOGY

- Ralph Adolphs (*Neurobiology*) B.S., M.S., Stanford University 1986.
Thesis: Processing of Interaural Level Differences in the Auditory Brainstem of the Barn Owl.
- Brooke Paul Anderson (*Computation and Neural Systems*) B.S.E., The University of Michigan 1985; M.S., California Institute of Technology 1987.
Thesis: Various Algorithms for Optimization and Learning in Adaptive Systems.
- Jan Öjvind Bernander (*Computation and Neural Systems*) M.S., Uppsala Institute of Technology 1987.
Thesis: Synaptic Integration and its Control in Neocortical Pyramidal Cells.
- Upinder Singh Bhalla (*Biology*) B.A., Cambridge University 1986.
Thesis: Information Processing in the Mammalian Olfactory Bulb.
- Alan-Philippe Blanchard (*Computation and Neural Systems*) B.S., California Institute of Technology 1980.
Thesis: Sequence Specific Effects on the Incorporation of Dideoxynucleotides by a Modified T7 Polymerase.
- Steven Manning Clark (*Biotechnology/Molecular Biology and Biochemistry*) B.S., California State University, Northridge 1985.
Thesis: Advances in Scanning Force Microscopy of Biological Structures.
- Tobias Delbrück (*Computation and Neural Systems*) B.S., University of California, San Diego 1983.
Thesis: Investigations of Analog VLSI Visual Transduction and Motion Processing.
- Dali Ding (*Biology*) B.S., Fudan University 1986.
Thesis: Localization of Maternal RNAs in the Early Embryo of *Drosophila*.
- Paul Allen Garrity (*Biology*) B.A., Swarthmore College 1985.
Thesis: The *In Vivo* Examination of Transcriptional Control Mechanisms in Mammalian Cells.
- Bruce Alan Hamilton (*Biology*) B.A., University of California, San Diego 1986.
Thesis: Assessing Molecular Function in the *Drosophila* Nervous System: A Reverse Genetic Approach.
- Hsiaolan Sharon Hsu (*Computation and Neural Systems*) B.A., University of California, Berkeley 1986; M.A., The Johns Hopkins University 1988.
Thesis: Properties of the First Genetically Engineered Neuron.
- Tim Hunkapiller (*Biology*) B.S., Oklahoma Baptist University 1976.
Thesis: Diversity and Evolution of the Immunoglobulin Gene Superfamily.
- Gregg Duane Jongeward (*Developmental Biology and Genetics*) B.S., University of Minnesota 1986.
Thesis: Negative Regulators of the *let-23* EGF Receptor in *Caenorhabditis elegans* Vulval Differentiation.

When more than one field of study is listed, in the Division of Biology it indicates a dual major; in other divisions the first is the major and the second and others are minors.

DOCTOR OF PHILOSOPHY — *Continued*

George Anthony Komatsoulis (*Molecular Biology and Biochemistry*) B.S., Cornell University 1986.

Thesis: Recognition of tRNA^{Cys} by the *E. coli* CysteinyI-tRNA Synthetase: *in vivo* and *in vitro* Studies.

Joseph Thomas Meier (*Biology*) B.A., Kalamazoo College 1978.

Thesis: A Biological Arms Race: Site Specific DNA Recombination in Competing Immunofunctional Proteins.

Edith Karina Schimmerling Cramer (*Biology*) B.A., University of California, Berkeley 1986.

Thesis: Motor Neuron Projection Patterns and Maturation of Motor Unit Types in the Rabbit Soleus Muscle.

Derek Lyle Stemple (*Biology*) B.A., B.S., University of Colorado 1983.

Thesis: Isolation of a Mammalian Neural Crest Stem Cell and Environmental Control of Cell Fate Choices.

Yukang Wang (*Immunology*) B.S., Shanghai Medical University 1984; M.S., Shanghai Second Medical University 1987.

Thesis: Transcriptional Regulation of T Cell Receptor Genes by a Novel CACCC Box Binding Protein.

Shawn Kathleen Westaway (*Molecular Biology and Biochemistry*) B.A., California State University, Northridge 1984.

Thesis: Structure and Function of Yeast tRNA Ligase.

DIVISION OF CHEMISTRY AND CHEMICAL ENGINEERING

Gabriel Bryan Balazs (*Chemistry*) B.S., Washington & Lee University 1985.

Thesis: Mechanistic and Electrochemical Studies of the Reduction of Carbon Dioxide as Catalyzed by Ni(I)cyclam*.

Richard Edward Barrans Jr. (*Chemistry*) B.A., The Johns Hopkins University 1985.

Thesis: Investigations in Molecular Recognition: Statistical Tools and Experimental Studies.

David Randall Baselt (*Chemistry*) B.S., University of California, Berkeley 1988.

Thesis: The Tip-Sample Interaction in Atomic Force Microscopy and its Implications for Biological Applications.

Richard Dean Braatz (*Chemical Engineering*) B.S., Oregon State University 1988; M.S., California Institute of Technology 1991.

Thesis: Robust Loopshaping for Process Control.

Steven Keith Buratto (*Chemistry*) B.S., University of Puget Sound 1987.

Thesis: Time-Sequenced Optical Nuclear Magnetic Resonance of Gallium Arsenide.

Elizabeth G. Burns (*Chemistry*) B.S., Southern Methodist University 1987.

Thesis: Functionalized Polymers via Ring-Opening Metathesis Polymerization.

Wilfred Chen (*Chemical Engineering*) B.S., University of California, Los Angeles 1988.

Thesis: Molecular Expression System Design: Theoretical and Experimental Characterization of a Novel Cross-Regulation System and its Application as a Metabolic Switch.

DOCTOR OF PHILOSOPHY — *Continued*

- Terry Ronald Coley (*Chemistry*) B.S. (*Chemistry*), B.S. (*Computer Science*), University of Illinois at Urbana-Champaign 1985.
Thesis: Prediction of Scanning Tunneling Microscope Images by Computational Quantum Chemistry: Chemical Models and Software Design.
- William Donald Cotter (*Chemistry*) B.A., Grinnell College 1987.
Thesis: Organoscandium Complexes as Mechanistic Probes in the Ziegler-Natta Polymerization of α -Olefins and Dienes.
- Peter Scott Dragovich (*Chemistry and Biology*) B.S., University of California, Berkeley 1988.
Thesis: Synthesis and Study of Chemically Activated Biradical Precursors.
- Robert James Driscoll (*Chemistry*) B.S., State University of New York at Purchase 1985.
Thesis: Scanning Tunneling Microscopy and Spectroscopy: I. Semimetals and Semiconductors II. Atom-Resolved Imaging of DNA.
- John Spencer Evans (*Chemistry*) D.D.S., University of Illinois at Chicago 1982.
Thesis: NMR and Computational Studies on the Conformational Folding of the Biominerization Template, Phosphophoryn.
- Mitsuko Fujiwara (*Chemistry*) A.B., Cornell University 1988.
Thesis: Characterization of pH-Dependent Poly(Acrylic Acid)-Vesicle Interaction and its Application in Cellular Drug Delivery.
- Douglas Lee Gin (*Chemistry*) B.Sc., The University of British Columbia 1988.
Thesis: A New Route to Poly(*p*-phenylene): Stereoregular Precursors via Transition-Metal-Catalyzed Polymerization.
- Kenneth S. Graham (*Chemistry*) B.S., The Pennsylvania State University 1985; M.S., 1986.
Thesis: Design and Chemical Synthesis of Sequence-Specific DNA-Cleaving Metalloprotein Ni (II) GGH- $\gamma\delta$ (141-183).
- Amy Jo Hoffman (*Chemistry*) B.S., Purdue University 1986.
Thesis: Photocatalytic Reactions on Quantum-sized Semiconductor Colloids: Photoinitiated Polymerization of Vinylic Monomers, Formation of Hydrogen Peroxide and Organic Peroxides, Oxidation of Carboxylic Acids, and Synthesis of Humic-like Material.
- Tyler Reed Holcomb (*Chemical Engineering*) B.S., The University of Texas at Austin 1987; M.S., California Institute of Technology 1992.
Thesis: Improved Linear Regression with Process Applications.
- Daniel Hall Jones (*Chemistry*) B.S., University of California, Berkeley 1987.
Thesis: I. Quantum-Mechanical Chemical Exchange II. Stochastic Averaging in Magnetic Resonance.
- Jongsun Kim (*Chemistry*) B.S., Seoul National University 1986; M.S., 1988.
Thesis: Crystallographic Structures and Functional Implications of Nitrogenase Molybdenum-Iron Proteins from *Azotobacter vinelandii* and *Clostridium pasteurianum*.
- Elaine Yee-Lin Kuo (*Chemistry*) A.B., Harvard College 1987.
Thesis: I. Thermal Cyclization of (Z)-1,2,4-Heptatrien-6-yne II. Studies Directed Toward the Synthesis of Neocarzinostatin Chromophore.

DOCTOR OF PHILOSOPHY — *Continued*

- Phillip Michael Lovaenti (*Chemical Engineering*) B.S., The University of Akron 1988; M.S., California Institute of Technology 1991.
Thesis: Intertial Effects on Particle Dynamics.
- Roxanne Male (*Chemistry*) B.A., State University of New York at Buffalo 1986; M.A., 1988.
Thesis: Development of an Effective Drug Delivery System Utilizing Loaded Platelets.
- Alan Martin Mathiowetz (*Chemistry*) B.A., Rice University 1985.
Thesis: Dynamic and Stochastic Protein Simulations: From Peptides to Viruses.
- Ann Miller (*Chemistry*) B.A., University of Pennsylvania 1986.
Thesis: *ab initio* Calculations in Heterogeneous and Homogeneous Catalysis
I. Methanol to Gasoline with ZSM-5 II. Carbonyl Ligand Effects on Metal-Metal Bonds.
- Srihari Murthy (*Chemistry*) B.Tech., Banaras Hindu University 1987; M.S., California Institute of Technology 1988.
Thesis: The Gas-Phase Ion Chemistry of Substituted Silanes.
- Changmoon Park (*Chemistry*) B.S., Seoul National University 1987.
Thesis: Protein Design and Simulation.
- Thanh Ngoc Phung (*Chemical Engineering*) B.S., University of Pittsburgh 1985; M.S., 1987.
Thesis: Behavior of Concentrated Colloidal Suspensions by Stokesian Dynamics Simulation.
- Earl Douglas Potter (*Chemistry*) B.A., Carleton College 1987.
Thesis: Ultrafast Control and Dynamics of Chemical Reactions.
- Russell John Pylki (*Chemistry*) B.S., Washington State University 1980; M.S., 1981.
Thesis: Probing Chemical Dynamics Near Electrode Surfaces with Ultramicroelectrodes.
- Michael M. Rock, Jr. (*Chemistry*) B.S., The University of Chicago 1987.
Thesis: The Design and Synthesis of Electroactive and Magnetic Polymers.
- Gail Naomi Ryba (*Chemistry*) B.A., Reed College 1984.
Thesis: Time-Resolved Photoluminescence Studies of Metal Ion Treated n-GaAs in Electrolytes.
- Ayesha Sitlani (*Chemistry*) B.A., Smith College 1988; M.A., Columbia University 1989.
Thesis: Sequence Specific Recognition and Photocleavage of DNA by Phenanthrenequinone Diimine Complexes of Rhodium (III).
- Robert J. Todd (*Chemical Engineering*) B.S., The University of Michigan 1987.
Thesis: Designing Protein Separations Based on Metal-Affinity Interactions.
- Margat Hoppe Werner (*Chemistry*) B.A., Wellesley College 1986.
Thesis: NMR Imaging of Solids with Multiple-Pulse Line Narrowing and Radiofrequency Gradients.
- Michael George Youngquist (*Chemistry*) B.A., Augustana College 1986.
Thesis: Atomic-Scale Imaging and Spectroscopy Using Scanning Tunneling Microscopy.

DOCTOR OF PHILOSOPHY — *Continued*

Xiaotian Zhu (*Chemistry*) B.S., Peking University 1988.

Thesis: Structure-function Studies of Fibroblast Growth Factors (FGFs).

DIVISION OF ENGINEERING AND APPLIED SCIENCES

Yoshio Abe (*Materials Science*) B.E., The University of Tokyo 1981; M.S., California Institute of Technology 1990.

Thesis: Formation and Stability of Nanocrystalline Alloys Synthesized by Mechanical Milling.

Lawrence Anthony (*Materials Science*) M.S., California Institute of Technology 1993.

Thesis: Kinetics of Disorder→Order Transformations in Highly Nonequilibrium Materials.

Andrew D. Bailey III (*Applied Physics*) B.S., University of Wisconsin-Madison 1987.

Thesis: Drift Wave Ion Fluid Velocity Field Measured by Planar Laser Induced Fluorescence.

Jacques Belanger (*Aeronautics and Planetary Science*) B.Sc.A., Laval University 1985; M.Sc., 1987.

Thesis: Studies of Mixing and Combustion in Hypervelocity Flows with Hot Hydrogen Injection.

MarC S. Bourzutschky (*Applied Physics*) B.A., Princeton University 1986.

Thesis: Complex Dynamics in Systems with Many Degrees of Freedom.

David Henry Bridges (*Aeronautics*) B.S., Mississippi State University 1986; M.S., 1987.

Thesis: Tip Effects on the Vortex Wake of an Axisymmetric Body at Angle of Attack.

Gregory Scott Cardell (*Aeronautics*) B.A., Reed College 1981; M.S., California Institute of Technology 1986.

Thesis: Flow Past a Circular Cylinder with a Permeable Wake Splitter Plate.

Wingsiu Richard Chan (*Mechanical Engineering*) S.B., Massachusetts Institute of Technology 1985; M.S., California Institute of Technology 1986.

Thesis: Experimental and Numerical Studies on Two-Dimensional Gravity Currents in a Horizontal Channel.

Tsuhuan Chen (*Electrical Engineering*) B.S., National Taiwan University 1987; M.S., California Institute of Technology 1990.

Thesis: Multidimensional Multirate Filters and Filter Banks: Theory, Design, and Implementation.

Dar-Yun Chiang (*Applied Mechanics*) B.S., National Taiwan University 1982; M.S., 1986.

Thesis: Parsimonious Modeling of Inelastic Systems.

Wooyoung Choi (*Engineering Science*) B.S., Seoul National University 1984; M.S., 1986.

Thesis: Forced Generation of Solitary Waves in a Rotating Fluid and Their Stability.

Luca Cortelezzi (*Engineering Science*) B.S., Milano State University 1978; M.S., California Institute of Technology 1988.

Thesis: A Theoretical and Computational Study on Active Wake Control.

DOCTOR OF PHILOSOPHY — *Continued*

- Jay Walter Dawson (*Applied Physics*) B.S., Carnegie Mellon University 1988; M.S., California Institute of Technology 1991.
Thesis: Single and Multiple Frequency Fiber Lasers.
- Regina E. Dugan (*Mechanical Engineering*) B.S., Virginia Polytechnic Institute and State University 1984; M.S., 1985.
Thesis: Axisymmetric Buoyant Jets in a Cross Flow with Shear: Transition and Mixing.
- Lars E. Eng (*Applied Physics*) M.S., Chalmers University of Technology 1984.
Thesis: Low Threshold Current Strained InGaAs/AlGaAs Quantum Well Lasers.
- Zezhong Fu (*Materials Science*) B.S., Jilin University 1982; M.S., 1985; M.S., California Institute of Technology 1989.
Thesis: The Mechanical Alloying of Aluminum and Zirconium.
- Philippe H. Geubelle (*Aeronautics and Materials Science*) Candidat Ingénieur Civil, Université Catholique de Louvain 1985; Ingénieur Civil Mecanicien, 1988; M.S., California Institute of Technology 1989.
Thesis: Nonlinear Effects in Interfacial Fracture.
- Ilan Gravé (*Applied Physics*) B.Sc. (*Physics*), Tel-Aviv University 1977; M.Sc., 1981; B.Sc. (*Electrical Engineering*), 1983.
Thesis: GaAs Quantum Well Devices for Detection and Nonlinear Optics in the Mid-Infrared.
- Jay Alan Hammer (*Aeronautics and Electrical Engineering*) B.S., Carnegie Mellon University 1986; M.S., California Institute of Technology 1987.
Thesis: Lifted Turbulent Jet Flames.
- Robert Adam Harley (*Environmental Engineering Science*) B.A.Sc., University of Toronto 1987; M.S., California Institute of Technology 1988.
Thesis: Mathematical Modeling of Gas-Phase Organic Air Pollutants.
- Douglas Payton Hart (*Mechanical Engineering*) B.S., University of Illinois at Urbana-Champaign 1983; S.M., Massachusetts Institute of Technology 1985.
Thesis: Cavitation and Wake Structure of Unsteady Tip Vortex Flows.
- Charles Marion Higgins, Jr. (*Electrical Engineering*) B.S., Louisiana State University 1987; M.S., Georgia Institute of Technology 1989.
Thesis: Classification and Approximation with Rule-Based Networks.
- Rudolf Josef Hofmeister (*Applied Physics*) B.S., California Institute of Technology 1987.
Thesis: Growth and Applications of Photorefractive Potassium Lithium Tantalate Niobate (KLTN).
- Shu-San Hsiau (*Mechanical Engineering*) B.S., National Taiwan University 1985; M.S., California Institute of Technology 1989.
Thesis: Shear-Induced Transport Properties of Granular Material Flows.
- Wen-Jean Hsueh (*Mechanical Engineering*) B.S., National Taiwan University 1987; M.S., California Institute of Technology 1989.
Thesis: High-Resolution Optoelectronic and Photogrammetric 3-D Surface Geometry Acquisition and Analysis.

- Fujio Inoya (*Applied Physics and Astronomy*) B.S., University of Wisconsin-Madison 1984; M.S., California Institute of Technology 1986.
Thesis: Pulsed Expansion of Plasma in a Magnetic Thruster.
- Nanette Jackson Boden (*Computer Science*) B.S., University of Alabama 1986; M.S., California Institute of Technology 1988.
Thesis: Runtime Systems for Fine-Grain Multicomputers.
- Douglas A. Kerns (*Electrical Engineering*) B.S., Northwestern University 1987; M.S., California Institute of Technology 1988.
Thesis: Experiments in Very Large-Scale Analog Computation.
- Moonil Kim (*Electrical Engineering*) B.S., Illinois Institute of Technology 1987; M.S., California Institute of Technology 1988.
Thesis: Grid Amplifiers.
- David B. Kirk (*Computer Science*) S.B., Massachusetts Institute of Technology 1982; S.M., 1984; M.S., California Institute of Technology 1990.
Thesis: Accurate and Precise Computation Using Analog VLSI, with Applications to Computer Graphics and Neural Networks.
- Tsz-Mei Ko (*Electrical Engineering*) B.E., The Cooper Union 1986; M.E., 1988.
Thesis: On the VLSI Decompositions for Complete Graphs, DeBruijn Graphs, Hypercubes, Hyperplanes, Meshes, and Shuffle-Exchange Graphs.
- Petros D. Koumoutsakos (*Aeronautics and Applied Mathematics*) Diploma, National Technical University of Athens 1986; M.S.E., The University of Michigan 1987; M.S., California Institute of Technology 1988.
Thesis: Direct Numerical Simulations of Unsteady Separated Flows Using Vortex Methods.
- Anastasios Michail Lappas (*Aeronautics*) Diploma, National Technical University of Athens 1987; M.S., California Institute of Technology 1988.
Thesis: An Adaptive Lagrangian Method for Computing 1-D Reacting Flows and the Theory of Riemann Invariant Manifolds for the Compressible Euler Equations.
- David Soong-hua Lee (*Applied Physics*) B.S.E., Princeton University 1986; M.S., California Institute of Technology 1993.
Thesis: Thermodynamic and Structural Aspects of Equilibrium and Mechanically Milled $\text{YBa}_2\text{Cu}_3\text{O}_{6+\delta}$ Powder.
- Derek Lee Ashton Lisoski (*Aeronautics and Planetary Science*) B.Sc., The University of Calgary 1984; M.Sc., 1986; M.S., California Institute of Technology 1987.
Thesis: Nominally 2-Dimensional Flow About a Normal Flat Plate.
- Michael Irving Mandell (*Electrical Engineering*) B.S.E., The University of Michigan 1989; M.S., California Institute of Technology 1990.
Thesis: A Comparison of CDMA and Frequency Hopping in a Cellular Environment.
- James Joseph Mason (*Applied Mechanics and Materials Science*) B.S., University of California, Berkeley 1986; M.S., 1988.
Thesis: Mechanisms and Effects of Heat Generation at the Tips of Dynamic Cracks and Notches in Metals.

DOCTOR OF PHILOSOPHY — *Continued*

- John Warren Miller (*Electrical Engineering*) B.S., Texas A&M University 1987; M.S., California Institute of Technology 1988.
Thesis: Building Probabilistic Models from Databases.
- Petros N. Mouchtaris (*Electrical Engineering*) Diploma, National Technical University of Athens 1989; M.S., California Institute of Technology 1990.
Thesis: Analysis of an Interactive Video Architecture.
- Charles F. Neugebauer (*Applied Physics*) B.S., California Institute of Technology 1988.
Thesis: Parallel Analog Computation with Charge Coupled Devices.
- James Kozo Okamoto (*Applied Physics*) B.S., California Institute of Technology 1988; M.S., 1989.
Thesis: Temperature-Dependent Extended Electron Energy Loss Fine Structure Measurements from K , L_{23} , and M_{45} Edges in Metals, Intermetallic Alloys, and Nanocrystalline Materials.
- Hao Ouyang (*Materials Science*) B.S., National Tsing Hua University 1985; M.S., California Institute of Technology 1989.
Thesis: Grain Boundaries of Nanophase Materials.
- Catherine Mary Petroff (*Civil Engineering*) B.A., Pomona College 1982; B.S., California Institute of Technology 1982; M.S., Stanford University 1983.
Thesis: The Interaction of Breaking Solitary Waves with an Armored Bed.
- Guillermo Pablo Pulos Cárdenas (*Aeronautics and Materials Science*) B.S., California Institute of Technology 1982; M.S., 1984.
Thesis: Nonsteady Crack Propagation and Craze Behavior in PMMA.
- Jerald Day Ramsden (*Civil Engineering*) B.S., Oregon State University 1985; M.S., 1986.
Thesis: Tsunamis: Forces on a Vertical Wall Caused by Long Waves, Bores, and Surges on a Dry Bed.
- Jim M. Restuccio (*Applied Mechanics*) B.S., The University of Tennessee 1986; M.S., Purdue University 1988.
Thesis: Continuum Modeling of Materials That Can Undergo Martensitic Phase Transformations.
- Wolfgang Fritz Rogge (*Environmental Engineering Science and Planetary Science*) Diplom-Ingenieur, Technische Universität Berlin 1986; M.S., California Institute of Technology 1989.
Thesis: Molecular Tracers for Sources of Atmospheric Carbon Particles: Measurements and Model Predictions.
- Héctor Pablo Rotstein (*Electrical Engineering*) Ingeniero Electricista, Universidad Nacional del Sur 1985; M.S., California Institute of Technology 1990.
Thesis: Constrained H_∞ -Optimization for Discrete-Time Control Systems.
- Carl Frederick Ruoff, Jr. (*Mechanical Engineering and Computer Science*) B.S., California State University, Long Beach 1967; M.S., University of California, Los Angeles 1971.
Thesis: Robotic Hand-Eye Motor Learning.

DOCTOR OF PHILOSOPHY — *Continued*

Barry James Ryan (*Applied Mathematics*) B.Sc., University College Dublin 1987; M.Sc., 1988.

Thesis: Lie-Poisson Integrators for Hamiltonian Fluid Mechanics.

Joel Christopher Sercel (*Mechanical Engineering*) B.S., University of Arizona 1984; M.S., California Institute of Technology 1987.

Thesis: An Experimental and Theoretical Study of the ECR Plasma Engine.

Finbar Thomas Sheehy (*Electrical Engineering*) B.E., University College Dublin 1986; M.S., California Institute of Technology 1990.

Thesis: Antenna-Coupled mm-Wave Electro-Optic Modulators and Linearized Electro-Optic Modulators.

Arthur Elliott Sheiman (*Electrical Engineering*) B.S., California Institute of Technology 1981; M.Eng., Rensselaer Polytechnic Institute 1984.

Thesis: A New Method for Solving Irises in Waveguides.

Anand Keshav Soman (*Electrical Engineering*) B.Tech., Indian Institute of Technology, Bombay 1989; M.S., California Institute of Technology 1990.

Thesis: New Results on Paraunitary Filter Banks: Energy Compaction Properties, Linear Phase Factorizations and Relation to Wavelets.

Donald Lloyd Watts (*Electrical Engineering*) B.Sc., Queen's University 1984; M.A.Sc., Simon Fraser University 1989.

Thesis: Cochlear Mechanics: Analysis and Analog VLSI.

Peter Michael Young (*Electrical Engineering*) B.A., Oxford University 1985; M.S., University of Florida 1988.

Thesis: Robustness with Parametric and Dynamic Uncertainty.

Yong Fang Zhang (*Electrical Engineering*) B.S., Northwest University 1982; M.S., Huazhong University of Science and Technology 1984; M.S., California Institute of Technology 1991.

Thesis: Coupled Array of CO₂ Waveguide Lasers.

Thomas William Zsak (*Mechanical Engineering*) B.S., Carnegie Mellon University 1982; M.S., 1985.

Thesis: An Investigation of the Reacting Vortex Structures Associated with Pulse Combustion.

DIVISION OF GEOLOGICAL AND PLANETARY SCIENCES

David Ronald Bell (*Geochemistry*) B.Sc., University of Cape Town 1980; B.Sc., 1981.

Thesis: Hydroxyl in Mantle Minerals.

Jennifer Glee Blank (*Geochemistry*) A.B., B.S., Stanford University 1983; M.S., The University of Washington 1986; M.S., California Institute of Technology 1988.

Thesis: An Experimental Investigation of the Behavior of Carbon Dioxide in Rhyolitic Melt.

DOCTOR OF PHILOSOPHY — Continued

- Emelia Anna Burt (*Geochemistry*) B.S., University of Maryland 1979; M.S., 1983; M.S., California Institute of Technology 1990.
 Thesis: Oxygen Isotope Studies of Some Sedimentary and Metasedimentary Rocks of the Central and Northern Appalachian Mountains, the Colorado Plateau, and the Ouachita Mountains.
- Douglas Scott Dreger (*Geophysics*) B.S., University of California, Riverside 1987; M.S., California Institute of Technology 1989.
 Thesis: Modeling Earthquakes with Local and Regional Broadband Data.
- Janusz B. Eluszkiewicz (*Planetary Science and Geophysics*) M.Sc., Warsaw University 1985.
 Thesis: I. Microphysics of Frost Metamorphism: Applications to Triton and Mars II. A Global Analysis of the Ozone Deficit in the Upper Stratosphere and Lower Mesosphere III. The Diabatic Circulation in the Stratosphere as Diagnosed from Microwave Limb Sounder Data.
- Lisa Baugh Grant (*Geology and Geophysics*) B.S., Stanford University 1985; M.S. (*Environmental Engineering Science*), California Institute of Technology 1989; M.S. (*Geology*), 1990.
 Thesis: Characterization of Large Earthquakes on the San Andreas Fault in the Carrizo Plain: Implications for Fault Mechanics and Seismic Hazard.
- Thomas LaTourrette (*Geology*) B.A., University of California, Berkeley 1985; M.S., California Institute of Technology 1988.
 Thesis: Experimental Determination of U and Th Partitioning Between Clinopyroxene, Garnet, Olivine, and Natural and Synthetic Silicate Melt.
- Kuo-Fong Ma (*Geophysics*) B.S., National Central University 1985; M.S., National Taiwan University 1987.
 Thesis: Part I: The Origin of Tsunamis Excited by Local Earthquakes Part II: Broadband Waveform Observation of Local Earthquakes.
- Linda Rose Rowan (*Geology*) B.S. (*Computer Science*), B.S. (*Geology*), B.S. (*Mathematics*), University of Illinois at Urbana-Champaign 1986; M.S., California Institute of Technology 1989.
 Thesis: I. The Equation of State of Molten Mid-Ocean Ridge Basalt II. Structure of Kilauea Volcano.
- Michelle Santee (*Planetary Science and Geophysics*) B.S., Cornell University 1982; M.S., The University of Texas at Austin 1984; M.S., California Institute of Technology 1989.
 Thesis: The Thermal Structure, Dust Loading, and Meridional Transport in the Martian Atmosphere During Late Southern Summer.
- David Jay Wald (*Geophysics*) B.S., St. Lawrence University 1984; M.S., University of Arizona 1986.
 Thesis: Rupture Characteristics of California Earthquakes.

DOCTOR OF PHILOSOPHY — *Continued*

DIVISION OF THE HUMANITIES AND SOCIAL SCIENCES

- Robert Joseph Cull (*Social Science*) B.A., Northwestern University 1988; M.S., California Institute of Technology 1993.
Thesis: A Comparative Study of Capital Market Failure and Institutional Innovation.
- Peng Lian (*Social Science*) B.S., Xiamen University 1984; M.A., 1987; M.S., California Institute of Technology 1991.
Thesis: Fiscal Policies, Optimal Growth, and Elections under Different Economic Systems.
- Charles Nabih Noussair (*Social Science*) B.A., University of Pennsylvania 1987; M.S., California Institute of Technology 1990.
Thesis: A Theoretical and Experimental Investigation of Auctions in Multi-Unit Demand Environments.
- Charles William Polk (*Social Science*) B.S., Harvey Mudd College 1983; M.A., University of California, Los Angeles 1989.
Thesis: The Organization of Production: Moral Hazard and R&D.
- Jeffrey Emig Prisbrey (*Social Science*) B.A., University of Massachusetts 1988.
Thesis: Cooperation in Reciprocity Games and in the Voluntary Contributions Mechanism.
- Langche Zeng (*Social Science*) B.S., Chengdu University of Science and Technology 1982; M.A., Sichuan Institute of Finance and Economics 1985; M.S., California Institute of Technology 1990.
Thesis: Individual Choice in Political Economy.

DIVISION OF PHYSICS, MATHEMATICS AND ASTRONOMY

- Stuart Bruce Anderson (*Physics*) B.A., Bethel College 1986.
Thesis: A Study of Recycled Pulsars in Globular Clusters.
- Darin Emerson Beigie (*Physics*) B.Sc., University of Toronto 1986; M.S., California Institute of Technology 1988.
Thesis: Transport, Stretching, and Mixing in Classes of Chaotic Tangles.
- Garrett Trent Biehle (*Physics*) B.A., Rice University 1985.
Thesis: Studies of Stars with Neutron Cores and of X-ray Binaries Displaying Quasi-periodic Oscillations.
- Thomas H. Büttgenbach (*Physics and Astronomy*) Vordiplom, Universität zu Köln 1985; M.S., California Institute of Technology 1988.
Thesis: Quasi-Optical SIS Receivers and Astrophysical Observations at Submillimeter Wavelengths.
- Wei-Feng Chen (*Mathematics*) B.S., Zhejiang University 1982; M.S., 1985.
Thesis: Birkhoff Periodic Orbits, Aubry-Mather Sets, Minimal Geodesics and Lyapunov Exponents.

DOCTOR OF PHILOSOPHY — *Continued*

- Gerald Bryan Cleaver (*Physics*) B.S. (*Mathematics*), B.S. (*Physics*), Valparaiso University 1985; M.S., California Institute of Technology 1988.
Thesis: Kač-Moody Algebras and String Theory.
- Stéphane Coutu (*Physics*) B.Sc., McGill University 1987; M.S., California Institute of Technology 1989.
Thesis: A Study of the Ultrahigh-Energy Cosmic Ray Mass Composition with the MACRO and EAS-TOP Experiments.
- Peter Kenneth Day (*Physics*) B.A., University of California, Berkeley 1988.
Thesis: On the Transition from Two- to Three-Dimensional Behavior in Adsorbed Films.
- Fernando P. Echeverría (*Physics*) B.S. (*Electrical Engineering*), Universidad de Chile 1982; B.S. (*Physics*), 1985; B.S. (*Computer Science*), 1986; M.S., 1986.
Thesis: Topics in General Relativity Theory: Gravitational-Wave Measurements of Black-Hole Parameters; Gravitational Collapse of a Cylindrical Body; and Classical-Particle Evolution in the Presence of Closed, Timelike Curves.
- Andrea Mia Ghez (*Physics*) S.B., Massachusetts Institute of Technology 1987; M.S., California Institute of Technology 1989.
Thesis: The Multiplicity of T Tauri Stars in the Star Forming Regions Taurus-Auriga and Ophiuchus-Scorpius: A 2.2 μm Speckle Imaging Survey.
- Martin Werner Grünewald (*Physics*) Vordiplom Physik, Rheinisch-Westfälische Technische Hochschule, Aachen 1984; Vordiplom Informatik, 1985; Diplom-Physiker, 1988; M.S., California Institute of Technology 1990.
Thesis: Measurement of the Tau-Pair Cross Section and Charge Asymmetry at the Z^0 Resonance.
- George D. A. Haas (*Physics*) B.S.E., Duke University 1986.
Thesis: Perturbative Corrections to the Ratio $\Gamma(\bar{B} \rightarrow D\pi^+)/\Gamma(\bar{B} \rightarrow D\pi^-)$.
- Jiangtao Hong (*Physics*) B.S., University of Science and Technology of China 1987; M.S., California Institute of Technology 1989.
Thesis: Search for GUT Magnetic Monopoles and Other Supermassive Particles with the MACRO Detector.
- Gladys Hau-Wan Lang (*Physics*) B.S., The Chinese University of Hong Kong 1988.
Thesis: Auxiliary-Field Monte Carlo Methods for Interacting Fermions: Application to the Nuclear Shell Model.
- Mark Dixon Looper (*Physics*) A.B., Princeton University 1985; M.S., California Institute of Technology 1989.
Thesis: Energetic Protons in the Magnetosphere of Neptune.
- Christopher Gerald Matthews (*Physics*) B.Sc., University of Waterloo 1983; M.S., California Institute of Technology 1985.
Thesis: Inclusive Weak Decays of Charmed Mesons.
- Chung-Yu Mou (*Physics*) B.S., National Taiwan University 1986.
Thesis: Spherical Model for Turbulence.
- Robert Lloyd Navin (*Physics*) B.Sc., University of Leeds 1987; M.S., California Institute of Technology 1993.
Thesis: Global Analogue of the Aharonov-Bohm Effect.

DOCTOR OF PHILOSOPHY — *Continued*

Mark C. Phillips (*Physics*) B.S., The University of Kansas 1987; M.S., California Institute of Technology 1989.

Thesis: Graded Injection: A New Approach to Wide-Bandgap Light Emitters.

Alice C. Quillen (*Physics*) A.B., Harvard College and Radcliffe College 1984; M.S., California Institute of Technology 1991.

Thesis: The Kinematics of Molecular Gas and Dust in the Nearby Galaxies Centaurus A and M82.

Tassilo Andreas Reisenegger (*Physics*) Licenciado, Universidad de Chile 1987; Magister, 1988.

Thesis: Hydrodynamics of Neutron Star Interiors and Laboratory Superfluids.

Philip Jeffrey Rosenthal (*Physics*) B.S., Yale University 1988; M.S., California Institute of Technology 1991.

Thesis: The Dimension of Spacetime.

Christof Schmidhuber (*Physics*) Vordiplom, Ludwig-Maximilians-Universität München 1986; M.S., California Institute of Technology 1989.

Thesis: Extending the Theory of Random Surfaces.

Murali Sharma (*Physics*) B.E., M.Sc., Birla Institute of Technology and Science 1985; M.S., California Institute of Technology 1988.

Thesis: Renormalization Corrections in Heavy Colored Scalar Effective Field Theory.

Jude Thaddeus U. Socrates (*Mathematics*) B.S., University of the Philippines 1986; M.S., 1988; M.S., California Institute of Technology 1990.

Thesis: The Quaternionic Bridge Between Elliptic Curves and Hilbert Modular Forms.

William Russell Softky (*Physics*) B.Sc., Haverford College 1984; M.S., California Institute of Technology 1990.

Thesis: Irregularity in the Cortical Spike Code: Noise or Information?

Christopher G. Tinney (*Astronomy*) B.Sc., University of Sydney 1987.

Thesis: The Faintest Stars.

Wensheng Wang (*Mathematics*) B.A., Beijing University 1983; M.A., 1986.

Thesis: Carleman Inequalities and Unique Continuation for Higher Order Elliptic Differential Operators.

Prizes and Awards

FREDERIC W. HINRICHS, JR., MEMORIAL AWARD

Awarded to the senior who, in the opinion of the undergraduate Deans, has made the greatest undergraduate contribution to the welfare of the student body and whose qualities of leadership, character, and responsibility have been outstanding.

1992 *Maneesh Sahani*

1993 *Michael Andrew Nassir*

THE MILTON AND FRANCIS CLAUSER DOCTORAL PRIZE

Awarded to the Ph.D. candidate whose research is judged to exhibit the greatest degree of originality as evidenced by its potential for opening up new avenues of human thought and endeavor as well as by the ingenuity with which it has been carried out.

Recipient to be announced at Commencement.

THE WILLIAM F. BALLHAUS PRIZE

Awarded to aeronautics students for outstanding doctoral dissertations.

Philippe H. Geubelle; Anastasios Michail Lappas

MABEL BECKMAN PRIZE

Awarded to an undergraduate woman upon completion of her junior or senior year in recognition of demonstrated academic and personal excellence, contributions to the Institute community, and outstanding qualities of character and leadership.

1992 *Aimée Louise Smith*

1993 *Catherine Irene Hafer*

ROLF BUHLER AWARD

Awarded to an aeronautics student for outstanding academic achievement in the Master's program.

Patrice Michel Maheo

Prizes and awards are listed only for those students awarded degrees in 1993, and include prizes and awards received by them in previous years.

PRIZES AND AWARDS — *Continued*

FRITZ B. BURNS PRIZE IN GEOLOGY

Awarded to a junior or senior who has demonstrated academic excellence and the greatest promise of future contributions in the fields represented by the Division of Geological and Planetary Sciences.

Francisco Gustavo Gomez; Tristania Kibbey

CALTECH PRIZE SCHOLARSHIPS AND CARNATION SCHOLARSHIPS

Each year Caltech awards these prizes for academic excellence. They are based solely on merit (selection is made on the basis of grades, faculty recommendations, and demonstrated research productivity) with no consideration given to need or any other nonacademic criteria. Listed below are graduating seniors who have been recipients of these prizes.

<i>George Richard Benzinger III</i>	<i>Victor Soo Lee</i>
<i>Francis Fu Shin Chong</i>	<i>Melissa Yan-Yee Li</i>
<i>Danny Chu</i>	<i>Areez Minoo Mody</i>
<i>Balasubramanian Girish</i>	<i>Antonio Rangel</i>
<i>Keow Lin (Lindee) Goh</i>	<i>Karen Eileen Ross</i>
<i>John Daniel Grade</i>	<i>Mimi Sengupta</i>
<i>Tarun Mohan Kapoor</i>	<i>Douglas G. Shiels</i>
<i>Nitya Ranjan Kitchloo</i>	<i>Maggie Elizabeth Taylor</i>
<i>Alan Eugene Kulawik</i>	<i>Chris Thad Ulmer</i>
<i>David Lande</i>	<i>Andreja Volenec</i>
<i>Wa-To Lau</i>	<i>Feng Yuan</i>

THE W. P. CAREY & CO., INC., PRIZE IN MATHEMATICS

Awarded to a student receiving a Doctor of Philosophy degree for an outstanding doctoral dissertation in applied mathematics or pure math.

Jude Thaddeus U. Socrates

RICHARD BRUCE CHAPMAN MEMORIAL AWARD

Awarded to a graduate student in hydrodynamics who has distinguished himself or herself in research in the Division of Engineering and Applied Science.

Wooyoung Choi; Douglas Payton Hart

DONALD S. CLARK MEMORIAL AWARDS

May be awarded to two juniors in recognition of service to the campus community and academic excellence. Preference is given to students in the Division of Engineering and Applied Science and to those in Chemical Engineering.

1992 Amitabh Mehra

PRIZES AND AWARDS — *Continued*

DEANS' CUP AND DIRECTOR OF RESIDENCE LIFE AND MASTER'S AWARD

Two awards, given by the Deans, the Director of Residence Life, and the Master of Student Houses, presented to undergraduates whose concern for their fellow students has been demonstrated by persistent efforts to improve the quality of undergraduate life and by effective communication with members of the faculty and administration.

1991 Catherine Irene Hafer, *Deans' Cup*; Maneesh Sahani, *Deans' Cup*

1993 Nathan Albert Frei, *Deans' Cup*; Joanna Marie Wills, *Director of Residence Life and Master's Award*

CONSTANTIN G. ECONOMOU MEMORIAL PRIZE

Awarded to a chemical engineering graduate student distinguished by outstanding research accomplishments and exemplary attitude while fulfilling candidacy requirements for the Ph.D. degree.

1992 Charles Budiana Khouw

LAWRENCE L. AND AUDREY W. FERGUSON PRIZE

Awarded to the graduating Ph.D. candidate in biology who has produced the outstanding Ph.D. thesis for the past year.

Dali Ding

HENRY FORD II SCHOLAR AWARD

Awarded either to the engineering student with the best academic record at the end of the third year of undergraduate study, or to the engineering student with the best first-year record in the graduate program.

1992 Melissa Yan-Yee Li

JACK E. FROELICH MEMORIAL AWARD

Awarded to a junior in the upper five percent of his or her class who shows outstanding promise for a creative professional career.

1992 Tarun Mohan Kapoor

GRADUATE DEAN'S AWARD FOR OUTSTANDING COMMUNITY SERVICE

Awarded to a Ph.D. candidate who, throughout his or her graduate years at the Institute, has made great contributions to graduate life and whose qualities of leadership and responsibility have been outstanding.

Tyler Reed Holcomb

PRIZES AND AWARDS — *Continued*

ARIE J. HAAGEN-SMIT MEMORIAL AWARD

Awarded to a sophomore or junior in biology or chemistry who has shown academic promise and who has made recognized contributions to Caltech.

1991 *Karen Eileen Ross*

1992 *Francis Fu Shin Chong*

ARTUR MAGER PRIZE IN ENGINEERING

Awarded to a senior in engineering who has shown excellence in scholarship and the promise of an outstanding professional career.

Melissa Yan-Yee Li

MARY A. EARL McKINNEY PRIZE IN LITERATURE

The purpose of this prize is to cultivate proficiency in writing. It may be awarded for essays submitted in connection with regular literature classes or awarded on the basis of a special essay contest.

1990 *George Richard Benzinger III*

1991 *Hoyt Emmet Hudson; Jennifer Ann Wright*

1993 *George Richard Benzinger III; Truxton King Fulton II*

ROBERT L. NOLAND LEADERSHIP SCHOLARSHIP

Awarded to students who exhibit qualities of outstanding leadership, which are most often expressed as personal actions that have helped other people and that have inspired others to fulfill their capabilities.

1991 *Michael Andrew Nassir*

1992 *Catherine Irene Hafer*

1993 *Claudine Butcher*

THE RODMAN W. PAUL HISTORY PRIZE

Awarded to a graduating senior who has displayed unusual interest in and talent for history.

1992 *Karen Eileen Ross*

1993 *Karen Eileen Ross*

HERBERT J. RYSER MEMORIAL SCHOLARSHIPS

Awarded to undergraduate students for academic excellence, preferably in mathematics.

1991 *Nitya Ranjan Kitchloo*

PRIZES AND AWARDS — *Continued*

RICHARD P. SCHUSTER MEMORIAL PRIZE

Awarded to one or more juniors or seniors in chemistry or chemical engineering on the basis of financial need and academic promise.

1992 Tarun Mohan Kapoor; Wa-To Lau

ERNEST E. SECHLER MEMORIAL AWARD IN AERONAUTICS

Awarded to an aeronautics student who has made the most significant contribution to the teaching and research efforts of GALCIT (Graduate Aeronautical Laboratories of the California Institute of Technology). Preference is given to students working in structural mechanics.

1992 Philippe H. Geubelle

DON SHEPARD AWARD

Awarded to students who would find it difficult, without additional financial help, to engage in extracurricular and cultural activities. The recipients are selected on the basis of their capacity to take advantage of and to profit from these activities rather than on the basis of their scholastic standing.

1991 Samuel Joseph Clark; Amy Therese Hansen

1992 Matthew David Durasoff; Balasubramanian Girish; Keow Lin (Lindee) Goh;

Nitya Ranjan Kitchloo; Rohan Mahadevan; Debra Louise Tuttle

SIGMA XI AWARD

Awarded to a senior selected for an outstanding piece of original scientific research.

Antonio Rangel

JOHN STAGER STEMPLE MEMORIAL PRIZE IN PHYSICS

Awarded to a graduate student in physics for outstanding progress in research as demonstrated by an excellent performance on the oral Ph.D. candidacy examination.

1991 Thomas Büttgenbach

1992 Peter Kenneth Day

THE MORGAN WARD PRIZE

Awarded for the best problems and solutions in mathematics submitted by a freshman or sophomore.

1991 Nitya Ranjan Kitchloo

PRIZES AND AWARDS — *Continued*

CHARLES WILTS PRIZE

Awarded to a graduate student for outstanding independent research in electrical engineering leading to a Ph.D.

Tsuhun Chen

FREDERICK J. ZEIGLER MEMORIAL AWARD

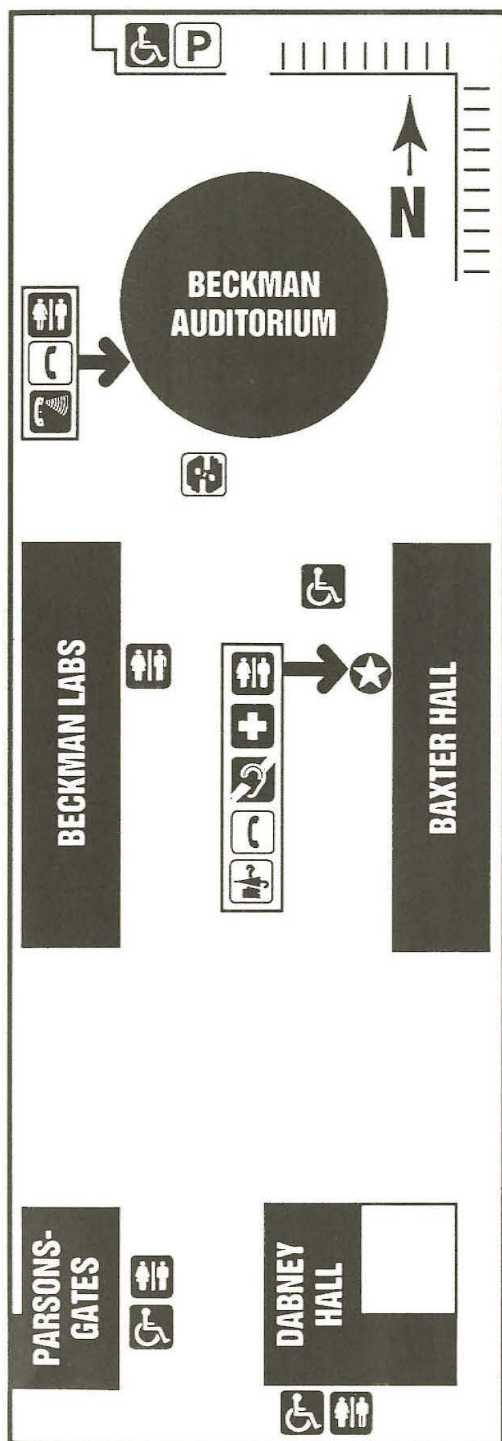
Awarded to an outstanding sophomore or junior in pure or applied mathematics, for excellence in scholarship as demonstrated in class activities or in the preparation of an original paper or essay in any subject area.

1992 Nitya Ranjan Kitchloo





CIT ALMA MATER

by Manton Barnes (BS '21 EE)

*In Southern California with grace and splendor bound,
Where the lofty mountain peaks look out to lands beyond,
Proudly stands our Alma Mater, glorious to see;
We raise our voices proudly, hailing, hailing thee.
Echoes ringing while we're singing over land and sea,
The halls of fame resound thy name, noble CIT.*



SERVICES FOR COMMENCEMENT GUESTS

-  **PUBLIC TELEPHONES** are available in Baxter Hall and Beckman Auditorium.
-  **RESTROOMS** are available in Baxter Hall, Beckman Labs, Dabney Hall, Parsons-Gates Hall of Administration, and Beckman Auditorium.
-  **FIRST AID SERVICES** are available adjacent to the Special Services Center.
-  **LOST AND FOUND** items may be reported and/or claimed at the Special Services Center.

SPECIAL SERVICES FOR PERSONS WITH DISABILITIES

-  **SPECIAL SERVICES CENTER** is located on the east side of the Ceremony seating area.
-  **ASSISTIVE LISTENING DEVICES** are available at the Special Services Center. A driver's license or state-issued ID card is required.
- LARGE-TYPE PROGRAMS (abridged)** are available at the Special Services Center.
-  **AMERICAN SIGN LANGUAGE (ASL)** interpreters will be stationed at the west front of the Ceremony seating area.
-  **PERSONS WHO USE WHEEL-CHAIRS**, and their guests, will find a special section near the east front of the Ceremony seating area.
-  **RESTROOMS ACCESSIBLE TO PERSONS WHO USE WHEEL-CHAIRS** are located on the first floor of Dabney Hall and in the Parsons-Gates Hall of Administration.
-  **AMPLIFIED TELEPHONE** is available in Beckman Auditorium.