INFORMATION FOR STUDENTS

1979-1980

CALIFORNIA INSTITUTE OF TECHNOLOGY
1201 East California Boulevard
Pasadena, California 91125
Telephone: (213) 795-6811

September 1979
## CONTENTS

<table>
<thead>
<tr>
<th>Abbreviation Key</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Calendar</td>
<td>4</td>
</tr>
<tr>
<td>Map and Directory</td>
<td>6</td>
</tr>
</tbody>
</table>

**SECTION I**

<table>
<thead>
<tr>
<th>Board of Trustees</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative Officers</td>
<td>9</td>
</tr>
<tr>
<td>Administrative Committees</td>
<td>12</td>
</tr>
<tr>
<td>Faculty Officers and Committees</td>
<td>13</td>
</tr>
<tr>
<td>Staff</td>
<td>14</td>
</tr>
<tr>
<td>Division of Biology</td>
<td>16</td>
</tr>
<tr>
<td>Division of Chemistry and Chemical Engineering</td>
<td>20</td>
</tr>
<tr>
<td>Division of Engineering and Applied Science</td>
<td>25</td>
</tr>
<tr>
<td>Division of Geological and Planetary Sciences</td>
<td>34</td>
</tr>
<tr>
<td>Division of the Humanities and Social Sciences</td>
<td>37</td>
</tr>
<tr>
<td>Division of Physics, Mathematics and Astronomy</td>
<td>40</td>
</tr>
<tr>
<td>Sherman Fairchild Distinguished Scholars</td>
<td>47</td>
</tr>
<tr>
<td>Athletics and Physical Education</td>
<td>48</td>
</tr>
<tr>
<td>Willis H. Booth Computing Center</td>
<td>48</td>
</tr>
<tr>
<td>Environmental Quality Laboratory</td>
<td>48</td>
</tr>
<tr>
<td>Hale Observatories</td>
<td>49</td>
</tr>
<tr>
<td>Health Center</td>
<td>50</td>
</tr>
<tr>
<td>Industrial Relations Center</td>
<td>50</td>
</tr>
<tr>
<td>Jet Propulsion Laboratory</td>
<td>51</td>
</tr>
<tr>
<td>Institute Libraries</td>
<td>52</td>
</tr>
<tr>
<td>Musical Activities</td>
<td>52</td>
</tr>
<tr>
<td>Officers and Faculty</td>
<td>54</td>
</tr>
</tbody>
</table>

**SECTION II GENERAL INFORMATION**

<table>
<thead>
<tr>
<th>Introduction</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical Sketch</td>
<td>105</td>
</tr>
<tr>
<td>Buildings and Facilities</td>
<td>107</td>
</tr>
<tr>
<td>Libraries</td>
<td>110</td>
</tr>
<tr>
<td>Industrial Relations Center</td>
<td>114</td>
</tr>
<tr>
<td>The Willis H. Booth Computing Center</td>
<td>115</td>
</tr>
<tr>
<td>Postdoctoral Appointments</td>
<td>115</td>
</tr>
<tr>
<td>Sherman Fairchild Distinguished Scholars Program</td>
<td>116</td>
</tr>
<tr>
<td>Study and Research</td>
<td>116</td>
</tr>
<tr>
<td>Aeronautics</td>
<td>116</td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>118</td>
</tr>
<tr>
<td>Applied Mechanics</td>
<td>118</td>
</tr>
<tr>
<td>Applied Physics</td>
<td>119</td>
</tr>
<tr>
<td>Astronomy</td>
<td>120</td>
</tr>
<tr>
<td>Biology</td>
<td>122</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>123</td>
</tr>
<tr>
<td>Chemistry</td>
<td>124</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>125</td>
</tr>
<tr>
<td>Computer Science</td>
<td>126</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>127</td>
</tr>
<tr>
<td>Energy</td>
<td>128</td>
</tr>
<tr>
<td>Engineering Science</td>
<td>129</td>
</tr>
<tr>
<td>Environmental Engineering Science</td>
<td>130</td>
</tr>
</tbody>
</table>
Environmental Quality Laboratory 131
Geological and Planetary Sciences 132
Humanities and Social Sciences 133
Independent Studies Program 135
Materials Science 135
Mathematics 136
Mechanical Engineering 136
Physics 137
Undergraduate Research 139
Student Life 139
Student Health 143
Notices and Agreements 145

SECTION III INFORMATION AND REGULATIONS FOR THE GUIDANCE OF UNDERGRADUATE STUDENTS

Requirements for Admission to Undergraduate Standing 151
Admission to the Freshman Class 151
Admission to Upper Classes by Transfer 155
Registration Regulations 158
Scholastic Requirements: Grading 160
Physical Education 165
Undergraduate Expenses 165
Financial Aid 167
Undergraduate Options and Course Schedules 175

SECTION IV INFORMATION AND REGULATIONS FOR THE GUIDANCE OF GRADUATE STUDENTS

General Regulations 208
Degree Regulations 211
Graduate Expenses 215
Financial Assistance 217
Special Regulations of the Graduate Options 220

SECTION V SUBJECTS OF INSTRUCTION

Key to Abbreviations 259

Aeronautics .......................... Ae
Anthropology .......................... An
Applied Mathematics ............... AMa
Applied Mechanics ......... AM
Applied Physics ................. APh
Art ...................................... Art
Astronomy ................... Ay
Bioinformation Systems .......... BIS
Biology .................................. Bi
Business Economics and Management .......... BEM
Chemical Engineering .......... ChE
Chemistry ........................ Ch
Civil Engineering ................ CE
Computer Science ........ CS
Economics ......................... Ec
Electrical Engineering .......... EE
Engineering ........................ E
Engineering & Applied Science .. E & AS
Engineering Graphics ........ Gr
Engineering Science ........ ES
Environmental Engineering Science ........................ Env
Geology .............................. Ge
History ................................ H
Humanities and Social Sciences .... HSS
Hydraulics ......................... Hy
Independent Studies Program .... ISP
Jet Propulsion ..................... JP
Languages .......................... L
Linguistics .......................... Lin
Literature ........................... Lit
Materials Science ................. MS
Mathematics ....................... Ma
Mechanical Engineering .......... ME
Music ............................... Mu
Philosophy .......................... Pl
Physical Education ............... PE
Physics ............................. Ph
Political Science .................. PS
Psychology .......................... Psy
Social Science ..................... SS
# ACADEMIC CALENDAR

## 1979-80

### First Term

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 19</td>
<td>Registration of entering freshmen — 1:00 p.m.-4:30 p.m.</td>
</tr>
<tr>
<td>September 20-22</td>
<td>New Student Orientation</td>
</tr>
<tr>
<td>September 24</td>
<td>General Registration — 8:30 a.m.-4:30 p.m.</td>
</tr>
<tr>
<td>September 24</td>
<td>Undergraduate Academic Standards and Honors Committee — 9:00 a.m.</td>
</tr>
<tr>
<td>September 25</td>
<td>Beginning of instruction — 8:00 a.m.</td>
</tr>
<tr>
<td>October 12</td>
<td>Last day for adding courses and for removing conditions and incompletes</td>
</tr>
<tr>
<td>October 29-</td>
<td>Mid-Term week</td>
</tr>
<tr>
<td>November 2</td>
<td>Last day for admission to candidacy for Master’s and Engineer’s degrees</td>
</tr>
<tr>
<td>November 5</td>
<td>Mid-Term deficiency notices due — 9:00 a.m.</td>
</tr>
<tr>
<td>November 12-16</td>
<td>Pre-registration for second term, 1979-80</td>
</tr>
<tr>
<td>November 22-25</td>
<td>Thanksgiving recess</td>
</tr>
<tr>
<td>November 22-23</td>
<td>Thanksgiving holidays</td>
</tr>
<tr>
<td>November 30</td>
<td>Last day for dropping courses, changing sections, and track changes</td>
</tr>
<tr>
<td>December 8-14</td>
<td>Final examinations, first term, 1979-80</td>
</tr>
<tr>
<td>December 15</td>
<td>End of first term, 1979-80</td>
</tr>
<tr>
<td>December 16-</td>
<td>Christmas recess</td>
</tr>
<tr>
<td>January 2</td>
<td>Mid-Term deficiency notices due — 9:00 a.m.</td>
</tr>
<tr>
<td>December 17</td>
<td>Instructors’ final grade reports due — 9:00 a.m.</td>
</tr>
<tr>
<td>December 21-25</td>
<td>Christmas holidays</td>
</tr>
<tr>
<td>December 31</td>
<td>New Year’s Day holiday</td>
</tr>
</tbody>
</table>

### Second Term

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 1</td>
<td>New Year’s Day holiday</td>
</tr>
<tr>
<td>January 7</td>
<td>General Registration — 8:30 a.m.-4:30 p.m.</td>
</tr>
<tr>
<td>January 7</td>
<td>Undergraduate Academic Standards and Honors Committee — 9:00 a.m.</td>
</tr>
<tr>
<td>January 8</td>
<td>Beginning of instruction — 8:00 a.m.</td>
</tr>
<tr>
<td>January 25</td>
<td>Last day for adding courses and for removing conditions and incompletes</td>
</tr>
<tr>
<td>February 11-15</td>
<td>Mid-Term week</td>
</tr>
<tr>
<td>February 18</td>
<td>Mid-Term deficiency notices due — 9:00 a.m.</td>
</tr>
<tr>
<td>February 25-29</td>
<td>Pre-registration for third term, 1979-80</td>
</tr>
<tr>
<td>March 7</td>
<td>Last day for dropping courses, changing sections, and track changes</td>
</tr>
<tr>
<td>March 15-21</td>
<td>Final examination, second term, 1979-80</td>
</tr>
<tr>
<td>March 21</td>
<td>Last day for obtaining admission to candidacy for the degree of Doctor of Philosophy</td>
</tr>
<tr>
<td>March 22</td>
<td>End of second term, 1979-80</td>
</tr>
<tr>
<td>March 23-30</td>
<td>Spring recess</td>
</tr>
<tr>
<td>March 24</td>
<td>Instructors’ final grade reports due — 9:00 a.m.</td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>March 31</td>
<td>General Registration — 8:30 a.m.-4:30 p.m.</td>
</tr>
<tr>
<td>March 31</td>
<td>Undergraduate Academic Standards and Honors Committee — 9:00 a.m.</td>
</tr>
<tr>
<td>April 1</td>
<td>Beginning of instruction — 8:00 a.m.</td>
</tr>
<tr>
<td>April 18</td>
<td>Last day for adding courses and for removing conditions and incompletes</td>
</tr>
<tr>
<td>April 28-May 2</td>
<td>Mid-Term week</td>
</tr>
<tr>
<td>May 5</td>
<td>Mid-Term deficiency notices due — 9:00 a.m.</td>
</tr>
<tr>
<td>May 9-10</td>
<td>Examinations for admission to upper classes, September 1980</td>
</tr>
<tr>
<td>May 19-23</td>
<td>Pre-registration for first term, 1980-81, and registration for summer research (graduate and undergraduate)</td>
</tr>
<tr>
<td>May 23</td>
<td>Last day for dropping courses, changing sections, and track changes</td>
</tr>
<tr>
<td>May 26</td>
<td>Memorial Day holiday</td>
</tr>
<tr>
<td>May 30</td>
<td>Last day for presenting theses for the degrees of Doctor of Philosophy and of Engineer</td>
</tr>
<tr>
<td>May 31-June 6</td>
<td>Final examinations for senior and graduate students, third term, 1979-80</td>
</tr>
<tr>
<td>June 7-13</td>
<td>Final examinations for undergraduate students, third term, 1979-80</td>
</tr>
<tr>
<td>June 9</td>
<td>Instructors' final grade reports due for senior and graduate students — 9:00 a.m.</td>
</tr>
<tr>
<td>June 11</td>
<td>Undergraduate Academic Standards and Honors Committee — 9:00 a.m.</td>
</tr>
<tr>
<td>June 11</td>
<td>Curriculum Committee meeting — 10:00 a.m.</td>
</tr>
<tr>
<td>June 11</td>
<td>Faculty meeting — 2:00 p.m.</td>
</tr>
<tr>
<td>June 13</td>
<td>Commencement</td>
</tr>
<tr>
<td>June 14</td>
<td>End of third term, 1979-80</td>
</tr>
<tr>
<td>June 16</td>
<td>Instructors' final grade reports due for undergraduate students — 9:00 a.m.</td>
</tr>
<tr>
<td>June 25</td>
<td>Undergraduate Academic Standards and Honors Committee — 9:00 a.m.</td>
</tr>
<tr>
<td>July 3-4</td>
<td>Independence Day holiday</td>
</tr>
<tr>
<td>September 1</td>
<td>Labor Day holiday</td>
</tr>
<tr>
<td>September 24</td>
<td>Registration of entering freshmen, 1:00 p.m.-4:30 p.m.</td>
</tr>
<tr>
<td>September 25-27</td>
<td>New Student Orientation</td>
</tr>
<tr>
<td>September 29</td>
<td>General Registration — 8:30 a.m.-4:30 p.m.</td>
</tr>
<tr>
<td>September 30</td>
<td>Beginning of instruction — 8:00 a.m.</td>
</tr>
</tbody>
</table>

**First Term 1980-81**

- September 24: Registration of entering freshmen, 1:00 p.m.-4:30 p.m.
- September 25-27: New Student Orientation
- September 29: General Registration — 8:30 a.m.-4:30 p.m.
- September 30: Beginning of instruction — 8:00 a.m.
CAMPUS DIRECTORY

Information — Building 71

28. Alles Laboratory (Molecular Biology)
2. Alumni Swimming Pool
25. Arms Laboratory (Geological and Planetary Sciences)
77. Art Gallery
61. Athenaeum (Faculty Club)
77. Baxter Lecture Hall
77. Baxter, Donald E., M.D., Ha... (Humanities and Social Sciences)
91. Beckman Auditorium
76. Beckman Laboratories (Behavioral Biology)
60. Blacker House (Undergraduate Residence)
51. Bookstore (Student Center)
79. Booth Computing Center
88. Braun House (Graduate Residence)
75. Braun Laboratories (Cell Biology and Chemistry) (Site of)
34. Bridge Annex
33. Bridge Laboratory (Physics)
1. Brown Gymnasium
74. Campbell Laboratory (Plant Research)
85. Central Engineering Services
5. Central Plant
52. Chandler Dining Hall
43. Chemical Engineering Laboratory
73. Chemistry Laboratory, Undergraduate
29. Church Laboratory (Chemical Biology)
93. Coffeehouse, Student
4. Cooling Tower Buildings
34. Cosmic Ray Laboratory
30. Crellin Laboratory (Chemistry)
40. Dabney Hall (Administration, EQL, and Humanities)
58. Dabney House (Undergraduate Residence)
36. Development Offices
47. Downs Laboratory (Physics)
96. Environmental Quality Laboratory
50. Firestone Laboratory (Flight Sciences and Applied Mathematics)
57. Fleming House (Undergraduate Residence)
31. Gates Building
31A. Gates Annex (Chemistry)
82. Grounds Operations Office
45. Guggenheim Laboratory (Aeronautics and Applied Physics)
56. Housing Office
90. Industrial Relations Center
35. Isotope Handling Laboratory
80. Jorgensen Laboratory (Computer Science and Bioinformatics Systems)
46. Karman Laboratory (Fluid Mechanics and Jet Propulsion)
86. Keck House (Graduate Residence)
78. Keck Laboratories (Environmental Engineering and Materials Science)
38. Kellogg Radiation Laboratory
27. Kerckhoff Laboratory (Biological Sciences)
48. Lauritsen Laboratory (High Energy Physics)
54. Lloyd House (Undergraduate Residence)
89. Marks House (Graduate Residence)
32. Millikan (Library and Administration)
87. Mosher-Jorgensen House (Graduate Residence)
23. Mudd, North (Geology and Geochemistry)
21. Mudd, South (Geophysics and Planetary Sciences)
72. Noyes Laboratory (Chemical Physics)
53. Page House (Undergraduate Residence)
4, 5, 82, 83, 84. Physical Plant
92. Public Events Office
71. Public Relations and Publications
77. Ramo Auditorium
59. Ricketts House (Undergraduate Residence)
24. Robinson Laboratory (Astrophysics)
55. Ruddock House (Undergraduate Residence)
37. Sloan Laboratory (Mathematics and Physics)
6. Spalding Building (Business Services)
41. Spalding Laboratory (Chemical Engineering)
94. Steele House (Residence, Master of Student Houses)
81. Steele Laboratory (Applied Physics and Electrical Engineering)
44. Thomas Laboratory (Civil and Mechanical Engineering)
92. Ticket Office
82. Transportation and Grounds Operations
95. Watson Laboratories of Applied Physics (Site of)
51. Winnett Student Center
51. Caltech Y
8. Young Health Center
Section I

CALIFORNIA INSTITUTE OF TECHNOLOGY

OFFICERS

R. Stanton Avery, Chairman
Marvin L. Goldberger, President
John G Braun, Vice Chairman
Deane F. Johnson, Vice Chairman
William M. Keck, Jr., Vice Chairman
Harry J. Volk, Vice Chairman

Robert F. Christy ........................................... Vice President and Provost
David W. Morrisroe ..................................... Vice President for Business and Finance and Treasurer
Ray D. Owen .................................................. Vice President for Student Affairs
Eugene R. Wilson .......................................... Vice President for Institute Relations
Hardy C. Martel ............................................. Secretary

BOARD OF TRUSTEES

Robert Anderson (1975)* ............................ Pittsburgh, Pennsylvania
Robert O. Anderson (1967) ............................ Roswell, New Mexico
Victor K. Atkins (1978) .................................... San Francisco
J. Paul Austin (1975) ...................................... Atlanta, Georgia
R. Stanton Avery (1971) ................................. Pasadena
Stephen D. Bechtel, Jr. (1967) ....................... Piedmont
Benjamin F. Biaggini (1970) ......................... San Francisco
John G Braun (1959) ...................................... Pasadena
Walter Burke (1975) ...................................... Greenwich, Connecticut
Richard P. Cooley (1972) .............................. San Francisco
Gilbert W. Fitzhugh (1972) ......................... Rancho Santa Fe
Camilla C. Frost (1977) .............................. Pasadena
Robert W. Galvin (1977) ............................... Barrington, Illinois
James W. Glanville (1970) ......................... Darien, Connecticut
Marvin L. Goldberger (1978) ...................... Pasadena
Fred L. Hartley (1967) ................................. Palos Verdes Estates
Philip M. Hawley (1975) ............................ Los Angeles
Shirley M. Hufstedler (1975) ....................... Pasadena
Deane F. Johnson (1968) ............................ Los Angeles
Earle M. Jorgensen (1957) ......................... Los Angeles
William M. Keck, Jr. (1961) ....................... La Quinta
Augustus B. Kinzel (1963) ...................... La Jolla
10 Trustee Committees

Frederick G. Larkin, Jr. (1969) ........................................ Los Angeles
L. F. McCollum (1961) ........................................ Houston, Texas
Dean A. McGee (1970) ........................................ Oklahoma City, Oklahoma
Chauncey J. Medberry III (1976) ........................... Los Angeles
Ruben F. Mettler (1969) ........................................ Los Angeles
Rudolph A. Peterson (1967) .................................... Piedmont
Simon Ramo (1964) ........................................ Beverly Hills
Mary L. Scranton (1974) ...................................... Dalton, Pennsylvania
Dennis C. Stanfill (1976) ...................................... San Marino
Charles H. Townes (1979) ....................................... Berkeley
Harry J. Volk (1950) ........................................ Los Angeles
Richard R. Von Hagen (1955) ................................ Los Angeles
Lew R. Wasserman (1971) ...................................... Beverly Hills
Thomas J. Watson, Jr. (1961) ................................... Greenwich, Connecticut
Harry H. Wetzel, Jr. (1979) .................................. Palos Verdes Estates
William E. Zisch (1963) ....................................... La Jolla

Life Trustees

Chairman Emeritus
Arnold O. Beckman (1953, 1974) ................................... Corona del Mar

President Emeritus
Lee A. DuBridge (1947, 1969) ................................... Laguna Hills

Honorary Life Trustee
Mrs. Norman Chandler (1974) ................................... Los Angeles

Life Trustees
John S. Griffith (1962, 1973) ..................................... Irvine
Herbert L. Hahn (1955, 1970) ................................ Pasadena
Louis E. Nohl (1966, 1973) ...................................... Los Angeles
John O'Melveny (1940, 1968) .................................. Los Angeles
Howard G. Vesper (1954, 1974) ................................ Oakland
Lawrence A. Williams (1954, 1975) ........................... Laguna Hills

Year of Life Trustee or Emeritus election is shown following year of initial election.

Trustee Elected Committees

Executive Committee
R. Stanton Avery, Chairman

John G Braun ................................................... Ruben F. Mettler
Marvin L. Goldberger ......................................... Harry J. Volk
Fred L. Hartley ................................................ Richard R. Von Hagen
Deane F. Johnson .............................................. Lew R. Wasserman
Earle M. Jorgensen ............................................. William E. Zisch
William M. Keck, Jr. ...........................................
Investment Committee
Benjamin F. Biaggini, Chairman
Frederick G. Larkin, Jr., Vice Chairman
Harry J. Volk, Vice Chairman

Consulting Members:
Arnold O. Beckman
Louis E. Nohl

Advisory Members:
David W. Morrisroe

Budget and Capital Expenditures Committee
Ruben F. Mettler, Chairman
William E. Zisch, Vice Chairman

Consulting Members:
Arnold O. Beckman
Howard G. Vesper

Advisory Members:
Robert F. Christy
David W. Morrisroe

Buildings and Grounds Committee
Stephen D. Bechtel, Jr., Chairman

Consulting Member:
Arnold O. Beckman

Audit Committee
Frederick G. Larkin, Jr., Chairman

Nominating Committee
John G. Braun, Chairman
Simon Ramo, Vice Chairman

Consulting Members:
Arnold O. Beckman

Advisory Members:
David W. Morrisroe

Note: The Secretary of the Board of Trustees is secretary of all committees.

Consulting Member
Arnold O. Beckman

Advisory Members
Robert F. Christy
David W. Morrisroe
ADMINISTRATIVE OFFICERS

Marvin L. Goldberger, President
Robert F. Christy, Vice President and Provost

Vice President for Business and Finance and Treasurer ............ David W. Morrisroe
Vice President for Institute Relations .......................... Eugene R. Wilson
Vice President for Student Affairs ................................ Ray D. Owen
Vice Provost .................................. Cornelius J. Pings
Assistant Provost .................................. Lea C. Sterrett

Chairmen of Divisions

Biology ............................................. Norman H. Horowitz
Chemistry and Chemical Engineering .............................. Harry B. Gray
Engineering and Applied Science ............................... Roy W. Gould
Geological and Planetary Sciences ............................... Barclay Kamb
The Humanities and Social Sciences ............................... Roger G. Noll
Physics, Mathematics and Astronomy .............................. Rochus E. Vogt

Student Affairs

Vice President for Student Affairs and
Dean of Students .................................... Ray D. Owen
Director of Student Relations and Registrar ..................... Lyman G. Bonner
Dean of Graduate Studies ............... Cornelius J. Pings
Director of Admissions and Associate Dean of Graduate Studies .... Stirling L. Huntley
Associate Dean of Graduate Studies .................. Francis S. Buffington
Associate Dean of Students ..................... David B. Wales
Director of Financial Aid .................................. Ursula Hyman
Director of Health Services ............................... Gregory Ketabgian, M.D.
Director of Physical Education and Athletics ..................... Warren G. Emery
Director of Secondary School Relations .......................... Lee F. Browne
Associate Director of Admissions .............................. Kathleen M. Crandall
Master of Student Houses .............................. James W. Mayer
Administrative Committees
1979

AFFIRMATIVE ACTION — C. J. Pings, Chairman; T. J. Ahrens, S. I. Chan, L. Davis, Jr.,

ATHLETIC FACILITIES—R. P. Dilworth, Chairman; L. G. Bonner, E. H. Davidson,


BOOKSTORE ADVISORY COMMITTEE—R. A. Rosenstone, Chairman; L. G. Bonner,
F. E. C. Culick, J. Mathews.

COMPUTING FACILITIES ADVISORY COMMITTEE — I. Sutherland, Chairman;
W. Goddard, D. M. Grether, T. J. R. Hughes, H. B. Keller, A. Kuppermann, R. E. Marsh,
J. Westphal, B. A. Zimmerman.

COMPUTING FACILITIES EXECUTIVE COMMITTEE — R. F. Christy, Chairman; R. W.
I. Sutherland, R. E. Vogt.

INSTITUTE ADMINISTRATIVE COUNCIL — M. L. Goldberger, Chairman; R. F. Christy,
R. E. Vogt.

INSURANCE AND ANNUITIES—L. Davis Jr., Chairman; J. P. Click, F. H. Felberg,

RADIATION SAFETY—T. A. Tombrello, Jr., Chairman; F. H. Boehm, D. S. Burnett,

RELATIONS WITH THE COMMUNITY—A. Kuppermann, Chairman; M. E. Alper, J. F.
Benton, J. B. Black, L. G. Bonner, J. L. Brown, L. F. Browne, S. Epstein, K. A. Jacobson,

PROTECTION OF HUMAN SUBJECTS — D. A. O’Handley, Chairman; E. S. Beckenbach,
J. F. Bonner, G. Brighouse, K. R. Castleman, E. R. Evans, D. H. Fender, D. R. Fowler,

RESEARCH INVOLVING WARM-BLOODED ANIMALS—J. M. Allman, Chairman;
W. M. Blackmore, C. Hamilton, M. Konishi, J. H. Richards, D. C. Van Essen.

SHOP FACILITIES — T. Vreeland, Jr., Chairman; J. F. Bonner, N. W. Keidel, J. E. Mercereau,

SPONSORED RESEARCH — W. H. Corcoran, Chairman; J. F. Bonner, S. I. Chan,

SPONSORED STUDENT RESEARCH—D. S. Wood, Chairman; D. E. Hudson, R. W.
Oliver, W. Whaling.
# FACULTY OFFICERS AND COMMITTEES

## 1979-1980

### OFFICERS

*Chairman:* D. L. Goodstein  
*Vice Chairman:* E. J. List  
*Secretary:* D. C. Elliot


<table>
<thead>
<tr>
<th>Term expires</th>
<th>Term expires</th>
<th>Term expires</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. M. Apostol</td>
<td>M. Gell-Mann</td>
<td>C. R. Allen</td>
</tr>
<tr>
<td>C. A. Barnes</td>
<td>W. A. Goddard III</td>
<td>P. E. Dimotakis</td>
</tr>
<tr>
<td>P. B. Dervan</td>
<td>G. W. Housner</td>
<td>S. Epstein</td>
</tr>
<tr>
<td>R. E. Dickerson</td>
<td>G. A. Lorden</td>
<td>J. K. Knowles</td>
</tr>
<tr>
<td>D. J. Kevles</td>
<td>J-P. Revel</td>
<td>T. C. McGill</td>
</tr>
<tr>
<td>H. W. Liepmann</td>
<td>W. Whaling</td>
<td>R. F. Scott</td>
</tr>
</tbody>
</table>

**STEERING COMMITTEE** — *D. L. Goodstein*, C. A. Barnes, R. F. Christy, R. E. Dickerson, D. C. Elliot, J. K. Knowles, E. J. List, G. A. Lorden

**ACADEMIC FREEDOM AND TENURE COMMITTEE**—*Ch.*, F. C. Anson, *Vice Ch.*, J. J. Morgan

<table>
<thead>
<tr>
<th>Term expires</th>
<th>June 30, 1980</th>
<th>Term expires</th>
<th>June 30, 1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. R. Allen</td>
<td>D. S. Cohen</td>
<td>F. C. Anson</td>
<td>J. J. Morgan</td>
</tr>
<tr>
<td>F. C. Anson</td>
<td>J. J. Morgan</td>
<td>N. R. Corngold</td>
<td>F. H. Shair</td>
</tr>
</tbody>
</table>

**MEMBERSHIP AND BYLAWS COMMITTEE** — *E. J. List*†, F. C. Anson, F. S. Buffington, Leverett Davis, Jr., D. C. Elliot*, F. Raichlen, E. E. Sechler

**NOMINATING COMMITTEE** — *G. A. Lorden*, C. A. Barnes, R. E. Dickerson, W. A. Goddard, W. D. Iwan, H. Liepmann, J-P. Revel

# STANDING COMMITTEES


*Ex officio*


INDEPENDENT STUDIES — D. H. Fender.


PATENTS — S. O. Samson, G. J. Dick, W. J. Dreyer, D. H. Fender, H. C. Martel


STUDENT HOUSING — R. W. Kavanagh, W. L. Johnson, W. G. Knauss, J. H. Richards, P. G. Saffman, K. E. Sieh, D. C. Van Essen


*Ex officio
STAFF OF INSTRUCTION AND RESEARCH

Division of Biology

Norman H. Horowitz, Chairman
Charles J. Brokaw, Executive Officer
Masakazu Konishi, Executive Officer

Board of Trustees Professor of Biology Emeritus

Max Delbrück, Ph.D., Sc.D., Nobel Laureate .......................... Biology

Professors Emeriti

Henry Borsook, Ph.D., M.D. .................................................. Biochemistry
Sterling Emerson, Ph.D. ....................................................... Genetics
George E. MacGinitie, M.A. .................................................. Biology
Antonie Van Harreveld, Ph.D., M.D. ..................................... Physiology

Professors

Giuseppe Attardi, M.D. ....................................................... Biology
Seymour Benzer, Ph.D., D.Sc. ................................................ James G. Boswell Professor of Neuroscience
Howard C. Berg, Ph.D. ....................................................... Biology
James F. Bonner, Ph.D. ....................................................... Biology
Charles J. Brokaw, Ph.D. .................................................... Biology
Eric H. Davidson, Ph.D. ...................................................... Biology
William J. Dreyer, Ph.D. ..................................................... Biology
Derek H. Fender, Ph.D. ....................................................... Biology and Applied Science
Leroy E. Hood, M.D., Ph.D. ................................................ Bowles Professor of Biology
Norman H. Horowitz, Ph.D. ................................................ Biology
Masakazu Konishi, Ph.D. ..................................................... Biology
Edward B. Lewis, Ph.D. ...................................................... Thomas Hunt Morgan Professor of Biology
Thomas P. Maniatis, Ph.D. .................................................. Biology
Herschel K. Mitchell, Ph.D. ................................................ Biology
Ray D. Owen, Ph.D., Sc.D. .................................................. Biology
Jean-Paul Revel, Ph.D. ....................................................... Albert Billings Ruddock Professor of Biology
Roger W. Sperry, Ph.D., Sc.D. ............................................ Hixon Professor of Psychobiology
Felix Strumwasser, Ph.D. .................................................... Biology

Sherman Fairchild Distinguished Scholars

William R. Levick, M.B.B.S. ............................................. Biology
F. Xavier Wilhelm, Ph.D. ................................................ Biology

Senior Research Associate

Roy J. Britten, Ph.D. ....................................................... Biology

1 Option Representative
2 Pre-Medical Adviser
3 Joint appointment with Carnegie Institution of Washington
Associate Professors

John M. Allman, Ph.D. ....................................................... Biology
A. James Hudspeth, M.D., Ph.D.¹ ........................................... Biology
Henry A. Lester, Ph.D. ..................................................... Biology
John D. Pettigrew, M.D. ................................................... Biology
James H. Strauss, Ph.D. .................................................. Biology
David C. Van Essen, Ph.D. ......................................... Biology

Research Associates

Charles R. Hamilton, Ph.D. ................................................ Biology
Peter H. Lowy, Doctorandum ........................................ Biology
Marianne E. Olds, Ph.D. ................................................ Biology

Gosney Visiting Associates

Douglas M. Fambrough, Ph.D.² ........................................ Biology
Nestor E. Gonzalez-Cadavid, Ph.D.² .................................. Biology
Yoshiki Hotta, Ph.D. ................................................. Biology

Visiting Associates

Hermes Bravo, D.D.S. ........................................................ Biography
Raymond P. Briggs, Ph.D. ...................................................... Biology and Applied Science
Enrique Cerdá-Olmedo, Ph.D.² ........................................... Biology
Arturo P. Eslava, Ph.D.² .................................................. Biology
Patrice L. French, Ph.D. .................................................... Biology
Rodney M. Hewick, Ph.D. ................................................ Biology
Dennis J. Hocevar, Ph.D. .................................................. Biology and Applied Science
Toru Itakura, Ph.D. .......................................................... Biology
Stanley A. Klein, Ph.D. ...................................................... Biology and Applied Science
Tamotsu Ootaki, Ph.D.² ..................................................... Biology
Edward F. Pate, Ph.D. ..................................................... Biology
Lajos Piko, D. V.M. ........................................................... Biology
Walter G. Roweckamp, Ph.D. ........................................... Biology
Danielle Thierry-Mieg, Ph.D. ........................................... Biology
R. Bruce Wallace, Ph.D. .................................................. Biology
Marcelle Wilhelm, Ph.D. ................................................ Biology
Ji-hou Xin, B.S. ............................................................. Biology

Assistant Professors

Jeremy P. Brockes, Ph.D. .................................................. Biology
Ronald J. Konopka, Ph.D.³ ................................................ Biology
Elias Lazarides, Ph.D. ..................................................... Biology
Elliot M. Meyerowitz, Ph.D. .......................................... Biology

Gosney Senior Research Fellow

Nancy S. Petersen, Ph.D. .................................................. Biology

¹ Pre-Medical Adviser
² In residence 1978-79
³ Undergraduate Student Adviser
### Senior Research Fellows

<table>
<thead>
<tr>
<th>Name</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorwin L. Birt, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Barbara Hough Evans, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Sandra Ewald, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Michael W. Hunkapiller, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Leonard K. Kaczmarek, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Takuji Kasamatsu, M.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Minnie McMillan, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Ronald L. Meyer, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Menasche M. Nass, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Nicholas J. Proudfoot, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Janet M. Roman, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Ellen G. Strauss, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>Terry L. Thomas, Ph.D.</td>
<td>Biology</td>
</tr>
<tr>
<td>John C. Woolum, Ph.D.</td>
<td>Biology</td>
</tr>
</tbody>
</table>

### Research Fellows

<table>
<thead>
<tr>
<th>Name</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>David M. Anderson, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>James P. Ary, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Marylouise Ary, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>David J. Asai, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Martha Bond, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Eugene T. Butler, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Kathryn A. Calame, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Anne Chomyn, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Mark C. Citron, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Loring G. Craymer, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Laura De FrancescO, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Ian W. Duncan, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Alberto Ferrus, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>James L. Fobes, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Edward F. Fritsch, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Paul A. Galland, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>John W. Grula, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Alfred M. Handler, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Ross C. Hardison, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Henry Huang, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Michael T. Hyson, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Lawrence M. Kauvar, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Laurence A. Lasky, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Richard M. Lawn, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Leslie S. Leutwiler, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Ze'e'ev Lev, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Pamela L. Mellon, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Christian G. Merkel, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>David J. Meyer, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Gordon P. Moore, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Kevin W. Moore, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Monica Mottes, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Joel Myerson, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Jeanne Nerbonne, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Clare M. O'Connor, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Makoto Okuno, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Manfred K. Otto, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>David E. Presti, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Vilayanur S. Ramachandran, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>John W. Roberts, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Kathleen S. Rockland, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Che-Kun James Shen, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Mark Tanouye, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Murray F. Teitel, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Martin M. Weinstock, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>John E. Wiktorowicz, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Kendrick N. Williams, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>S. Barbara Yancey, Ph.D.</td>
<td></td>
</tr>
</tbody>
</table>

1 U.S. Public Health Service Fellow
2 U.S. Public Health Service Postdoctoral Trainee
3 Helen Hay Whitney Foundation Fellow
4 Damon Runyon-Walter Winchell Cancer Fund Fellow
5 Deutsche Forschungsgemeinschaft Fellow
6 American Cancer Society Fellow
7 Jane Coffin Childs Memorial Fund for Medical Research Fellow
8 Chaim Weizmann Research Fellow
9 European Molecular Biology Organization Fellow
10 Muscular Dystrophy Association of America Fellow
Graduate Students 1979-80

David John Asai
Eileen A. Bagdonas
John Richard Bell
John Lovell Bixby
Beverley Jean Bond
Edwin Paul Ching
Arlene Y. C. Chiu
David Paul Corey
Franklin David Costantini
Stephen Thomas Crews
Alice M. Cronin
Madeline Anne Crosby
Thomas Edward Crowley
Mark Morris Davis
Philip Warren Early
Ruth Anne Eatock
Jay William Ellison
Douglas Arthur Fisher
John Gregory Frelinger
Karl Joseph Fryxell
David Lynn Gard
Karen Elizabeth Gaston
Robert Allen Gelfand
David Alan Goldberg
Richard Hans Gomer
Herman John Gordon
Bruce Leslie Granger
Steven Haym Green
Mark Gurney
Tim Hunkapiller
Kent Richard Jennings
Larry E. Johnson
Nelson Daniell Johnson
Gary Stephen Jones
Po ning Kao
Lawrence Charles Katz
Marilyn Rose Kehry
Stuart Kisu Kim
Michael William Klymkowski
Mitchell Edwin Kronenberg

Mauri Eugene Krouse
Baruch Kuppermann
Elizabeth Lacy
Joyce Ellen Lauer
Katherine Dai-Li Lee
Greg Erwin Lemke
David Eliot Levy
Richard Sheridan Lewis
Donna Lucy Livant
Kenneth Lawrence Marton
Jeffrey Nelson Masters
John Henry Richard Maunsell
Jeffrey Terrell Mayne
James Stacy McCasland
Katharine Stevens Mixter
Jay Jasper Myers
William Thomas Newsome III
Bruce John Nicholson
Deanna Kae Ojala
Dominic Ping-Yim Orr
Jing-hsiung James Ou
Vann Phillips Parker
Steven Elery Petersen
James W. Posakony
Antonio Arevalo Reyes
Charles Moen Rice III
Arthur Henry Roach
Thomas Dean Sargent
Loveriza A. Sarmiento
James Walter Schilling, Jr.
Jeffrey Edward Segall
Sandra Lee Shotwell
Dave William Sivertsen
Randall Forrest Smith
Michael Paul Snyder
Beverly Jean Taylor
Betty Anne Vermeire
Chung Wang
Wilson Wu
Joanne Mulligan Yeakley
Division of Chemistry and Chemical Engineering

Harry B. Gray, Chairman
Sunney I. Chan, Executive Officer for Chemistry
John H. Seinfeld, Executive Officer for Chemical Engineering

Professors Emeriti

Linus Pauling, Ph.D., Sc.D., L.H.D., U.J.D., Dr. h.c., D.F.A.
LL.D., Nobel Laureate
Chemistry
Bruce H. Sage, Ph.D., Eng. D.
Chemical Engineering
Ernest H. Swift, Ph.D., LL.D.
Analytical Chemistry

Professors

Fred C. Anson, Ph.D.
Chemistry
John D. Baldeschwieler, Ph.D.
Chemistry
Jesse L. Beauchamp, Ph.D.
Chemistry
John E. Bercaw, Ph.D.
Chemistry
Sunney I. Chan, Ph.D.
Chemical Physics and Biophysical Chemistry
William H. Corcoran, Ph.D.
Institute Professor of Chemical Engineering
Norman Davidson, Ph.D.
Chemistry
Richard E. Dickerson, Ph.D.
Physical Chemistry
David A. Evans, Ph.D.
Chemistry
George R. Gavalas, Ph.D.
Chemical Engineering
William A. Goddard III, Ph.D.
Chemistry and Applied Physics
William R. Kenan, Jr. Professor and Professor of Chemistry
Harry B. Gray, Ph.D.
Robert H. Grubbs, Ph.D.
Chemistry
Robert E. Ireland, Ph.D.
Organic Chemistry
Aron Kuppermann, Ph.D.
Chemistry
L. Gary Leal, Ph.D.
Chemical Engineering
Rudolph A. Marcus, Ph.D.
Arthur Amos Noyes Professor of Chemistry
Vincent McKoy, Ph.D.
Theoretical Chemistry
Cornelius J. Pings, Ph.D.
Chemical Engineering and Chemical Physics
Michael A. Rafiery, Ph.D., D.Sc.
Chemical Biology
John H. Richards, Ph.D.
Organic Chemistry
John D. Roberts, Ph.D., Dr. rer. nat. h.c., Sc.D.
Institute Professor of Chemistry
John H. Seinfeld, Ph.D.
Chemical Engineering
Fredrick H. Shair, Ph.D.
Chemical Engineering
Nicholas W. Tschoegl, Ph.D.
Chemical Engineering
W. Henry Weinberg, Ph.D.
Chemical Engineering and Chemical Physics

Standard Oil Company of California
Visiting Professor

Morton Denn, Ph.D.
Chemical Engineering

Visiting Professor

Josef Michl, Ph.D.
Chemistry

Senior Research Associates Emeriti

Edward W. Hughes, Ph.D.
Chemistry
Joseph B. Koepfli, D. Phil.
Chemistry
Oliver R. Wulf, Ph.D.
Physical Chemistry
Associate Professors

Peter B. Dervan, Ph.D.  Chemistry
Ahmed H. Zewail, Ph.D.  Chemical Physics

Research Associates

Richard E. Marsh, Ph.D.  Chemistry
Sten O. Samson, Fil. Dr.  Chemistry
William P. Schaefer, Ph.D.  Chemistry
Walter A. Schroeder, Ph.D.  Chemistry

Visiting Associates

Vasiliy I. Avdeev, Ph.D.  Chemical Engineering
Henri Benoit, Sc.D.  Chemical Engineering
Richard J. Bing, M.D.  Chemical Engineering
Emilio Bordignon, Ph.D.  Chemistry
George A. Carlson, Ph.D.  Chemistry
Maurice Cohen, Ph.D.  Chemistry
Frank DeHaan, Ph.D.  Chemistry
Riccardo Destro, Ph.D.  Chemistry
Dennis Dietz, Ph.D.  Chemistry
Henry Freiser, Ph.D.  Chemistry
M. Michael Glovsky, M.D.  Chemical Engineering
Daniel Grosjean, Ph.D.  Chemical Engineering
Earl C. Harrison, M.D.  Chemical Engineering
Keiichi Itakura, Ph.D.  Chemistry
Thomas Kistenmacher, Ph.D.  Chemistry
Jo Wong Lee, Ph.D.  Chemistry
Rachmiel Levine, M.D.  Chemical Engineering
Wing-Ki Liu, Ph.D.  Chemistry
Joann S. Loehr, Ph.D.  Chemistry
Thomas M. Loehr, Ph.D.  Chemistry
Rein Luus, Ph.D.  Chemical Engineering
Edward Macias, Ph.D.  Chemical Engineering
Marie-Jeanne Peltre, Ph.D.  Chemical Engineering
Stanley H. Pine, Ph.D.  Chemistry
Judith Poe, M.Sc.  Chemistry
C. K. Poon, Ph.D.  Chemistry
Richard C. Powell, Ph.D.  Chemistry
Carl F. Prenzlow, Ph.D.  Chemistry
Gregorio Santillan, Ph.D.  Chemistry
Raymond L. Schmidt, Ph.D.  Chemical Engineering
Ingeborg Schuster, Ph.D.  Chemistry
Joseph R. Schwartz, Ph.D.  Chemistry
B. D. Sharma, Ph.D.  Chemistry
Mavis Shure, Ph.D.  Chemistry
Stephen H. Smallcombe, Ph.D.  Chemistry
Thomas J. Smith, Ph.D.  Chemistry
Vladimir Tapilan, Ph.D.  Chemical Engineering
Richard M. Wing, Ph.D.  Chemistry

Associate

Lyman G. Bonner, Ph.D.  Chemistry
Assistant Professors
Judith L. Campbell, Ph.D. ........................................... Chemistry
Dennis A. Dougherty, Ph.D. .................................. Chemistry
Robert R. Gagné, Ph.D. ....................................... Chemical Engineering
Gregory N. Stephanopoulos, Ph.D. ......................... Chemical Engineering

Senior Research Fellow
H. Hollis Reamer, M.S. .................................................. Chemical Engineering

Noyes Research Instructor
Kenneth C. Janda, Ph.D. .................................................. Chemistry

Research Fellows
William S. Agnew, Ph.D.
Robert C. Anderson, Ph.D.
Vasil K. Babamov, Ph.D.
Raphael Badoud, Ph.D.
Bo Inge Berglund, Ph.D.
John R. Brabson, Ph.D.
John D. Buhr, Ph.D.
Mark J. Burns, Ph.D.
Peter M. Chandler, Ph.D.
Maurice Cohen, Ph.D.
Robin Sue Eichen Conn, Ph.D.
Calvin J. Curtis, Ph.D.
John H. Dawson, Ph.D.
Eric J. M. de Boir, Ph.D.
Chung-Tsan Chan Deng, Ph.D.
Jerry S. Dodgson, Ph.D.
Susan M. J. Dunn, Ph.D.
Christina Dyllick-Brenzinger, Dr. nat. sc.
Ranier Dyllick-Brenzinger, Dr. nat. sc.
Steven E. Ealick, Ph.D.
Jay B. Edelman, Ph.D.
David A. Edmonson, Ph.D.
Beat Ernst, Ph.D.
Rolf Etter, Ph.D.
Thomas E. Felter, Ph.D.
Arne FifiLet, Ph.D.
Eric A. Fryberg, Ph.D.
Michael D. Fryzuk, Ph.D.
Thomas Geiger, Ph.D.
Wayne Gladfelter, Ph.D.
Jollic D. Godfrey, Jr., Ph.D.
John W. F. Goers, Ph.D.
P. Dieter Habich, Ph.D.
David J. Hart, Ph.D.
Paul R. Hartig, Ph.D.
Nancy Ann Harvey, Ph.D.
Kenshi Hayashi, Ph.D.
Yoshinore Hirata, Ph.D.
Jay Hirsh, Ph.D.
Friedrich M. Hoffman, Ph.D.
Charles F. Hoyng, Ph.D.
Richard P. Junghans, Ph.D.
David B. Kaback, Ph.D.
Karen L. Kindle, Ph.D.
William A. Kleshch, Ph.D.
Masato Koda, Ph.D.
Donna M. Kunert, Ph.D.
Jean-Pierre Lemaistre, Ph.D.
Sung Chang Lin, Ph.D.
Vanessa Lum, Ph.D.
Kent R. Mann, Ph.D.
Shlomo Margel, Ph.D.
Glen J. McGarvey, Ph.D.
Stephen J. Milder, Ph.D.
Vincent M. Miskowski, Ph.D.
Akira Miyashita, Ph.D.
Anne C. Moore, Ph.D.
James I. Mullins, Ph.D.
Wendy I. Noall, Ph.D.
Noboru Oyama, Ph.D.
Ronald J. Pace, Ph.D.
George R. Painter, Ph.D.
Gregory A. Parker, Ph.D.
Micha Polak, Ph.D.
Ramakrishna Ramaswamy, Ph.D.
Georges J. Rancourt, Ph.D.
Michael A. Reuben, Ph.D.
James D. Satterlee, Ph.D.
Michael Schimerlik, Ph.D.
Joseph R. Schuh, Ph.D.
Christian Seigneur, Ph.D.
Ayusman Sen, Ph.D.
Takashi Shimomura, Ph.D.
Karl M. Sirotkin, Ph.D.
Thomas Smith, Ph.D.
Michael E. Squillacote, Ph.D.
Wayne Thompson, Ph.D.
James E. Swartz, Ph.D.
Michael Tabor, Ph.D.
Yoram Tambour, D.Sc.
Vernon Tanaguchi, Ph.D.
Soji Tanaka, Ph.D.
Stephen P. Tanis, Ph.D.
Wayne Thompson, Ph.D.
John A. Turner, Ph.D.
David R. Tyler, Ph.D.

Jean-Paul Vevert, Ph.D.
William H. Vine, Ph.D., M.D.
Makoto Wada, Ph.D.
Deborah K. Watson, Ph.D.
Karl Wilks, Ph.D.
Veit Witzemann, Ph.D.
Joseph Wong, Ph.D.
Piotr K. Wrona, Ph.D.
Robert Zhaler, Ph.D.

Applied Physics
John Joseph Barton
John Samuel Batchelder
William Matthew Bowser

Graduate Students 1979-80

Chemical Engineering
David Thomas Allen
Alan Brad Anton
Samir Ilyas Barudi
Mark Elliott Bassett
Barry Jerome Bentley
Clarke Berdan II
Russell Leslie Bone
Willie Ann Brown
Douglas Glenn Carson
Paul Chun-Ho Chan
Karl Kho-Chung Chang
Bo Kyung Chi
Ying-chee Chung
Douglas Snyder Clark
James Gleason Crump
Brian Henry Davison
Michael Thomas Duncan
Paul Nathan Dunlap
Kenneth Eagle
Howard Edwin Evans
Silvia Fernandez
Kurt Dale Pickie
Lynn Forester
Gerald Gendall Fuller
Anthony Sigmund Geller
Cigdem Gurur
Daniel Dale Hanle
Philip Alan Hookham
Stephen Ju-ming Hsia
Dale Edward Ibbotson
Nicholas Alexandrou Kaffes
William Samson Kalema
Rohit Khanna
John Edwin Killough

Stuart Thomas Hopkins
Kevin Eugene Jones

James Gregory Kralik
Constantine Kravaris
Ronald Robert Lagnado
Seong Hee Lee
Joseph Anthony Leone
Oded Levy
Edward Douglas Lynch
William Kevin Moonan
William Lee Olbricht
Byron Lance O'Steen
Nutan Kumari Pande
Andrew John Pesthy
Charunya Phichitkul
Puvin Pichaichanarong
Danny David Reible
Donald F. Rogers
Gregory Ryskin
Kai-Yiu San
John Robert Schlup
Karl Allen Seibert
Mark Alan Siddoway
Aguiles Carlos Sobrero
Arthur Wesley Stelson
David Michael Strand
David Walter Suobank
Michael Karpovich Templeton
Grant Fred Tiefenbruck
Nick Vasilakos
Jimmy K. Y. Wang
Dale S. Warren
Albert Theodore Watson
Gary Eugene Whatley
Thomas Stephen Wittrig
Chemistry
George Adler
David Andrew Agard
Janet Noel Allison
William George Antypas, Jr.
Peter Bruce Armientrout
Pamela Rae Auburn
Jay Douglas Audett
Roger Bennett Baar
Raymond Alan Bair
Utpal Banerjee
Paul Theron Barger
Javier Francisco Bartroli
Michael McClellan Becker
Nancy Newton Becker
Tadhg Pulcarius Begley
D. Wayne Berman
Donald Harry Berry
Scott Adams Biller
Steven Gerard Blanchard
John James Boland
David Scott Bonse
Mark John Bowick
Robert Clark Bowman, Jr.
David Edward Brinza
William Joseph Brittain
Duncan William Brown
Frank Ripley Brown, Jr.
Katherine Ann Brown-Wensley
Gary Wayne Brudvig
Daniel Alan Buttry
Gary Wayne Campbell
Michael Paul Casassa
Carla Jutta Casewit
Robert John Cave
Francis Gabriel Celli
Richard Eugene Cherpeck
Jocelyn Terese Chupka
Steven Alan Cohen
Benjamin Norman Conner
William Robert Croasmun
John Powell Daub
Robert Anthony dePaola
John Austin Dodge
Nancy Marie Doherty
William Clinton Dow
Kenneth Martin Doxsee
Horace Rainsford Drew III
Daniel Charles Duan
Richard Raymond Durand, Jr.
Kenneth Eugene Eigenberg
Janet Ruth Elliott
Michael Dalton Ennis
Eric Robert Evitt
Joseph John Falke
Peter Mark Felker
Brian Joseph Fitzsimmons
Dorothy Jean Flanagan
Jane Elizabeth Frommer
James Francis Garvey
Jeff Daniel Gelles
Patricia Margaret George
Gary Eugene Gilmartin
James William Gleeson
Jorge Soto Gonzalez
Marvin Mark Goodgame
Paula Jean Grunthaner
David Owen Hall
Linda Fay Hale
Neal Bruce Handly
Maureen Alice Hanratty
Richard Randolph Hardy
Lawrence Michael Henling
Brian Garnet Herndier
Mark William Hersey
Robert Philip Hertzberg
Albert John Highe
William Dinan Hinsberg
Ellen Yuan-Chu Ho
Diane Marie Hood
Thomas Robert Howard
John Mitchell Huggins
Richard Alan Ikeda
Carl R. Illig
David Michael Ingle
Melvin Owen Jones
Robert James Kaiser, Jr.
Santosh Pandurang Kamath
Keiko Kanamori
Robert McNamara Kanne
Jack Alan Kaye
Peter Martin Koelsch
Charles Frederick Koerting
Eric Martin Krauss
Robert Paul Kreh
Chia-Lam Kuo
Paul Martin Lahti
William Roger Lambert
John Bosco Chi-Bun Lee
George Clark Lisensky
Thomas P. Lockhart
John James Low
Robert Ross Lucchese
David Neil Marks
William Alan Marritt
Craig Timothy Martin
David John Mathe
Andrew William Maverick
James Moers Mayer
Division of Engineering and Applied Science

Roy W. Gould, Chairman
William B. Bridges, Executive Officer for Electrical Engineering
Paul C. Jennings, Executive Officer for Civil Engineering and Applied Mechanics
Hans W. Liepmann, Director of the Graduate Aeronautical Laboratories and Executive Officer for Aeronautics
James J. Morgan, Executive Officer for Environmental Engineering Science
Gerald B. Whitham, Executive Officer for Applied Mathematics

Professors Emeriti

Frederick J. Converse, B.S. .................................................. Soil Mechanics
Pol E. Duwez, D.Sc. .................................................. Applied Physics and Materials Science
Arthur L. Klein, Ph.D. .................................................. Aeronautics
#### Professors

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allan J. Acosta, Ph.D.</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Charles D. Babcock, Jr., Ph.D.</td>
<td>Aeronautics</td>
</tr>
<tr>
<td>William B. Bridges, Ph.D.</td>
<td>Electrical Engineering and Applied Physics</td>
</tr>
<tr>
<td>Norman H. Brooks, Ph.D.</td>
<td>James Irvine Professor of Environmental and Civil Engineering; Director, Environmental Quality Laboratory</td>
</tr>
<tr>
<td>Garry L. Brown, D.Phil.</td>
<td>Aeronautics</td>
</tr>
<tr>
<td>Thomas K. Caughey, Ph.D.</td>
<td>Applied Mechanics</td>
</tr>
<tr>
<td>Francis H. Clauser, Ph.D.</td>
<td>Clark Blanchard Millikan Professor of Engineering</td>
</tr>
<tr>
<td>Donald S. Cohen, Ph.D.</td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>Donald E. Coles, Ph.D.</td>
<td>Aeronautics</td>
</tr>
<tr>
<td>Noel R. Corngold, Ph.D.</td>
<td>Applied Physics</td>
</tr>
<tr>
<td>Fred E. C. Culick, Ph.D.</td>
<td>Applied Physics and Jet Propulsion</td>
</tr>
<tr>
<td>Derek H. Fender, Ph.D.</td>
<td>Biology and Applied Science</td>
</tr>
<tr>
<td>Joel N. Franklin, Ph.D.</td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>Roy W. Gould, Ph.D.</td>
<td>Applied Physics</td>
</tr>
<tr>
<td>George W. Housner, Ph.D.</td>
<td>Carl F Braun Professor of Engineering</td>
</tr>
<tr>
<td>Donald E. Hudson, Ph.D.</td>
<td>Mechanical Engineering and Applied Mechanics</td>
</tr>
<tr>
<td>Floyd B. Humphrey, Ph.D.</td>
<td>Electrical Engineering and Applied Physics</td>
</tr>
<tr>
<td>Wilfred D. Iwan, Ph.D.</td>
<td>Applied Mechanics</td>
</tr>
<tr>
<td>Paul C. Jennings, Ph.D.</td>
<td>Civil Engineering and Applied Mechanics</td>
</tr>
<tr>
<td>Herbert B. Keller, Ph.D.</td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>Wolfgang G. Knauss, Ph.D.</td>
<td>Aeronautics</td>
</tr>
<tr>
<td>James K. Knowles, Ph.D.</td>
<td>Applied Mechanics</td>
</tr>
<tr>
<td>Heinz-Otto Kreiss, Dr. Tech.</td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>Toshi Kubota, Ph.D.</td>
<td>Aeronautics</td>
</tr>
<tr>
<td>Paco A. Lagerstrom, Ph.D.</td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>Robert V. Langmuir, Ph.D.</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Lester Lees, M.S.</td>
<td>Environmental Engineering and Aeronautics</td>
</tr>
<tr>
<td>Hans W. Liepmann, Ph.D.</td>
<td>Charles Lee Powell Professor of Fluid Mechanics and Thermodynamics</td>
</tr>
<tr>
<td>E. John List, Ph.D.</td>
<td>Environmental Engineering Science</td>
</tr>
<tr>
<td>Frank E. Marble, Ph.D.</td>
<td>Jet Propulsion and Mechanical Engineering</td>
</tr>
<tr>
<td>James W. Mayer, Ph.D.</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>James O. McCalgin, Ph.D.</td>
<td>Applied Physics and Electrical Engineering</td>
</tr>
<tr>
<td>Gilbert D. McCann, Ph.D.</td>
<td>Applied Science</td>
</tr>
<tr>
<td>Thomas C. McGill, Ph.D.</td>
<td>Applied Physics</td>
</tr>
<tr>
<td>Carver A. Mead, Ph.D.</td>
<td>Computer Science and Electrical Engineering</td>
</tr>
<tr>
<td>Robert D. Middlebrook, Ph.D.</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Julius Miklowitz, Ph.D.</td>
<td>Applied Mechanics</td>
</tr>
<tr>
<td>James J. Morgan, Ph.D.</td>
<td>Environmental Engineering Science</td>
</tr>
<tr>
<td>Marc-Aurele Nicolet, Ph.D.</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Wheeler J. North, Ph.D.</td>
<td>Environmental Science</td>
</tr>
</tbody>
</table>

1 Half time
2 On leave of absence
Charles H. Papas, Ph.D. ........................................ Electrical Engineering
John R. Pierce, Ph.D., D.Sc., D.Eng., E.D., LL.D. 1 ........................................ Engineering
Fredric Raichen, Sc.D. ........................................ Civil Engineering
W. Duncan Rannie, Ph.D. ........................................ Robert H. Goddard Professor of Jet Propulsion and Professor of Mechanical Engineering
Anatol Roshko, Ph.D. ........................................ Aeronautics
Rolf H. Sabersky, Ph.D. ........................................ Mechanical Engineering
Philip G. Saffman, Ph.D. ........................................ Applied Mathematics
Ronald F. Scott, Sc.D. ........................................ Civil Engineering
Eli Sternberg, Ph.D., D.Sc. ........................................ Mechanics
Homer J. Stewart, Ph.D. ........................................ Aeronautics
Bradford Sturtevant, Ph.D. ........................................ Aeronautics
Ivan E. Sutherland, Ph.D. ........................................ Fletcher Jones Professor of Computer Science
Frederick B. Thompson, Ph.D. ........................................ Applied Philosophy and Computer Science
Thad Vreeland, Jr., Ph.D. ........................................ Materials Science
Gerald B. Whitham, Ph.D. ........................................ Applied Mathematics
Charles H. Wilts, Ph.D. ........................................ Electrical Engineering and Applied Physics
David S. Wood, Ph.D. ........................................ Materials Science
Theodore Y. Wu, Ph.D. ........................................ Engineering Science
Amnon Yariv, Ph.D. ........................................ Electrical Engineering and Applied Physics
Edward E. Zukoski, Ph.D. ........................................ Jet Propulsion and Mechanical Engineering

Sherman Fairchild Distinguished Scholars

Julian D. Cole, Ph.D. ........................................ Aeronautics and Applied Mathematics
Horst Hoffmann, Habil. ........................................ Solid State Physics
Fritz John, Ph.D. ........................................ Applied Mathematics
Walter H. Munk, Ph.D. ........................................ Geophysics

Visiting Professors

Sheldon K. Friedlander, Ph.D. 2 ........................................ Chemical Engineering and Environmental Engineering
Edward C. Posner, Ph.D. ........................................ Electrical Engineering
Lawrence L. Rauch, Ph.D. ........................................ Electrical Engineering
Russell A. Westmann, Ph.D. ........................................ Aeronautics

Associate Professors

Christopher Brennen, Ph.D. ........................................ Mechanical Engineering
Francis S. Buffington, Sc.D. ........................................ Materials Science
Thomas J. R. Hughes, Ph.D. ........................................ Structural Mechanics
Hardy C. Martel, Ph.D. ........................................ Electrical Engineering
David F. Welch, I.D. ........................................ Engineering Design

Visiting Associate Professors

Martin Rem, Ph.D. ........................................ Computer Science
Lincoln J. Wood, Ph.D. ........................................ Systems Engineering

Research Associates

James E. Broadwell, Ph.D. ........................................ Aeronautics
John P. Gray, Ph.D. ........................................ Computer Science

1 Half time
2 In residence 1978-79
Robert C. Y. Koh, Ph.D. .......................... Environmental Engineering Science
Charles L. Seitz, Ph.D. ............................ Computer Science

Visiting Associates

Jack L. Alford, Ph.D. ............................... Civil Engineering
Mircea A. Barglazan, Dipl. ........................ Mechanical Engineering
Malcolm I. C. Bloor, Ph.D. ........................ Applied Mathematics
Maria I. Bochenek, M.S. ............................. Aeronautics
William T. Burke, B.S.E.E. ........................ Computer Science
Anthony T. W. Cheung, Ph.D. ....................... Engineering Science
Ellen R. Domb, Ph.D. ................................ Applied Physics
Sverre T. Eng, Dr. Tech. .................. Electrical Engineering
James M. Galligan, Ph.D. ........................ Materials Science
Edward M. Gates, Ph.D. ............................ Mechanical Engineering
Avraham Gover, Ph.D. ............................... Applied Physics
Estelle Gregory, Ph.D. ............................... Biomedical Engineering
Michael S. Longuet-Higgins, Ph.D. ............... Applied Mathematics
Seid Hossein Izadpanah, Ph.D. ........................ Applied Physics
Deane B. Jacobs, M.D. ............................... Biomedical Engineering
Aurora M. Landel, Ph.D. ............................... Biomedical Engineering
Shlomo Margalit, D.Sc. ............................... Applied Physics
Vasilis Z. Marmarelis, Ph.D. ........................ Bioinformation Systems
Samuel A. Marshall, Ph.D. ......................... Engineering Science
Akio Masuyama, Dr. Eng. ........................... Electrical Engineering
James D. Murray, Ph.D., D.Sc. ..................... Applied Mathematics
Frank Obermeier, Ph.D. .............................. Applied Mathematics
Thomas E. Ogden, M.D., Ph.D. ..................... Biomedical Engineering
Hiroichi Ohira, D.Eng. ............................... Aeronautics
Daniel M. Oldenziel, Ph.D. ........................ Mechanical Engineering
Gary Parker, Ph.D. ................................. Hydraulics
Ruggiero L. Pierantoni, Ph.D. ....................... Biomedical Engineering
Simon Ramo, Ph.D. ................................. Engineering
Subramanian Ranganathan, Ph.D. ........................ Applied Physics
Ilan Samid, Ph.D. ................................. Applied Physics
C. Hunter Shelden, M.D. .......................... Biomedical Engineering
Ryo Suzuki, Ph.D. ................................. Applied Physics
Martin F. von Allmen, Ph.D. ....................... Applied Physics
Howard Winet, Ph.D. ............................... Engineering Science
Dean E. Wooldridge, Ph.D. ......................... Engineering
Moshe Yust, M.Sc. ................................. Applied Physics

Assistant Professors

Paul M. Bellan, Ph.D. ........................... Applied Physics
Glen R. Cass, Ph.D. ................................. Environmental Engineering
Slobodan M. Cuk, Ph.D. ........................... Electrical Engineering
Paul E. Dimotakis, Ph.D. ........................ Aeronautics and Applied Physics
Richard C. Flagan, Ph.D. ........................ Environmental Engineering Science
Bengt Fornberg, Ph.D. ........................ Applied Mathematics
William L. Johnson, Ph.D. ........................ Materials Science
James T. Kajiya, Ph.D. ........................ Computer Science
Charles R. Minter, Ph.D. ........................ Computer Science
Darryl L. Smith, Ph.D. ........................ Applied Physics

1 In residence 1978-79
### Senior Research Fellows

<table>
<thead>
<tr>
<th>Name</th>
<th>Ph.D.</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mool C. Gupta</td>
<td></td>
<td>Aeronautics</td>
</tr>
<tr>
<td>Vernal H. Kenner</td>
<td></td>
<td>Aeronautics</td>
</tr>
<tr>
<td>Silvanus S. Lau</td>
<td>1</td>
<td>Applied Physics</td>
</tr>
<tr>
<td>George T. Yates</td>
<td></td>
<td>Engineering Science</td>
</tr>
<tr>
<td>C. Gupta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vernal H. Kenner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silvanus S. Lau</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>George T. Yates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James C. Long</td>
<td></td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Philip M. Neches</td>
<td>2</td>
<td>Computer Science</td>
</tr>
</tbody>
</table>

### Instructors

<table>
<thead>
<tr>
<th>Name</th>
<th>Ph.D.</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>James C. Long</td>
<td></td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Philip M. Neches</td>
<td>2</td>
<td>Computer Science</td>
</tr>
</tbody>
</table>

### Lecturers

<table>
<thead>
<tr>
<th>Name</th>
<th>Ph.D.</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stanley H. Bacon</td>
<td></td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Gerald J. Biernman</td>
<td></td>
<td>Systems Engineering</td>
</tr>
<tr>
<td>John Choma, Jr.</td>
<td></td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Richard R. Green</td>
<td>2</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>James R. Lesh</td>
<td>2</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Thomas R. McDonough</td>
<td></td>
<td>Engineering</td>
</tr>
<tr>
<td>Amir M. Mohsen</td>
<td></td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Marc H. Raibert</td>
<td></td>
<td>Computer Science</td>
</tr>
<tr>
<td>Charles B. Ray</td>
<td>M.S.</td>
<td></td>
</tr>
<tr>
<td>Marvin K. Simon</td>
<td></td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>David Sonnabend</td>
<td>M.S.</td>
<td></td>
</tr>
</tbody>
</table>

### Research Fellows

<table>
<thead>
<tr>
<th>Name</th>
<th>Ph.D.</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael J. Barcelona</td>
<td></td>
<td>Environmental Engineering Science</td>
</tr>
<tr>
<td>Nadav Bar-Chaim</td>
<td></td>
<td>Applied Physics</td>
</tr>
<tr>
<td>Robert E. Breidenthal, Jr.</td>
<td></td>
<td>Aeronautics</td>
</tr>
<tr>
<td>Richard H. Buckholz, Jr.</td>
<td>2</td>
<td>Engineering Science</td>
</tr>
<tr>
<td>Pandipati R. K. Chetty</td>
<td></td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Thomas Erneux</td>
<td></td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>Athanassios S. Fokas</td>
<td></td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>Gregory Gartrell</td>
<td>3</td>
<td>Environmental Engineering Science</td>
</tr>
<tr>
<td>Valerie Ann Gerard</td>
<td></td>
<td>Environmental Engineering Science</td>
</tr>
<tr>
<td>Ilan Golecki</td>
<td></td>
<td>Applied Physics</td>
</tr>
<tr>
<td>Lambertus Hesselink</td>
<td>4</td>
<td>Fluid Mechanics</td>
</tr>
<tr>
<td>S. John Hogan</td>
<td></td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>Antoine Kahn</td>
<td>2</td>
<td>Applied Physics</td>
</tr>
<tr>
<td>Kyung-Suk Kim</td>
<td></td>
<td>Aeronautics</td>
</tr>
<tr>
<td>John P. Kroeker</td>
<td></td>
<td>Bioinformation Systems</td>
</tr>
<tr>
<td>Mark J. Kushner</td>
<td>3</td>
<td>Applied Physics</td>
</tr>
<tr>
<td>David M. Lee</td>
<td></td>
<td>Earthquake Engineering</td>
</tr>
<tr>
<td>Stephen H. Lieberman</td>
<td></td>
<td>Environmental Engineering Science</td>
</tr>
<tr>
<td>Bruce E. MacNeal</td>
<td></td>
<td>Applied Physics</td>
</tr>
<tr>
<td>Martti O. T. Maenpaa</td>
<td></td>
<td>Applied Physics</td>
</tr>
<tr>
<td>Steven L. Manley</td>
<td></td>
<td>Environmental Engineering Science</td>
</tr>
<tr>
<td>Samuel E. Matteson</td>
<td></td>
<td>Applied Physics</td>
</tr>
</tbody>
</table>

---

1 Also part-time Lecturer in Materials Science
2 In residence, 1978-79
3 Chaim Weizmann Research Fellow
4 Also part-time Lecturer in Applied Physics
Gabor Mezey, Ph.D. ........................................ Applied Physics
Tom Smedaas, Ph.D. ....................................... Applied Mathematics
Gary Strumolo, Ph.D. ¹ .................................... Applied Mathematics
Coenraad A. Swarts, Ph.D. ² .............................. Applied Physics
Alan A. Vetter, Ph.D. .................................... Applied Physics
Hermann C. von Seefeld, Ph.D. ......................... Applied Physics
Per Fredrik Wahlund, D.Phil. ............................. Applied Mathematics

¹ In residence 1978-79
² IBM Research Fellow

Member of the Professional Staff

William H. Bettes, Manager GALCIT

Graduate Students 1979-80

Aeronautics
Kim Maynard Aaron
Kenneth W. Barker
Thomas Patrick Bauer
Luis Paulino Bernal
Christopher Jeyaparan Catherasoo
Herzl Chai
Samuel Kwang-Yeh Chang
John Michael Cimbala
Phuc The Doan
Igor Joze Emri
Frank K. Fay
Morteza Gharib
Ari Glezer
Jean-Francois Luc Haas
James Carl Hermanson
Luc Jozef Heymans
David Matthew Kuzo
Stelios Kyriakides
Kenneth MacDougall Liechti
Wen W. Liu
Peter F. Lorber
Hiroshi Mackawa
Patrick Jacques Mattei
Manoochehr Mohseni-Koochesfahani
M. Mullainathan
Mark Godfrey Mungal
Michele Nesme
Peter John Nicklin
Hideki Nomoto

Applied Mathematics
John Wilson Barker
Evangelos Athanassios Coutsias
Patrick H. Dunne
Jeffrey M. Fier
Allan Douglas Jepson
William Lawrence Kath
Gregory William Medlin

Daniel Mark Nosenchuck
Tor Endre Ostbo
Dimitris A. Papantoniou
Judith Elaine Peach
Paul Michael Rapacz
Krishnaswamy Ravi Chandar
Fredrick Allan Roberts
Thomas Roesgen
Paul David Ronney
Olivier Roy
Todd S. Rust
Edward Kenneth Ruth
Alejandro Sergio Salamonovitz
William Stapf Sargent
Kevin John Sene
Choon-foo Shih
Lorenz Willard Sigurdson
David John Steigmann
Ming Han Tang
Vicente Tortoriello
Bernd Otto Trebitz
Timothy Neal Turner
Luigi Vigevano
Steven Ray Vosen
Chiun Wang
Joseph Kam-Leung Wat
Keith P. Zondervan
Kevin L. Zondervan

James Robert Mueller
Allen C. Robinson
Louis Anthony Romero
James Carl Schatzman
Robert Elmer Scheid
Jeffrey Alan Simmen
Zareh S. Tatoian


Applied Mechanics
Mark Carter Anderson
Carl Leei Chen
Jeremiah Finbarr Connolly
Graham Christopher Fleming
Graeme Francis Fowler
Basile Jarmak
Charles Morton Krousgrill, Jr.
Graeme Haynes McVerry

Applied Physics
Pierre Asselin
Thomas Clyde Banwell
Randall Keith Bartman
David Verge Baxter
Thomas Michael Bemis
Martha Ann Berding
Henry Abram Blauvelt
Michael Anthony Blessinger
Elliott Rowe Brown
Pei Chuang Chen
Woontong Nathan Cheung
Arthur Er-terg Chiu
Liew-Chuang Chiu
Bruce Montgomery Clemens
Reuben T. Collins
Kenneth Robert Elliott
Randall Meindert Feenstra
Eric Donald Fredrickson
James R. Fruchterman
Andrew Keith Gabriel
Timothy Joseph Gallagher
Patrick William Goalwin
Glenn Joel Greene
Mark Allen Hedemann
Anne Marie Hofmeister
Ralph Boyd James
Prakash Kasiraj
David Clark Keezer
Isabella Brygida Kierkowska
Thomas Lawson Koch
Evelyn Ann Kramer

Civil Engineering
Jean-Pierre Bardet
Jean-Luc Bilhou-Nabera
Dirceu Luiz Rodrigues Botelho
Alexander N. Brooks
William Robert Brownlie
Jing-Chang Chen
Glen John Cherepon
John Eric Christenson
Martin Francis Cohen
Bernard Andre Jean-Marie Cuny
Lee Don Dobbs
Reda Abdu el-Hay Mohamed Ali El-Damak

Timothy Christopher O’Sullivan
Thomas James Pence
Gustaf Per Reinhall
Nicolas Alexis Roy
Rodney Allen Stephenson
James Michael Winget
Paul Jerome Yoder
Layne Zee

David Alan Krider
Thomas Francis Kuech
Daniel Bernard Lang
Martin D. Lerner
Christian Mailhiot
Gordon Stuart Mitchard
Douglas Marion Moody, Jr.
Richard Harrison Moyer
Michael Steven Muha
Dean Paul Neikirk
David Mort Pepper
Dale Austen Prouty
Mark Alan Richards
Kenneth V. Rousseau
Robert Schulz
David Martin Scott
Joseph Emmett Shepherd
Chun-Ching Shih
Virgil Simon Speriosu
Lawrence Henry Sverdrup, Jr.
Michael Alan Tenhover
John R. Torczynski
Jeffrey Eugene Ungar
Israel Ury
Jeffrey Owen White
Arthur Ray Williams
Daniel Paul Wilt
Paul Kit-Lai Yu
Jan Jacek Zebrowski
Amikam Zur

Marius Gerber
Medhat Ahmed El-Sayed Haroun
Randall Lee Harrill
Mohammed Fawzy Helwa
Moh-jian Huang
Behnam Hushmand
Dominic John Izzo
Sudhir Kumar Jain
Garrett Duane Jeong
Thierry Lepelletier
Albert Niu Lin
Anne Lin
Wing Kam Liu
Jaime Jose Olaechea
Louis Alexander Ortiz
Ronald Yu Sang Pak
Panayiotis Nicolas Papanicolaou
Ioannis John Psycharis

Computer Science
Anthony Francis Barton
Eric Edward Barton
Sally Anne Browning
Christopher Ralph Carroll
Marina Chien-Mei Chen
Young-II Choo
Erik Penn DeBenedictis
Stefan Gabriel Demetrescu
Gregory H. Efland
Moshe Gray
Gideon Hess
Sai Yuen Billy Ho
Tai-Ping Ho
David Lawrence Johannsen
Charles Richard Lang, Jr.
Herman Sui Ning Li

Electrical Engineering
Mustafa Abushagur Gyth Abushagur
Abdul-Rehman Abdul-Mohsen Al-Bassam
Denis William Aull
Nancy Walden Barcus
Meir Bartur
Farhad Barzegar
Robert Jacques Bensoussan
Bruno Bernard Berlizot
Philippe Rene Bertrand
Alex M. Bolea
Richard Carl Bozzuto, Jr.
Arthur Raymond Brown
Giles Chauncey
Bo Hyung Cho
Joseph James Connery, Jr.
Henry Marie Defalque
Alain Delsupexhe
Mark Barry Dolson
Steven Glen Eaton
James Richard Ellison
Nader Engheta
Robert Warren Erickson, Jr.
Sai-Wai Fu
Celestino John Gaeta
Dhrumil Jayantilal Gandhi
Douglas Gene Hager
Christopher Harder
Jerry Michael Harris
Kuo Ting Ho
Ahmed Atef Rashed
Michael Vincent Russo
John George Sherstobitoff
James Eric Skjelbreia
Costas Emmanuel Synolakis
Catharine L. van Ingen
Pey-yun Li
Bartholomew N. Locanthi III
Barry Bruce Megdal
Philip Malcolm Neches
Alexandros Christos Papachristidis
James Allely Rowson
Richard Lawrence Segal
Larry Dean Seiler
Gary Mario Tarolli
Alastair James Thompson
Stephen Mathias Trimberger
Michael Karl Ullner
Lawrence Allan White
Telle Elizabeth Whitney
Kwang-I Yu
Kwok Kee Ho
Kuan-Hsiung Hsieh
Shi-Ping Hsu
Joseph Katz
Michael Joseph Kavaya
Conor Francis Kehoe
David Louis Keller
Vijaya Narayan Korwar
Albert Yau Yee Lam
Billy Ying Bui Lau
Kam-Yin Lau
Bosco Hok-Chung Leung
Bruce Stephen Levine
Shawn Michael Logan
Paul Henry Milenkovic
Patrick Bartholomew Moran
Phyllis Roberta Nelson
Khai D. T. Ngo
Elliot Martin Pines
William Michael Polivka
Arati Prabhakar
Keith Gerard Regan
Loman Rensink
Wayne Harvey Richardson
William Allen Salter
Martine Marie Francoise Savalle
Pierre Schnoeller
Edgard Roger Schweig
Linda Ann Seltzer
Ralph Eric Strong
John Edward Tanner
Allen Eric Tracht
Bor-Yeu Tsaur
Paul William Tuinega

Engineering Science
Rob Bonney
Michael Jiu-Wei Chen
Jean-Luc Cornet
Peter Kent Edberg
K. Jeffrey Eriksen
Carol Leslie Frand
Nam Quan Huyn
Michael Yih-Hwa Jin

Environmental Engineering Science
Lisa Anderson
Martha Harriet Conklin
Deanna Sherry Dean
Jesus Moria De La Garza Rodriquez
Bruce Charles Faust
Tomas Michael Fitzpatrick
Harry Andrew Gray
James Evan Houseworth
James Robert Hunt
Steven Wayne Johnston
Tony Siu Pong Kong
James Shigeru Kuwabara
Howard Michael Liljestrand
Gregory John McRae

Materials Science
Paul Baxter Harwood

Mechanical Engineering
Paul Mihran Agbabian
MD Khairul Alam
Jean-Luc Raphael Aschard
Richard Bartlett Ashman
Elias Awad
Katherine Hamilton Barhydt
Robert Bernier
Roland Louis Bouchard
David Miner Braisted
Charles Soutter Campbell
Antonio Carreón Carpio
Baki Mehmet Cetegen
Dimitri S. Chamieh
Albert Lee Charles
Javier Gutierrez Chavez
Wen-Wei Chiang
Andre Colpart
Martine Paule Galand
Francois Jean Gondoin

Vatche Vorperian
Kadri Vural
Thierry Lucien Watteyne
Barton Zwiebach

Alan Stewart Katz
Boris Kharag
Larry Douglas Koffman
Daniel Margoliash
Ronald Benjamin Melton
Gerard Nihous
Helene R. Schember

James Richard Ouimette
Jean Michel Roques
Stanley Paul Sander
Connie Lynn Senior
Wayne Waldrip Simmons
Tracy Marie Stigers
Alan Thomas Stone
Windsor Sung
Marco Giorgio Tellini
Eddy Hubert Paula Van Bouwel
Jed Michael Waldman
Leighton Gec Mung Wong
James Robert Young

William A. Greene
Burnett Deloney Gunter
Shawn Anthony Hall
Daniel Connell Haworth
Jean-Marc Claude Henry
Gregory Scott Hoffman
Douglas Kerry Ikemi
Belgacem Jery
Ann Renee Karagozian
Joseph Katz
William Gerard Kerschen
Douglas Harold Klein
Dung Quang Le
Francois Le Clerc de Bussy
Itzhak Levit
Edmond Yatman Lo
Eric Francois Matthys
Michel Muszynski
Tanh Van Nguyen
Division of Geological and Planetary Sciences

Barclay Kamb, Chairman
Donald S. Burnett, Academic Officer
Don L. Anderson, Director, Seismological Laboratory

Professors Emeriti

C. Hewitt Dix, Ph.D. ........................................ Geophysics
Charles F. Richter, Ph.D. ................................... Seismology
Robert P. Sharp, Ph.D. ...................................... Geology

Professors

Thomas J. Ahrens, Ph.D. ..................................... Geophysics
Arden L. Albee, Ph.D. ....................................... Geology
Clarence R. Allen, Ph.D. .................................. Geology and Geophysics
Don L. Anderson, Ph.D. ..................................... Geophysics
Donald S. Burnett, Ph.D. .................................. Nuclear Geochemistry
Samuel Epstein, Ph.D. ....................................... Geochemistry
Peter Goldreich, Ph.D. ...................................... Planetary Science and Astronomy
David G. Harkrider, Ph.D. .................................. Geophysics
Andrew P. Ingersoll, Ph.D. ................................ Planetary Science
Barclay Kamb, Ph.D. ......................................... Geology and Geophysics
Hiroo Kanamori, Ph.D. ..................................... Geophysics
Heinz A. Lowenstam, Ph.D. ................................ Paleocology
Duane O. Muhleman, Ph.D. ................................. Planetary Science
Bruce C. Murray, Ph.D. ..................................... Planetary Science
Eugene M. Shoemaker, Ph.D., Sc.D. ....................... Geology
Leon T. Silver, Ph.D. ....................................... Geology
Hugh P. Taylor, Jr., Ph.D. ................................. Geology
Gerald J. Wasserburg, Ph.D. ................................ Geology and Geophysics
James A. Westphal, B.S. ................................... Planetary Science

Visiting Professors

Bruce W. Chappell, Ph.D. .................................. Geology
C. Bernard Farmer, Ph.D. .................................. Planetary Science
John A. Larimer, Ph.D. ..................................... Geochemistry
Ralphe Wiggins, Ph.D. ..................................... Geophysics
Senior Research Associate

Clair C. Patterson, Ph.D. .................................................. Geochemistry

Associate Professors

Donald V. Helmberger, Ph.D. ........................................ Geophysics
George R. Rossman, Ph.D. .............................................. Mineralogy
Jason Saleeby, Ph.D. ..................................................... Geology

Research Associates

Richard M. Goldstein, Ph.D. ........................................... Planetary Science
John C. Huncke, M.S. ..................................................... Geochemistry
Dimitri A. Papanastassiou, Ph.D. ................................. Geochemistry

Visiting Associates

Georg Amthauer, Ph.D. ................................................... Mineralogy
Donald E. Brownlee, Ph.D. .......................................... Geochemistry
Giuseppe Colombo, Ph.D. .......................................... Planetary Science
Edward S. Gaffney, Ph.D. ........................................ Geophysics
David M. Hadley, Ph.D. ........................................ Geophysics
Thomas H. Heaton, Ph.D. ........................................ Geophysics
Tracy Johnson, Ph.D. ................................................ Geophysics
Sergei F. Karpenko, Ph.D. ........................................ Geochemistry
Osamu Matsubaya, Ph.D. ........................................ Geochemistry
Susumu Nohda, Ph.D. ................................................ Geochemistry
John D. O'Keefe, Ph.D. .............................................. Planetary Science
Christine A. Powell, Ph.D. ........................................ Geochemistry
James F. Scheimer, Ph.D. ........................................ Geophysics
Dorothy S. Woolum, Ph.D. ........................................ Geochemistry

Assistant Professors

Jean-Bernard H. Minster, Ph.D. ..................................... Geophysics
Kerry E. Sieh, Ph.D. .................................................. Geology
Edward M. Stolper, Ph.D. ........................................ Geology
Yuk L. Yung, Ph.D. ..................................................... Planetary Science

Visiting Assistant Professor

Timothy L. Grove, Ph.D. .............................................. Geology

Senior Research Fellows

Richard H. Becker, Ph.D. ........................................ Geochemistry
Hermann F. Engelhardt, Ph.D. ..................................... Geophysics
Karen C. McNally, Ph.D. ........................................ Geophysics
John T. Trauger, Ph.D. ............................................. Planetary Science

Lecturer

David T. Burhans, Ph.D. .............................................. Speech Communication
Research Fellows

Mark Allen, Ph.D. ................................................................. Planetary Science
Michel Cara, Ph.D. ............................................................. Geochemistry
Shuji Deguchi, Ph.D. .......................................................... Planetary Science
Joel E. Everson, Ph.D. ......................................................... Geochemistry
Kazuya Fujita, Ph.D. ............................................................ Geophysics
Marian J. Furst, Ph.D. .......................................................... Geochemistry
Stephen H. Hartzell, Ph.D. .................................................... Geophysics
Tai-Lin Hong, Ph.D. ............................................................. Geophysics
Thomas Kaiser, Ph.D. .......................................................... Geochemistry
Louise Levien, Ph.D. ............................................................. Geology
Barry R. Liener, Ph.D. .......................................................... Geophysics
Kon-Kee Liu, Ph.D. ............................................................... Geochemistry
George Mellman, Ph.D. ......................................................... Geophysics
Franz R. Niederer, Ph.D. ....................................................... Geochemistry
Arthur Raefsky, Ph.D. .......................................................... Geochemistry
Malcolm R. Somerville, Ph.D. .............................................. Geophysics
Ute R. Vetter, Ph.D. ............................................................... Geophysics
Ian S. Williams, Ph.D. .......................................................... Geology

Members of the Professional Staff

Arthur A. Chodos, M.S., Senior Research Spectroscopist
Glenn L. Berge, Ph.D., Senior Scientist

Graduate Students, 1979-80

Applied Physics
Mark Bruce Boslough
Gregory Allen Lyzenga

Geochemistry
Timothy Miller Benjamin
Robert Everett Criss
John Hume Jones
Crayton Jeffery Yapp

Geology
Roger Deane Aines
Stein Bjornar Jacobsen
David Wayne Beaty
Raymond Francois Jeanloz
Lawrence Richard Bernstein
Gary Michael Kolbasuk
Melinda Mary Brugman
Manfred Adolf Lange
Duane Edwin Champion
Peter Brennan Larson
Josephine Beatrice Cimino
Thorne Lay
James Louis Conca
Ronan Le Bras
Rosemarie Cubba
Richard Edwin Lewis, Jr.
Charles Brown Douthitt
Stephanie Margaret Mattison
Keith Alan Echelmeyer
Malcolm Thomas McCulloch
Lucien Froudevaux
Amy Chihang Ng
Alan Reed Gillespie
Donald Wallace Northfelt
George Randall Gladstone
Quinn R. Passey
Robert Theodore Gregory
Donald John Piepgras
Thomas Martin Hearn
Robert Edward Powell
Robert Ian Hill
James Edward Quick
Sally Miranda Rigden Hill
Francois Michel Robert
Eugene Drake Humphreys
Karen Irene Robinson
Staff of Instruction and Research

David Bruce Sams
Christopher O'Neill Sanders
Gregory Brian Scott
Henry Francis Shaw
George Cleve Solomon
Elizabeth Anne Thomas

Geophysics
Eric Paul Chael
John Joseph Cipar
Stephen Norfleet Cohn
David Martin Cole
Edward J. Corbett
Christopher Thomas Creaven
John Edward Ebel
Holly K. Eissler
Anthony Lee Endres
Jeffrey Wayne Given

Planetary Science
Robert Todd S. Clancy
David Clifford Jewitt
Michael Alan Kroupa
William Beall McKinnon
David Abbey Paige, Jr.

Marios Simon Vassiliou
Joana Marija Vizgirda
Marianne Carol Walck
Terry Charles Wallace, Jr.
Ray James Weldon II

Stephen Pierre Grand
Bruce Martin Jakosky
Richard Paul Keller
Hsui-Lin Liu
Kristian Erik Meisling
James Christopher Pechmann
Larry John Ruff
Patricia Frances Scott
Gordon Selbie Stewart
Daniel Wenkert

Judith Ann Pechmann
Carolyn C. Porco
Maritza Irene Stapanian
Michael Earl Summers

Division of the Humanities and Social Sciences

Roger G. Noll, Chairman
David M. Grether, Executive Officer
Daniel J. Kevles, Executive Officer

Professors Emeriti

Paul Bowerman, A.M. ........................................ Modern Languages
Hallett D. Smith, Ph.D., L.H.D. ................................. English
Alfred Stern, Ph.D. .............................................. Philosophy
Alan R. Sweezy, Ph.D. ........................................... Economics
Ray E. Untereiner, Ph.D., J.D. ................................. Economics

Lecturer Emeritus

Charles Newton, Ph.B. ........................................ English

Professors

Robert H. Bates, Ph.D. ........................................ Political Science
John F. Benton, Ph.D. .......................................... History
J. Kent Clark, Ph.D. ............................................ English
Lance E. Davis, Ph.D. .......................................... Economics
David C. Elliot, Ph.D. .......................................... History
Peter W. Fay, Ph.D. ............................................ History
John A. Ferejohn, Ph.D. ....................................... Political Science
Morris P. Fiorina, Ph.D. ................................................. Political Science
Michael J. Graetz, LL.B. ................................................. Law and Social Science
David M. Grether, Ph.D. ................................................. Economics
William T. Jones, Ph.D. ................................................. Philosophy
Daniel J. Kevles, Ph.D. ................................................. Economics
Burton H. Klein, Ph.D. ................................................. History
J. Morgan Kousser, Ph.D. ................................................. History
Michael E. Levine, J.D ..................................................... Luce Professor of Law and Social Change
Oscar Mandel, Ph.D. ..................................................... English
George P. Mayhew, Ph.D. ................................................. English
Richard D. McKelvey, Ph.D. ............................................. Political Science
Edwin S. Munger, Ph.D. ................................................. Geography
Roger G. Noll, Ph.D. .................................................... Economics
Robert W. Oliver, Ph.D. ................................................. Economics
Rodman W. Paul, Ph.D. ................................................. Edward S. Harkness Professor of History
Charles R. Plott, Ph.D. ................................................. Economics
James P. Quirk, Ph.D. 1 .................................................. Economics
Robert A. Rosenstone, Ph.D. ............................................. History
Thayer Scudder, Ph.D. ................................................... Anthropology
Eleanor M. Searle, Ph.D. .................................................. History
Frederick B. Thompson, Ph.D. ...................................... Applied Philosophy and Computer Science

Sherman Fairchild Distinguished Scholars

Theodore W. Anderson, Ph.D. ........................................... Economics and Statistics
G. S. Maddala, Ph.D. .................................................... Economics

Visiting Professors

Saul Bellow, B.A. ......................................................... Dreyfuss Professor of Humanities
Steven A. Lippman, Ph.D. .............................................. Business Economics
Alan Schwartz, LL.B. .................................................... Law and Social Science

Associate Professors

Louis Breger, Ph.D. ...................................................... Psychology
Heinz E. Ellersieck, Ph.D. .............................................. History
Stuart A. Ende, Ph.D. .................................................... English
Jenjoy La Belle, Ph.D. ................................................... English
David R. Smith, Ph.D. ................................................... English
Louis L. Wilde, Ph.D. .................................................... Economics

Visiting Associate Professor

James S. Jordan, Jr., Ph.D. ............................................ Economics

Research Associates

R. Talbot Page, Ph.D. ................................................... Economics
Bozena Henisz-Dostert Thompson, Ph.D. ................................ Linguistics

1 Leave of absence
2 Part time
Visiting Associates
Edward J. Green, Ph.D. .................................................. Economics
Nancy Hayles, Ph.D. .................................................. English
Hans-Jörn Kruse, Dr. rer. pol. ........................................... Economics
Edward W. Packel, Ph.D. .................................................. Political Science

Assistant Professors
Kim Border, Ph.D. .................................................. Economics
Bruce E. Cain, Ph.D. .................................................. Political Science
Robert Forsythe, Ph.D. .................................................. Economics
David W. Galenson, Ph.D. ............................................. Social Science and History
D. Roderick Kiewiet, Ph.D. ........................................... Political Science
Forrest D. Nelson, Ph.D. .................................................. Economics
George W. Pigman III, Ph.D. ........................................... English
Jennifer F. Reinganum, Ph.D. ........................................ Economics
Randolph N. Splitter, Ph.D. ............................................ English

Visiting Assistant Professor
David DeLeon, Ph.D. .................................................. History

Mellon Postdoctoral Instructors
Gordon Appleby, Ph.D. .................................................. Anthropology
Terrence J. McDonald, Ph.D. ........................................... History

Instructors
David W. Burchmore, Ph.D. ........................................... English
Nicholas B. Dirks, Ph.D. .................................................. History

Lecturers
Andreas Aebi, Ph.D. .................................................. German
Irving S. Bengelsdorf, Ph.D. ........................................... Science Communication
David J. Britton, D.M.A. .................................................. Music
Lee F. Browne, M.S. .................................................. Education
Klara Carmely, Ph.D. .................................................. German
Clayton Eshleman, M.A.T. ............................................. Dreyfuss Poet in Residence and Lecturer in Creative Writing
Barbara Fass, Ph.D. .................................................. Psychology
Brady Lee Garrison, M.A. .................................................. Debate
Sonia Ghattas, Ph.D. .................................................. French
Stirling L. Huntley, Ph.D. .................................................. Drama
Edward Hutchings, Jr., B.A. ........................................... Journalism
Sigrid R. McPherson, Ph.D. ........................................... Psychology
David W. Morrisroe, M.B.A. ........................................... Business Economics
Jon R. Pariser, M.A. .................................................. Russian
Aimée Brown Price, Ph.D. ............................................. Art History
Harihar Rao .................................................. Music
Amé C. Rose, M.A. .................................................. History
Elma Schonbach, B.M. .................................................. Music
Annette J. Smith, Ph.D. .................................................. French
Victor V. Veysey, M.B.A. ............................................. Business Economics and Industrial Relations
Robert R. Wark, Ph.D. .................................................. Art
Valentina Zaydman, M.A. .................................................. Russian

1Part-time
Research Fellow

George Fox, Ph.D. ......................................................... Economics

Graduate Students 1979-80

Social Science
Joel Abe Balbien
Michael Stanley Becker
Donna Hope Berry
Isabelle Roux-Buisson
Randall Lee Calvert
Cynthia Rae Carlston
Gary Walter Cox
James Michael Gerard
Robert William Hahn
Steven Wayne Hashimoto
James Takfay Hong
Robert Mark Isaac
Jeffrey Bowman Johnson
Julie Marie Laherty
Carl J. Lydick

Mathew Daniel McCubbins
Kenneth Frank McCue
Thomas Rossman Palfrey III
Asha Bhalachandra Paranjape
William Paul Rogerson
Venkatraman Sadanand
John Patrick Schmitz
Stephen Richard Selinger
Charles Seymour Slater
Lee Ira Sparling
Shin-Ichi Takekuma
Howard Alan Tarre
Paul Arthur Thomas
John Marshall Williamson

Division of Physics, Mathematics and Astronomy

Rochus E. Vogt, Chairman
Robert L. Walker, Executive Officer for Physics
W. A. J. Luxemburg, Executive Officer for Mathematics
W. L. W. Sargent, Executive Officer for Astronomy

Board of Trustees Professor Emeritus

Carl D. Anderson, Ph.D., Sc.D., LL.D., Nobel Laureate ................. Physics

Professors Emeriti

Robert F. Bacher, Ph.D., Sc.D., LL.D. .................................. Physics
H. F. Bohnenblust, Ph.D. .................................................. Mathematics
H. Victor Neher, Ph.D., Sc.D. ............................................. Physics
William R. Smythe, Ph.D. ................................................. Physics
Olga Taussky Todd, Ph.D. ................................................... Mathematics

Professors

Tom M. Apostol, Ph.D. ..................................................... Mathematics
Michael Aschbacher, Ph.D. ................................................ Mathematics
Barry C. Barish, Ph.D. ..................................................... Physics
Charles A. Barnes, Ph.D. .................................................. Physics
Roger G. Blandford, Ph.D. ................................................ Theoretical Astrophysics
Felix H. Boehm, Ph.D. ....................................................... Physics
Robert F. Christy, Ph.D. .................................................... Theoretical Physics
Donald S. Cohen, Ph.D. ................................................... Applied Mathematics
Marshall H. Cohen, Ph.D. .................................................. Radio Astronomy
Eugene W. Cowan, Ph.D. ................................................... Physics
Leverett Davis, Jr., Ph.D. .................................................. Physics
Richard A. Dean, Ph.D. .................................................... Mathematics

1Leave of absence, first term, 1979-80
Staff of Instruction and Research

Charles R. De Prima, Ph.D. ........................................ Mathematics
Robert P. Dilworth, Ph.D. ........................................ Mathematics
Ronald W. P. Drever, Ph.D. ....................................... Physics
Richard P. Feynman, Ph.D., Nobel Laureate ........................ Richard Chace Tolman
.................................................. Professor of Theoretical Physics
William A. Fowler, Ph.D., D.Sc. .................................. Institute Professor of Physics
Steven C. Frautschi, Ph.D. .......................................... Theoretical Physics
F. Brock Fuller, Ph.D. ............................................... Mathematics
Gordon P. Garmire, Ph.D. ........................................... Physics
Murray Gell-Mann, Ph.D., Sc.D., Nobel Laureate 1 ............ Robert Andrews Millikan
.................................................. Professor of Theoretical Physics
Marvin L. Goldberger, Ph.D. ........................................ Physics
Peter Goldreich, Ph.D. ............................................. Planetary Science and Astronomy
Ricardo Gomez, Ph.D. ................................................ Physics
David L. Goodstein, Ph.D. .......................................... Physics and Applied Physics
Jesse L. Greenstein, Ph.D. .......................................... Lee A. DuBridge Professor of Astrophysics
James E. Gunn, Ph.D. ................................................... Astronomy
Marshall Hall, Jr., Ph.D. ........................................... IBM Professor of Mathematics
Ralph W. Kavanagh, Ph.D. .......................................... Physics
Herbert B. Keller, Ph.D. 1 ........................................ Applied Mathematics
Heinz-Otto Kreiss, Docent .............................................. Applied Mathematics
Robert B. Leighton, Ph.D. ........................................... Physics
Gary Lorden, Ph.D. ................................................... Mathematics
W. A. J. Luxemburg, Ph.D. .......................................... Mathematics
Jon Mathews, Ph.D. 1 ................................................ Theoretical Physics
James E. Mercerseau, Ph.D., D.Sc. ................................... Physics and Applied Physics
Alan T. Moffet, Ph.D. ................................................ Radio Astronomy
Gerry Neugebauer, Ph.D. ............................................. Physics
J. Beverley Oke, Ph.D. .............................................. Astronomy
Charles W. Peck, Ph.D. ............................................... Physics
Jerome Pine, Ph.D. ..................................................... Physics
H. David Politzer, Ph.D. ............................................. Theoretical Physics
Herbert J. Ryser, Ph.D. ............................................... Mathematics
Wallace L. W. Sargent, Ph.D. ......................................... Astronomy
Maarten Schmidt, Ph.D., Sc.D. ................................... Astronomy
Frank J. Sciulli, Ph.D. ............................................... Physics
Edward C. Stone, Jr., Ph.D. ........................................ Physics
Kip S. Thorne, Ph.D. .................................................. Theoretical Physics
John Todd, B.Sc. ....................................................... Mathematics
Thomas A. Tombrello, Jr., Ph.D. ...................................... Physics
Rochus E. Vogt, Ph.D. ................................................ Physics
David B. Wales, Ph.D. ................................................ Mathematics
Robert L. Walker, Ph.D. ............................................. Physics
Alan Weinstein, Ph.D. ................................................ Mathematics
Ward Whaling, Ph.D. ................................................... Physics
Gerald B. Whitham, Ph.D. ............................................. Applied Mathematics
Fredrik Zachariasen, Ph.D. ....................................... Theoretical Physics
Harold Zirin, Ph.D. .................................................... Astrophysics
George Zweig, Ph.D. .................................................. Theoretical Physics

Sherman Fairchild Distinguished Scholars

Alexandra Bellow, Ph.D. ........................................ Mathematics
Irving Kaplansky, Ph.D. ........................................ Mathematics

1Leave of absence, 1979-80
<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyman Spitzer, Ph.D.</td>
<td></td>
<td>Astronomy</td>
</tr>
<tr>
<td>Valentine Telegdi, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>John Thompson, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td><strong>Visiting Distinguished Scholar</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruno Zumino, Ph.D.</td>
<td></td>
<td>Theoretical Physics</td>
</tr>
<tr>
<td><strong>Visiting Professors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benno Fuchssteiner, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td>N. G. de Bruijn, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td>James G. Wendel, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td><strong>Associate Professors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Judith G. Cohen, Ph.D.</td>
<td></td>
<td>Astronomy</td>
</tr>
<tr>
<td>Geoffrey Fox, Ph.D.</td>
<td></td>
<td>Theoretical Physics</td>
</tr>
<tr>
<td>David Hitlin, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Alexander S. Kechris, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td>Steven E. Koonin, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Peter G. Wannier, Ph.D.</td>
<td></td>
<td>Radio Astronomy</td>
</tr>
<tr>
<td><strong>Visiting Associate Professor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael J. Collins, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td><strong>Research Associates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Richard D. Field, Ph.D.</td>
<td></td>
<td>Theoretical Physics</td>
</tr>
<tr>
<td>Richard J. Powers, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Pierre Ramond, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Anthony C. S. Readhead, Ph.D.</td>
<td></td>
<td>Radio Astronomy</td>
</tr>
<tr>
<td>John H. Schwarz, Ph.D.</td>
<td></td>
<td>Theoretical Physics</td>
</tr>
<tr>
<td>George A. Seielstad, Ph.D.</td>
<td></td>
<td>Radio Astronomy</td>
</tr>
<tr>
<td>Petr Vogel, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td><strong>Visiting Associates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daniel Bix, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Ronald J. Crowley, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Ebbel de Jonge, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td>David Garelick, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Sylvester J. Gates, Ph.D.</td>
<td></td>
<td>Theoretical Physics</td>
</tr>
<tr>
<td>Leonid P. Grishchuk, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Albert J. Howard, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Sir Fred Hoyle, D.Sc.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Ardon Hyland, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Denis Johnson, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td>Joseph B. Krieger, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Paul S. Lee, Ph.D.</td>
<td></td>
<td>Physics</td>
</tr>
<tr>
<td>Thomas G. Phillips, Ph.D.</td>
<td></td>
<td>Radio Astronomy</td>
</tr>
<tr>
<td>Charles Rockland, Ph.D.</td>
<td></td>
<td>Mathematics</td>
</tr>
</tbody>
</table>

1Richard Chace Tolman Research Associate
P. G. Rooney, Ph.D. ........................................... Mathematics
Mark H. Shapiro, Ph.D. ....................................... Physics
Armando Silva Moreira, Ph.D. ......................... Physics
James H. Trainor, Ph.D. ................................... Physics

Assistant Professors

Jack F. Conn, Ph.D. ........................................ Mathematics
Eric J. Siskind, Ph.D. ........................................ Physics
Peter Young, Ph.D. ........................................... Astronomy

Senior Research Fellows

G. John Dick, Ph.D. .......................................... Applied Physics
Alan M. Dressler, Ph.D. ...................................... Astronomy
Richard Ellis, Ph.D. ......................................... Theoretical Physics
Thomas R. Geballe, Ph.D. .................................. Astronomy
Terrance J. Goldman, Ph.D. ............................. Theoretical Physics
Gillian Knapp, Ph.D. ......................................... Radio Astronomy
Kwok-Yung Lo, Ph.D. ........................................ Radio Astronomy
Kenneth Marsh, Ph.D. ....................................... Astrophysics
Richard A. Mewaldt, Ph.D. .............................. Physics
Ronald L. Moore, Ph.D. ..................................... Astrophysics
Douglas Ross, Ph.D. ........................................ Theoretical Physics
I-Juliana Sackmann, Ph.D. ............................... Physics
Michael Shaevitz, Ph.D. ................................... Physics
B. Thomas Soifer, Ph.D. .................................. Physics

Instructors

Michael J. Hoffman, Ph.D. ............................... Mathematics
A. J. Janssen, Ph.D. ........................................ Mathematics
Richard P. Morton, Ph.D. ............................... Mathematics
Robert Roth, Ph.D. .......................................... Mathematics
Anton R. Schep, Ph.D. ..................................... Mathematics
William A. Squires, Ph.D. ............................... Mathematics
Neculai S. Teleman, Ph.D. ............................... Mathematics

Research Fellows

Thomas B. Ake III, Ph.D. .................................. Astronomy
Yoram Alhassid, Ph.D. ..................................... Physics
Charles Beichman, Ph.D. .................................. Physics
William Bieber, Ph.D. ..................................... Physics
Eric Bovet, Ph.D. ........................................... Physics
Carlton M. Caves, Ph.D. .................................. Physics
Brian L. Combridge, Ph.D. .............................. Physics
France A. Cordova, Ph.D. ............................... Physics
Peter Cottrell, Ph.D. .......................................... Astronomy
Joseph Cugnon, Ph.D. ..................................... Physics
William M. DeCampli, Ph.D. ....................... Astrophysics
K. R. Sandhya Devi, Ph.D. .............................. Physics

1Harry Bateman Research Instructor
2Chaim Weizmann Research Fellow
Jean O. Dickey, Ph.D. ....................................................... Physics
Joseph E. Griffith, Ph.D. ................................................... Physics
Frank P. Israel, Ph.D. ..................................................... Radio Astronomy
Rosemary G. Kennett, Ph.D. ............................................... Physics
Edward W. Kolb, Ph.D. .................................................... Physics
Bahram Mashhoon, Ph.D. .................................................. Physics
Colin R. Masson, Ph.D. .................................................... Radio Astronomy
David L. Meier, Ph.D. ...................................................... Physics
Robert L. Messner, Ph.D. .................................................. Physics
Stefan Mochnacki, Ph.D. .................................................. Astronomy
John A. Nousek, Ph.D. ..................................................... Physics
Bruce M. Paine, Ph.D. ..................................................... Physics
David G. Payne, Ph.D. ..................................................... Theoretical Astrophysics
Timothy J. Pearson, Ph.D. .................................................. Radio Astronomy
Frank C. Porter, Ph.D. ..................................................... Physics
Thomas A. Prince, Ph.D. ................................................... Physics
David G. Sandler, Ph.D. ................................................... Physics
Anneila Sargent, Ph.D. .................................................... Astronomy
Jean Thierry-Mieg, Ph.D. .................................................. Theoretical Physics
David L. Tubbs, Ph.D. ..................................................... Physics
Stephen Unwin, Ph.D. ..................................................... Radio Astronomy
R. Craig Walker, Ph.D. ..................................................... Radio Astronomy
Keh-Chung Wang, Ph.D. .................................................... Physics
Stephen V. Weber, Ph.D. ................................................... Astrophysics
Alwyn Wooten, Ph.D. ..................................................... Radio Astronomy
Alice Wu, Ph.D. ............................................................ Physics
Cosmas Zachos, Ph.D. ..................................................... Theoretical Physics
John L. Zyskind, Ph.D. .................................................... Physics

Members of the Professional Staff

Martin S. Ewing, Senior Research Engineer
Herbert E. Henrikson, Senior Design Engineer
Keith Matthews, Scientist
Richard B. Read, Senior Engineer
Donald Skelton, Engineer
Barbara A. Zimmerman, Computing Analyst

Graduate Students 1979-80

Applied Mathematics
David Leslie Brown
Elizabeth Ann Crooks
Bernard Joseph Deppmeier
John Alan Fawcett
Thomas M. Hagstrom
Uli Manfred Huener
Fai Ma
George Joseph Majda
John Weidman McLean

David Joseph Perozzi
Michael D. Prendergast
Douglas Alan Reinelt
Luis Guillermo Maria Reyna
Leonid Rudin
Saleh Ahmed Tanveer
Daniel Herbert Turnbull
Daniel Ian Zwillinger

1Chaim Weizmann Research Fellow
**Astronomy**
Graham Berriman  
John Anthony Biretta  
Kirk Daniel Borne  
Alexei Vladimir Filipenko  
Boris Gokham  
John Greg Hoessl  
Keith Douglas Horne  
Stephen Matthew Kent  
Stephen Morris Lichten  
Roger Paul Linfield  
Thomas Glenn Lockhart

**Mathematics**
Richard Paul Anstee  
Gary Ray Becker  
Stuart Lynch Blackburn  
Arthur Robert Calderbank  
Leslie Joseph Deutsch  
Jeffrey Lee Fordon  
Philip James Hanlon  
Dean Robert Hart  
Ralph Elwood Howard  
Michael David Huffman

**Physics**
Timothy James Alleman  
Hideaki Aoyama  
Gregory John Ball  
Alan Voltz Barnes  
Howard Louis Berg  
Robert Eugene Blair  
Anthony Michael Bloch  
Norman Boboff  
Hugh Herbert Breneman  
Richard Laurence Brenner  
Eugene David Brooks III  
Kay Wyatt Brown  
Nestor Felipe Caticha-Alfonso  
Ariel Caticha  
Yia-chung Chang  
Yam Ki Chu  
Joseph Stevens Clapp  
Christopher Alan Cole  
Walter Richardson Cook  
Barbara Hope Cooper  
Brian Ronald Davis  
Murray Scot Daw  
Eva Maria Dohrn  
Mark F. Dumke  
Charles David Edwards, Jr.  
David James Ennis  
Mark Harold Finger  
Richard Alan Flammang  
Bradley Arnold Flanders

Matthew Arnold Malkan  
Jeffrey Ross Pier  
Douglas Mark Rabin  
Russell Ormond Redman  
Abhijit Saha  
Donald Patrick Schneider  
William Lawrence Sebok  
Richard Stanley Simon  
Richard Alan Wade  
Howard Kwong Chew Yee

Reiner Josef Kallenborn  
Ilias George Kastanas  
Hong-Chuan Lin  
Bruce Michael Ian Rands  
Geoffrey Raymond Robinson  
Subhash Sharma  
Gregory Paul Tollisen  
Igor Mikolic-Torreira  
Frans Gerhardus Johannes Wild  
John Charles Wolfskill

Michael David Poote  
Patrick Michael Frantz  
George Michael Fuller  
Cornelius Adolf Gehrels  
James Lawrence Gimlett  
Mark Golomb  
Jeffrey Mark Greif  
Rajan Gupta  
Yekta Gursel  
Craig Warren Gustafson  
Jeffrey John Hamilton  
Michael David Hamrick  
Jeffrey Alan Harvey  
Robert Lee Hatch  
Jay Hauser  
Lowell Eugene Hazelton  
William Donald Hazelton  
Mark Hereld  
Andrew Thompson Hunter  
Kenneth Alan Jensen  
Sarbmeet Singh Kanwal  
Rosemary Gillian Keminett  
Jaisam Kim  
Jeffrey George Koller  
Arieh Konigl  
Dale Edward Koop  
Keith E. Krombel  
Heemin Kwon  
Nai-Hang Kwong
Owens Valley Radio Observatory
Staff Members

Alan T. Moffet, Director

Glenn L. Berge, Ph.D.
Marshall H. Cohen, Ph.D.
Martin S. Ewing, Ph.D.
Gillian R. Knapp, Ph.D.
Robert B. Leighton, Ph.D.
Alan T. Moffet, Ph.D.

Duane O. Muhleman, Ph.D.
Thomas G. Phillips, Ph.D.
Richard B. Read, Ph.D.
Wallace L. W. Sargent, Ph.D.
George A. Seielstad, Ph.D.
Peter Wannier, Ph.D.
Sherman Fairchild Distinguished Scholars

1978-79

Seymour Jonathan Singer, Ph.D.
Professor of Biology, University of California, San Diego

1979-80

Theodore W. Anderson, Ph.D.
Professor of Statistics and Economics, Stanford University
Alexandra Bellow, Ph.D.
Professor of Mathematics, Northwestern University
Julian D. Cole, Ph.D.
Professor of Engineering and Mathematics, School of Engineering and Applied Science,
University of California, Los Angeles
William Hayes, Sc.D.
Professor of Genetics, The Australian National University
Horst Hoffmann, Habil.
Head of the Physics Department, University of Regensburg
Fritz John, Ph.D.
Professor, Courant Institute of Mathematical Sciences, New York University
Irving Kaplansky, Ph.D.
George Herbert Mead Distinguished Service Professor, Department of Mathematics,
The University of Chicago
Robert P. Kraft, Ph.D.
Professor and Astronomer, Lick Observatory, University of California, Santa Cruz;
Chairman, Board of Studies in Astronomy and Astrophysics
William R. Levick, M.Sc.
Professorial Fellow in Physiology, The John Curtin School of Medical Research, the Aus­
tralian National University
G. S. Maddala, Ph.D.
Graduate Research Professor of Economics, University of Florida
Peter A. G. Scheuer, Ph.D.
Assistant Director of Research in Physics, Cavendish Laboratory,
University of Cambridge
Lyman Spitzer, Ph.D., D.Sc., LL.D.
Professor of Astronomy, Princeton University
Valentine L. Telegdi, Ph.D.
Professor of Physics, The University of Chicago
John G. Thompson, Ph.D.
Rouse Ball Professor of Mathematics, University of Cambridge
F. Xavier Wilhelm, Ph.D.
Head of Research, National Center for Scientific Research, Institute of Molecular
and Cellular Biology (Strasbourg)
Athletics and Physical Education

Warren G. Emery, M.S., Director of Athletics and Physical Education

Full-Time Staff

Bob Davies, M.S.
E. Leroy Neal, M.A.
Edward T. Preisler, B.A.
Edwin Spencer, B.S.

Part-Time Staff

David E. Beck, B.A.
Dean G. Bond, B.A.
Donald R. Cameron, B.Sc.
Harold G. Cassriel, B.S.
John L. Lamb
George Clovis
Elizabeth Oberstein, M.A.
Donald R. Cameron,
B.Sc.
Harold G. Cassriel,
B.S.
George Clovis
E. Leroy Neal, M.A.

Athletic Council

The intercollegiate athletic program is under the supervision of the Athletic Council, which consists of representatives of the faculty, the Associated Students of the California Institute of Technology (ASCIT), and the alumni of the Institute.

Willis H. Booth Computing Center

Charles B. Ray, Director
Kiku Matsumoto, Deputy Director

Staff Members

James V. Bys
Albert Fuwu Chang
Lucie E. Cofield
Joseph H. Dailey
James P. Elliott
Edith P. Huang
Michael D. Lackman
Robert S. Logan
Dallas W. Oller, Jr.
William C. Peterson
Donald D. Rintala
Hector R. Valdez
Kimo Yap
Dimitrios Zorbas

Environmental Quality Laboratory

Norman H. Brooks, Director

Staff Council

Norman H. Brooks, Chairman
Glen R. Cass¹
John Ferejohn¹
Richard C. Flagan
Leroy E. Hood
Robert C. Y. Koh
Lester Lees¹
E. John List¹
James J. Morgan
Roger G. Noll
R. Talbot Page
Charles R. Plott
James P. Quirk²
John H. Seinfeld¹
Frederick H. Shair
Leon T. Silver

¹Executive Committee
²On leave 1979-80
Research Staff

Norman H. Brooks, Director; James Irvine Professor of Environmental and Civil Engineering  
Glen R. Cass, Assistant Professor of Environmental Engineering  
John Ferejohn, Professor of Political Science  
Richard C. Flanagan, Assistant Professor of Environmental Engineering Science  
Robert E. Forsythe, Assistant Professor of Economics  
George Fox, Research Fellow in Economics  
Morton S. Isaacson, Research Engineer  
Robert C. Y. Koh, Research Associate in Environmental Engineering Science  
Lester Lees, Professor of Environmental Engineering Science and Aeronautics  
E. John List, Professor of Environmental Engineering Science  
Gregory J. McRae, Senior Research Engineer  
James J. Morgan, Professor and Executive Officer of Environmental Engineering Science  
Roger G. Noll, Professor of Economics; Chairman, Division of the Humanities and Social Sciences  
R. Talbot Page, Research Associate in Economics  
James P. Quirk, Professor of Economics  
Christian Seigneur, Research Fellow in Chemical Engineering  
John H. Seinfeld, Professor and Executive Officer of Chemical Engineering  
Frederick H. Shair, Professor of Chemical Engineering  
Brent D. Taylor, Senior Research Engineer, Member of the Professional Staff  
James W. Tilden, Senior Research Engineer  
Wade Wells, Hydrologist (on assignment to EQL by U.S. Forest Service)  
Louis L. Wilde, Assistant Professor of Economics  

Consultant

James E. Krier, Professor of Law, Stanford University

Graduate Students 1978-79

William Brownlie (Engineering)  
Robert Hahn (Social Science)  
Steven Hashimoto (Social Science)  
Mark Isaac (Social Science)  
Gregory McRae (Engineering)  
Thomas Palfrey (Social Science)  
Charles Slater (Social Science)

Hale Observatories

Operated jointly by the California Institute of Technology  
and the Carnegie Institution of Washington

Maarten Schmidt, Director

Observatory Committee

Halton C. Arp  
Gerry Neugebauer  
S. Eric Persson  
Allan R. Sandage  
Wallace L. W. Sargent  
Maarten Schmidt, Chairman  
James A. Westphal

Staff Members

Halton C. Arp, Ph.D.  
Horace W. Babcock, Ph.D., Sc.D.  
Judith G. Cohen, Ph.D.  
Jesse L. Greenstein, Ph.D.
James E. Gunn, Ph.D.
Robert F. Howard, Ph.D.
Jerome Kristian, Ph.D.
Robert B. Leighton, Ph.D.
Gerry Neugebauer, Ph.D.
J. Beverley Oke, Ph.D.
S. Eric Persson, Ph.D.
George W. Preston, Ph.D.
Allan R. Sandage, Ph.D., Sc.D., D.Sc., LL.D.

Wallace L. W. Sargent, Ph.D.
Maarten Schmidt, Ph.D., Sc.D.
Leonard Searle, Ph.D.
Stephen A. Shetman, Ph.D.
Arthur H. Vaughan, Ph.D.
James A. Westphal, B.S.
Peter J. Young, Ph.D.
Harold Zirin, Ph.D.

Robert J. Brucato, Ph.D.
Charles T. Kowal, B.S.
Jean J. Lorre, M.S.
Keith W. Matthews, M.S.

B. Thomas Soifer, Ph.D.
John T. Trauger, Ph.D.
Michael W. Werner, Ph.D.

Alan M. Dressler, Ph.D.
Thomas R. Geballe, Ph.D.

Ronald Moore, Ph.D.
Robert J. Zinn, Ph.D.

Thomas B. Ake III, Ph.D.
Peter L. Cottrell, Ph.D.
Gary S. Da Costa, Ph.D.
Debra M. Elmegreen, Ph.D.
Howard B. French, Ph.D.
Robert C. Kennicutt, Jr., Ph.D.

Barry J. LaBonte, Ph.D.
Stefan Mochnacki, Ph.D.
Jeremy R. Mould, Ph.D.
Annela I. Sargent, Ph.D.
Horace A. Smith, Ph.D.

Gregory Ketabgian, M.D. ........................................ Director of Health Services
Marlene Coleman, M.D. .......................................... Attending Physician
Barbara Fass, Ph.D. .............................................. Institute Psychologist
Judson James, M.D. .............................................. Attending Physician
Warren Jones, M.D. ............................................. Consulting Psychiatrist
Jack Lindheimer, M.D. .......................................... Consulting Psychiatrist
Haig Manjikian, M.D. ........................................... Attending Physician
Sigrid R. McPherson, Ph.D. .................................... Senior Institute Psychologist
Robert Drezner, Ph.D. ........................................... Institute Psychologist

Industrial Relations Center

Victor V. Veysey, M.B.A., Director, Industrial Relations Center;
Lecturer in Business Economics and Industrial Relations
Jet Propulsion Laboratory

Administered by Caltech for the National Aeronautics and Space Administration

Bruce C. Murray, Director
C. H. Terhune, Jr., Deputy Director

Advisory Council

Dr. Philip H. Abelson
Editor, Science

Dr. Arden Albee
Professor of Geology, Caltech; Chief Scientist, JPL

Mr. Norton Belknap
Senior Vice President, Exxon International Company

Mr. Walter Burke
Caltech Trustee, and President of Sherman Fairchild Foundation, Inc.

Dr. Lee A. DuBridge
President Emeritus, Caltech, and Life Trustee of Caltech

Dr. Eugene G. Fubini
E. G. Fubini Consultants, Ltd.

Mr. John Gardner
Chairman, President’s Commission on White House Fellowships, and Founding Chairman, Common Cause

Hon. Shirley Hufstedler
Caltech Trustee, and Circuit Judge, U.S. Court of Appeals

Dr. Barclay Kamb
Professor of Geology and Geophysics; Chairman of the Division of Geological and Planetary Sciences, Caltech

Dr. James J. Morgan
Professor of Environmental Engineering Science and Executive Officer, Environmental Engineering Science; Chairman of the Faculty, Caltech

Dr. Roger Noll
Professor of Economics and Chairman of the Division of the Humanities and Social Sciences, Caltech

Dr. Bernard M. Oliver
Vice President, Research and Development, Hewlett-Packard Company

Dr. Allen Peterson
Professor of Electrical Engineering and Co-Director, Stanford Center for Radar Astronomy, Stanford University

Dr. John R. Pierce
Professor of Engineering, Caltech

Mr. Stanley R. Rawn, Jr.
Caltech Trustee, and President of Marline Resources Company, Inc.

Dr. Eberhardt Rechtin
President, Aerospace Corporation

Mrs. Mary L. Scranton
Caltech Trustee

Dr. John M. Teem (Council Chairman)
President, Association of Universities for Research in Astronomy, Inc.

Ex Officio:
Dr. Robert Christy
Vice President and Provost, Caltech

Mr. David Morrisroe
Vice President for Business and Finance and Treasurer, Caltech

Past Members:

Mr. Benjamin Biaggini
Dr. Harry Gray
Mr. Robert Gilmore
Dr. Ray Owen

Dr. Simon Ramo
Dr. Robert Sharp
Dr. Robert W. Vaughan
Dr. Rochus Vogt

1Deceased
Institute Libraries

Johanna E. Tallman, Director

Janet Casebier, Humanities and Documents Librarian
Roderick J. Casper, Public Services Librarian, MPS
Judith R. Goodstein, Institute Archivist, MPS
Helen Lyons, Engineering Librarian
Donald McNamee, Catalog Librarian
Edward R. Moser, Serials Librarian
Dana L. Roth, Sciences Librarian, MPS

Representatives for the Departmental Libraries

Clarence R. Allen, Ph.D. .................................................... George R. Gavalas, Ph.D.
Tom M. Apostol, Ph.D. .................................................... Paco A. Lagerstrom, Ph.D.
John F. Benton, Ph.D. ...................................................... Gilbert D. McCann, Ph.D.
Felix H. Boehm, Ph.D. ...................................................... Charles H. Papas, Ph.D.
Charles J. Brokaw, Ph.D. .................................................... Rolf H. Sabersky, Ph.D.
Norman H. Brooks, Ph.D. .................................................... Walter A. Schroeder, Ph.D.
Francis S. Buffington, Ph.D. ............................................... Leonard Searle, Ph.D.
Marshall Cohen, Ph.D. ...................................................... Victor V. Veysey, M.B.A.
Donald E. Coles, Ph.D. ......................................................

Musical Activities

Olaf Frodsham .......................................................... Director of Choral Music
Monica Roegler .......................................................... Assistant Director of Choral Music
William Bing .............................................................. Jazz Band Director
Kim Kowalke ............................................................... Symphony Orchestra Director
James Rötter ............................................................... Wind Ensemble Director
James Boyk ................................................................. Interpretive Music Class
Marvin Leonard Goldberger, Ph.D., President; Professor of Physics

Allan James Acosta, Ph.D., Professor of Mechanical Engineering
B.S., California Institute, 1945; M.S., 1949; Ph.D., 1952. Assistant Professor, 1954-58; Associate Professor, 1958-66; Professor, 1966-

Andreas Aebi, Ph.D., Lecturer in German
M.A., University of Southern California, 1970; Ph.D., 1974. Lecturer in French, California Institute, 1978; Lecturer in German, 1978-

William Scott Agnew, Ph.D., Research Fellow in Chemistry
A.B., University of California (Los Angeles), 1968; Ph.D., 1976. California Institute, 1976-

Thomas J. Ahrens, Ph.D., Professor of Geophysics
B.S., Massachusetts Institute of Technology, 1957; M.S., California Institute, 1958; Ph.D., Rensselaer Polytechnic Institute, 1962. Associate Professor, California Institute, 1967-76; Professor, 1976-

Thomas Bellis Ake III, Ph.D., Research Fellow in Astronomy
B.S., Case Western Reserve University, 1971; M.S., 1974; Ph.D., 1977. California Institute, 1978-

Arden Leroy Albee, Ph.D., Professor of Geology; Chief Scientist, Jet Propulsion Laboratory
A.B., Harvard College, 1950; A.M., Harvard University, 1951; Ph.D., 1957. Visiting Assistant Professor, California Institute, 1959-60; Associate Professor, 1960-66; Professor, 1966-; Academic Officer, Geological and Planetary Sciences, 1971-79; Chief Scientist, 1979-

Igor Tigranovich Alexanian, Cand. Sci., Visiting Associate in Electrical Engineering
Bacc., Moscow State University, 1958; Cand. Sci., 1964. Head, Laboratory of Physical Problems in Microelectronic Reliability, Institute of Electronic Technology (Moscow), 1974-. California Institute, 1979-

Yoram Alhassid, Ph.D., Weizmann Research Fellow in Physics

Clarence Roderic Allen, Ph.D., Professor of Geology and Geophysics
B.A., Reed College, 1949; M.S., California Institute, 1951; Ph.D., 1954. Assistant Professor, 1955-59; Associate Professor, 1959-64; Professor, 1964-. Interim Director of Seismological Laboratory, 1965-67; Acting Chairman, Division of Geology, 1967-68.

Mark Andrew Allen, Ph.D., Research Fellow in Planetary Science

John Morgan Allman, Ph.D., Associate Professor of Biology
B.A., University of Virginia, 1965; A.M., The University of Chicago, 1968; Ph.D., 1971. Assistant Professor, California Institute, 1974-77; Associate Professor, 1977-

George Amthauer, Dr. rer. nat., Visiting Associate in Mineralogy

Carl David Anderson, Ph.D., Sc.D., LL.D., Nobel Laureate, Board of Trustees Professor of Physics, Emeritus
B.S., California Institute, 1927; Ph.D., 1930. Research Fellow, 1930-33; Assistant Professor, 1933-37; Associate Professor, 1937-39; Professor, 1939-76; Chairman, Division of Physics, Mathematics and Astronomy, 1962-70; Board of Trustees Professor Emeritus, 1976-

David Maurice Anderson, Ph.D., Research Fellow in Biology
B.A., California State University (Fresno), 1970; M.A., 1972; Ph.D., Purdue University, 1977. California Institute, 1977-

Don Lynn Anderson, Ph.D., Professor of Geophysics; Director, Seismological Laboratory
B.S., Rensselaer Polytechnic Institute, 1955; M.S., California Institute, 1958; Ph.D., 1962. Research Fellow, 1962-63; Assistant Professor, 1963-64; Associate Professor, 1964-68; Professor, 1968-; Director, 1967-

(KF) Supported by the Koepfli Fund (LOA) Leave of Absence (PT) Part Time
Robert Charles Anderson, Ph.D., *Research Fellow in Chemistry*

Theodore W. Anderson, Ph.D., *Sherman Fairchild Distinguished Scholar*
B.S., Northwestern University, 1939; M.A., Princeton University, 1942; Ph.D., 1945. Professor, Stanford University, 1967-. California Institute, 1979-80.

Fred Colvig Anson, Ph.D., *Professor of Chemistry*
B.S., California Institute, 1954; Ph.D., Harvard University, 1957. Instructor, California Institute, 1957-58; Assistant Professor, 1958-62; Associate Professor, 1962-68; Professor, 1968-; Executive Officer for Chemistry, 1973-77.

Tom M. Apostol, Ph.D., *Professor of Mathematics*
B.S., University of Washington, 1944; M.S., 1946; Ph.D., University of California, 1948. Assistant Professor, California Institute, 1950-56; Associate Professor, 1956-62; Professor, 1962-.

Gordon Appleby, Ph.D., *Mellon Postdoctoral Instructor in Anthropology*

Halton Christian Arp, Ph.D., *Staff Member, Hale Observatories*
A.B., Harvard College, 1949; Ph.D., California Institute, 1953. Staff Member, Hale Observatories, 1957.

James Patrick Ary, Ph.D., *Research Fellow in Biology*
B.S., St. Mary’s College of California, 1969; Ph.D., The Ohio State University, 1976. California Institute, 1976-.

Marylouise Ary, Ph.D., *Research Fellow in Biology*
B.A., Immaculate Heart College, 1969; Ph.D., University of California (Los Angeles), 1977. California Institute, 1977-.

Michael Aschbacher, Ph.D., *Professor of Mathematics*
B.S., California Institute, 1966; Ph.D., University of Wisconsin, 1969. Bateman Research Instructor, California Institute, 1970-72; Assistant Professor, 1972-74; Associate Professor, 1974-76; Professor, 1976-.

Giuseppe Attardi, M.D., *Professor of Biology*
M.D., University of Padua, 1947. Research Fellow, California Institute, 1959-60; Assistant Professor, 1963; Associate Professor, 1963-67; Professor, 1967-.

Vasiliy L. Avdeev, Cand., *Visiting Associate in Chemical Engineering*

Vasil K. Babamov, Ph.D., *Research Fellow in Chemistry*
B.S., University of Skopje (Yugoslavia), 1965; Ph.D., University of Illinois (Urbana), 1977. California Institute, 1978-79.

Charles Dwight Babcock, Jr., Ph.D., *Professor of Aeronautics*
B.S., Purdue University, 1957; M.S., California Institute, 1958; Ph.D., 1962. Research Fellow, 1962-63; Assistant Professor, 1963-68; Associate Professor, 1968-74; Professor, 1974-.

Horace Welcome Babcock, Ph.D., Sc.D., *Staff Member, Hale Observatories*
B.S., California Institute, 1934; Ph.D., University of California, 1938. Staff Member, Hale Observatories, 1946-; Assistant Director, 1956-63; Associate Director, 1963-64; Director, 1964-78.

Robert Fox Bacher, Ph.D., Sc.D., LL.D., *Professor of Physics, Emeritus*
B.S., The University of Michigan, 1926; Ph.D., 1930; Sc.D., 1948. Professor of Physics, California Institute, 1949-76; Chairman, Division of Physics, Mathematics and Astronomy; Director, Norman Bridge Laboratory of Physics, 1949-62; Provost, 1962-70; Vice President and Provost, 1969-70; Professor Emeritus, 1976-.

Stanley H. Bacon, *Lecturer in Electrical Engineering (PT)*
California Institute, 1977-.

Raphael Badoud, Ph.D., *Research Fellow in Chemistry*

John Dickson Baldeschwieler, Ph.D., *Professor of Chemistry*
B. ChemE., Cornell University, 1956; Ph.D., University of California, 1959. Professor, California Institute, 1973-; Chairman, Division of Chemistry and Chemical Engineering, 1973-78.
Michael Joseph Barcelona, Ph.D., Research Fellow in Environmental Engineering Science  
B.A., St. Mary's College, 1971; M.S., Northeastern University, 1974; Ph.D., University of Puerto Rico, 1976, California Institute, 1976-.

Nadav Bar-Chaim, Ph.D., Research Fellow in Applied Physics  

Mircea A. Bargazlan, Dipl., Visiting Associate in Mechanical Engineering  

Barry Clark Barish, Ph.D., Professor of Physics  
B.A., University of California, 1957; Ph.D., 1962. Research Fellow, California Institute, 1963-66; Assistant Professor, 1966-69; Associate Professor, 1969-72; Professor, 1972-.

Charles Andrew Barnes, Ph.D., Professor of Physics  
B.A., McMaster University, 1943; M.A., University of Toronto, 1944; Ph.D., University of Cambridge, 1950. Research Fellow, California Institute, 1953-54; Senior Research Fellow, 1954-55; 1956-58; Associate Professor, 1958-62; Professor, 1962-.

Robert Hinrichs Bates, Ph.D., Professor of Political Science  
B.A., Haverford College, 1964; Ph.D., Massachusetts Institute of Technology, 1969. Assistant Professor, California Institute, 1969-75; Associate Professor, 1975-79; Professor, 1979-.

Jesse Lee Beauchamp, Ph.D., Professor of Chemistry  
B.S., California Institute, 1964; Ph.D., Harvard University, 1967. Noyes Research Instructor, California Institute, 1967-69; Assistant Professor, 1969-71; Associate Professor, 1971-74; Professor, 1974-.

Richard H. Becker, Ph.D., Senior Research Fellow in Geochemistry  

Charles Beichman, Ph.D., Research Fellow in Physics  

Paul B. Bell, Jr., Ph.D., Visiting Associate in Biology (PT)  
A.B., Washington University, 1968; Ph.D., Yale University, 1974. Research Fellow, California Institute, 1974-79; Visiting Associate, 1979-80.

Paul Murray Bellan, Ph.D., Assistant Professor of Applied Physics  

Alexandra Bellow, Ph.D., Sherman Fairchild Distinguished Scholar  
M.S., University of Bucharest, 1957; Ph.D., Yale University, 1959. Professor, Northwestern University, California Institute, 1980.

Saul Bellow, B.A. Visiting Dreyfuss Professor of Humanities  

Irving S. Bengelsdorf, Ph.D., Lecturer in Science Communication (PT)  
B.S., University of Illinois, 1943; M.S., The University of Chicago, 1948; Ph.D., 1951. Lecturer, California Institute, 1971; Director of Science Communication, 1971-.

Henri Benoit, Sc.D., Visiting Associate in Chemical Engineering  

John Frederick Benton, Ph.D., Professor of History  
B.A., Haverford College, 1953; M.A., Princeton University, 1955; Ph.D., 1959. Assistant Professor, California Institute, 1965-66; Associate Professor, 1966-70; Professor, 1970-.

Seymour Benzer, Ph.D., D.Sc., James G. Boswell Professor of Neuroscience  
B.A., Brooklyn College, 1942; M.S., Purdue University, 1943; Ph.D., 1947. Research Fellow, California Institute, 1949-50; Visiting Associate, 1965-67; Professor, 1967-75; Boswell Professor, 1975-.

John Edward Bercaw, Ph.D., Professor of Chemistry  
B.S., North Carolina State University, 1967; Ph.D., The University of Michigan, 1971. Arthur Amos Noyes Research Fellow, California Institute, 1972-74; Assistant Professor, 1974-77; Associate Professor, 1977-79; Professor, 1979-.
Howard C. Berg, Ph.D., Professor of Biology

Glenn L. Berge, Ph.D., Staff Member, Owens Valley Radio Observatory

Bo Inge Berglund, Ph.D., Research Fellow in Chemical Engineering

John William Bieber, Ph.D., Research Fellow in Physics

Gerald J. Bierman, Ph.D., Lecturer in Systems Engineering (PT)

Richard John Bing, M.D., Visiting Associate in Chemistry and Chemical Engineering
M.D., University of Munich, 1934; M.D., University of Bern, 1935. Professor of Medicine, University of Southern California; Director, Cardiology and Intramural Medicine, Huntington Memorial Hospital, 1969-70; Research Associate in Engineering Science, California Institute, 1970-72; Visiting Associate in Biomedical Engineering, 1972-78; Visiting Associate in Chemistry and Chemical Engineering, 1978.

Dorwin L. Birt, Ph.D., Senior Research Fellow in Biology
B.S., Purdue University, 1968; Ph.D., Indiana University, 1973. Research Fellow, California Institute, 1974-77; Senior Research Fellow, 1977.

Daniel Lloyd Birx, Ph.D., Visiting Associate in Physics

Karen J. Blair, Ph.D., Instructor in U.S. History

Roger D. Blandford, Ph.D., Professor of Theoretical Astrophysics
B.A., Magdalene College, University of Cambridge, 1970; Ph.D., University of Cambridge, 1974. Assistant Professor, California Institute, 1976-79; Professor, 1979.

Maria I. Bochenek, M.S., Visiting Associate in Aeronautics
M.S., University of Krakow. Lecturer in Physics (Retired), Warsaw Polytechnic School. California Institute, 1979.

Felix Hans Boehm, Ph.D., Professor of Physics
Dipl. Phys., Federal Institute of Technology, Zurich, 1948; Ph.D., 1951. Research Fellow, California Institute, 1953-55; Senior Research Fellow, 1955-58; Assistant Professor, 1958-59; Associate Professor, 1959-61; Professor, 1961.

Henri Frederic Bohnenblust, Ph.D., Professor of Mathematics, Emeritus
A.B., Federal Institute of Technology, Zurich, 1928; Ph.D., Princeton University, 1931. Professor, California Institute, 1946-74; Dean of Graduate Studies, 1956-70; Executive Officer for Mathematics, 1964-66; Professor Emeritus, 1974.

Martha W. Bond, Ph.D., Research Fellow in Biology

James F. Bonner, Ph.D., Professor of Biology (PT)
A.B., University of Utah, 1931; Ph.D., California Institute, 1934. Research Assistant, 1935-36; Instructor, 1936-38; Assistant Professor, 1938-42; Associate Professor, 1942-46; Professor, 1946.

Lyman Gaylord Bonner, Ph.D., Associate in Chemistry; Director of Student Relations; Registrar
Thomas Theodore Bopp, Ph.D., *Visiting Associate in Chemical Engineering*
B.S., California Institute, 1963; Ph.D., Harvard University, 1968. Associate Professor, University of Hawaii, 1972-; Visiting Associate, California Institute, 1978.

Kim Border, Ph.D., *Assistant Professor of Economics*
B.S., California Institute, 1974; Ph.D., University of Minnesota, 1979. Assistant Professor, California Institute, 1979.

Emilio Bordignon, Ph.D., *Visiting Associate in Chemistry*

Henry Borsook, Ph.D., M.D., *Professor of Biochemistry, Emeritus*
Ph.D., University of Toronto, 1924; M.B., 1927; M.D., 1940. Assistant Professor, California Institute, 1929-35; Professor, 1935-68; Professor Emeritus, 1968-.

Anastassios C. Bountis, Ph.D., *Bateman Research Instructor in Applied Mathematics*

Eric Bovet, Ph.D., *Research Fellow in Physics*
Ph.D., University of Neuchatel (Switzerland), 1978. California Institute, 1978-79.

Paul Bowerman, A.M., *Professor of Modern Languages, Emeritus*
A.B., Dartmouth College, 1920; A.M., The University of Michigan, 1936. Instructor, California Institute, 1942-45; Assistant Professor, 1945-47; Associate Professor, 1947-69; Professor Emeritus, 1969-.

Hermes Bravo, D.D.S., *Visiting Associate in Biology*

Louis Breger, Ph.D., *Associate Professor of Psychology*
B.A., University of California (Los Angeles), 1957; M.A., The Ohio State University, 1959; Ph.D., 1961. Visiting Associate Professor, California Institute, 1970-71; Associate Professor, 1971-.

Robert Edward Breidenthal, Jr., Ph.D., *Research Fellow in Aeronautics*

Christopher Brennen, Ph.D., *Associate Professor of Mechanical Engineering*
B.A., Oxford University, 1963; M.A., Ph.D., 1966. Research Fellow, California Institute, 1969-72; Senior Research Fellow, 1972-75; Research Associate, 1975-76; Associate Professor, 1976-.

William B. Bridges, Ph.D., *Professor of Electrical Engineering and Applied Physics; Executive Officer for Electrical Engineering*
B.S., University of California, 1956; M.S., 1957; Ph.D., 1962. Sherman Fairchild Distinguished Scholar, California Institute, 1974-75; Professor, 1977-; Executive Officer for Electrical Engineering, 1978-.

Raymond P. Briggs, Ph.D., *Visiting Associate in Biology (PT)*

Roy John Britten, Ph.D., *Senior Research Associate in Biology*
B.S., University of Virginia, 1940; Ph.D., Princeton University, 1951. Staff Member, Carnegie Institution, 1951-. Visiting Associate, California Institute, 1971-73; Senior Research Associate, 1973-.

David James Britton, D.M.A., *Lecturer in Music (PT)*

James Eugene Broadwell, Ph.D., *Research Associate in Aeronautics (PT)*
B.S., Georgia Institute of Technology, 1942; M.S., California Institute, 1944; Ph.D., The University of Michigan, 1952. Senior Staff Engineer, TRW Systems, 1964-. Senior Research Fellow, California Institute, 1967-72; Research Associate, 1972-.

Jeremy P. Brockes, Ph.D., *Assistant Professor of Biology*
Charles Jacob Brokaw, Ph.D., Professor of Biology; Executive Officer for Biology
B.S., California Institute, 1955; Ph.D., University of Cambridge, 1958. Visiting Assistant Professor, California Institute, 1960; Assistant Professor, 1961-63; Associate Professor, 1963-68; Professor, 1968--; Executive Officer, 1976-.

Norman Herrick Brooks, Ph.D., James Irvine Professor of Environmental and Civil Engineering; Director of Environmental Quality Laboratory
A.B., Harvard College, 1949; M.S., Harvard University, 1950; Ph.D., California Institute, 1954. Instructor, 1953-54; Assistant Professor, 1954-58; Associate Professor, 1958-62; Professor of Environmental Science and Civil Engineering, 1962-76; Irvine Professor of Environmental Engineering Science, 1976-77; Irvine Professor of Environmental and Civil Engineering, 1977--; Academic Officer for Environmental Engineering Science, 1972-74; Director, 1974-.

Garry L. Brown, D.Phil., Professor of Aeronautics
B.E., University of Adelaide, 1964; D.Phil., University of Oxford, 1967. Research Fellow, California Institute, 1967-69; Senior Research Fellow, 1970; Visiting Associate, 1974; Professor, 1977-.

Lee F. Browne, M.S., Lecturer in Education
B.S., West Virginia State College, 1944; M.S., New York University, 1950. Director of Secondary School Relations, California Institute, 1969--; Lecturer, 1971-.

Donald Eugene Brownlee II, Ph.D., Visiting Associate in Geochemistry
B.S., University of California, 1965; Ph.D., University of Washington, 1971. Senior Research Associate, 1974-; California Institute, 1977-.

Robert Joseph Brucato, Ph.D., Staff Associate, Hale Observatories
B.S., University of Illinois, 1966; M.S., University of Chicago, 1968; Ph.D., Northwestern University, 1970. Research Fellow, California Institute, 1971-72; Staff Associate, 1972-.

Richard Hugh Buckholz, Jr., Ph.D., Research Fellow in Engineering Science
B.S., University of Maryland, 1971; Ph.D., The Johns Hopkins University, 1979; California Institute, 1978-79.

Francis Stephan Buffington, Sc.D., Associate Professor of Materials Science; Associate Dean of Graduate Studies
S.B., Massachusetts Institute of Technology, 1938; Sc.D., 1951. Assistant Professor of Mechanical Engineering, California Institute, 1951-56; Associate Professor, 1956-62; Associate Professor of Materials Science, 1963--; Associate Dean of Graduate Studies, 1975-.

John Douglas Buhr, Ph.D., Research Fellow in Chemistry

David W. Burchmore, Ph.D., Instructor in English

David T. Burhans, Ph.D., Lecturer in Speech Communication

Patricia Virginia Burke, Ph.D., Visiting Associate in Biology

William T. Burke, B.S.E.E., Visiting Associate in Computer Science

Donald Stacy Burnett, Ph.D., Professor of Nuclear Geochemistry; Academic Officer, Division of Geological and Planetary Sciences
B.S., The University of Chicago, 1959; Ph.D., University of California, 1963. Research Fellow in Physics, California Institute, 1963-65; Assistant Professor of Nuclear Geochemistry, 1965-68; Associate Professor, 1968-75; Professor, 1975--; Academic Officer, 1979-.

Mark J. Burns, Ph.D., Research Fellow in Chemistry

Eugene Thaddeus Butler III, Ph.D., Research Fellow in Biology
B.S., University of California (Davis), 1973; Ph.D., University of California, 1978. California Institute, 1978-. 

 Officers and Faculty  59
Bruce E. Cain, Ph.D., Assistant Professor of Political Science  
B.A., Bowdoin College, 1970; B.Phil., Oxford University, 1972; Ph.D., Harvard Graduate School of Arts and Sciences, 1976. California Institute, 1976-.

Kathryn Lee Calame, Ph.D., Research Fellow in Biology  

Judith L. Campbell, Ph.D., Assistant Professor of Chemistry  

Michel Jacques Cara, Ph.D., Research Fellow in Geophysics  

George A. Carlson, Ph.D., Visiting Associate in Chemistry  

Klara Carmely, Ph.D., Lecturer in German  

Glen R. Cass, Ph.D., Assistant Professor of Environmental Engineering  
B.A., University of Southern California, 1969; M.S., Stanford University, 1970; Ph.D., California Institute, 1977. Senior Research Fellow and Instructor, 1977-79; Assistant Professor, 1979-.

Thomas Kirk Caughey, Ph.D., Professor of Applied Mechanics  
B.Sc., Glasgow University, 1948; M.M.E., Cornell University, 1952; Ph.D., California Institute, 1954. Instructor, 1953-54; Assistant Professor, 1955-58; Associate Professor, 1958-62; Professor, 1962.

Carlton M. Caves, Ph.D., Research Fellow in Physics  
B.A., Rice University, 1972; Ph.D., California Institute, 1977. Research Fellow, 1977-.

Enrique Cerdá-Olmedo, Ph.D., Visiting Associate in Biology  
M.A., University of Madrid, 1965; Ph.D., Stanford University, 1967. Professor of Genetics, University of Seville. Research Fellow, California Institute, 1967-69; Sherman Fairchild Distinguished Scholar, California Institute, 1975-76; Visiting Associate, 1979.

Sunney Ignatius Chan, Ph.D., Professor of Chemical Physics and Biophysical Chemistry; Executive Officer for Chemistry  
B.S., University of California, 1957; Ph.D., 1960. Assistant Professor of Chemical Physics, California Institute, 1963-64; Associate Professor, 1964-68; Professor, 1968-76; Professor of Chemical Physics and Biophysical Chemistry, 1976-. Acting Executive Officer, 1977-78; Executive Officer, 1978-.

Bruce W. Chappell, Ph.D., Visiting Professor of Geology  

Thomas J. Chester, Ph.D., Research Fellow in Astrophysics  

Pandipati Radhakrishnaiah Chetty, Ph.D., Research Fellow in Electrical Engineering  

John Choma, Jr., Ph.D., Lecturer in Electrical Engineering  
B.S.E.E., University of Pittsburgh, 1963; M.S.E.E., 1965; Ph.D., 1969. California Institute, 1979-.

Anne Chomyn, Ph.D., Research Fellow in Biology  

Robert Frederick Christy, Ph.D., Professor of Theoretical Physics; Vice President and Provost  
B.A., The University of British Columbia, 1935; Ph.D., University of California, 1941. Associate Professor of Physics, California Institute, 1946-50; Professor of Theoretical Physics, 1950-; Executive Officer for Physics, 1968-70; Vice President and Provost, 1970-; Acting President, 1977-78.

Mark Calvin Citron, Ph.D., Research Fellow in Biology  
B.S., Purdue University, 1971; Ph.D., The University of Rochester, 1976. California Institute, 1976-.
J. Kent Clark, Ph.D., Professor of English
A.B., Brigham Young University, 1939; Ph.D., Stanford University, 1950. Instructor, California Institute, 1947-50; Assistant Professor, 1950-54; Associate Professor, 1954-60; Professor, 1960-.

Francis Hettinger Clauser, Ph.D., Clark Blanchard Millikan Professor of Engineering

Donald S. Cohen, Ph.D., Professor of Applied Mathematics
Sc.B., Brown University, 1956; M.S., Cornell University, 1959; Ph.D., New York University (Courant Institute), 1962. Assistant Professor of Mathematics, California Institute, 1965-67; Associate Professor of Applied Mathematics, 1967-71; Professor, 1971-.

Judith G. Cohen, Ph.D., Associate Professor of Astronomy
B.A., Radcliffe College, 1967; Ph.D., California Institute, 1971. Associate Professor, 1978--; Staff Member, Hale Observatories, 1978-.

Marshall Harris Cohen, Ph.D., Professor of Radio Astronomy
B.E.E., The Ohio State University, 1948; M.S., 1949; Ph.D., 1952. Visiting Associate Professor, California Institute, 1965; Professor, 1968--.

Maurice Cohen, Jr., Ph.D., Visiting Associate in Chemistry
B.S., Florida State University, 1968; M.S., 1970; Ph.D., University of Tennessee, 1974. Research Fellow, California Institute, 1974-79; Visiting Associate, 1979-.

Julian D. Cole, Ph.D., Sherman Fairchild Distinguished Scholar
B.M.E., Cornell University, 1944; Ph.D., California Institute, 1949. Professor, University of California (Los Angeles), 1969-. Research Fellow, California Institute, 1949-51; Assistant Professor, 1951-55; Associate Professor, 1955-59; Professor 1959-69; Fairchild Scholar, 1979-80.

Terry Cole, Ph.D., Research Associate in Chemistry

William E. Coleman, Ph.D., Lecturer in Management

Donald Earl Coles, Ph.D., Professor of Aeronautics
B.S., University of Minnesota, 1947; M.S., California Institute, 1948; Ph.D., 1953. Research Fellow, 1953-55; Senior Research Fellow, 1955-56; Assistant Professor, 1956-59; Associate Professor, 1959-64; Professor, 1964-.

Michael J. Collins, D.Phil., Visiting Associate Professor of Mathematics

Giuseppe Colombo, Ph.D., Visiting Associate in Planetary Science
Ph.D., University of Pisa, 1943. Professor, University of Padua, 1955-. California Institute, 1978-.

Brian L. Combridge, Ph.D., Research Fellow in Physics

Jack F. Conn, Ph.D., Assistant Professor of Mathematics

Robin Sue Eichen Conn, Ph.D., Research Fellow in Chemistry

Frederick James Converse, B.S., Professor of Soil Mechanics, Emeritus
B.S., The University of Rochester, 1914. Instructor, California Institute, 1921-33; Assistant Professor, 1933-39; Associate Professor, 1939-47; Professor, 1947-62; Professor Emeritus, 1962-.

William Harrison Corcoran, Ph.D., Institute Professor of Chemical Engineering
B.S., California Institute, 1941; M.S., 1942; Ph.D., 1948. Associate Professor, 1952-57; Professor, 1957-79; Institute Professor, 1979-. Executive Officer for Chemical Engineering, 1967-69; Vice President for Institute Relations, 1969-79.

France Anne Cordova, Ph.D., Research Fellow in Physics

Noel Robert Corngold, Ph.D., Professor of Applied Physics
A.B., Columbia College, 1949; A.M., Harvard University, 1950; Ph.D., 1954. Professor of Applied Science, California Institute, 1966-74; Professor of Applied Physics, 1974-.
Peter Ledsam Cottrell, Ph.D., *Research Fellow in Astronomy*

Eugene Woodville Cowan, Ph.D., *Professor of Physics* (LOA)
B.S., University of Missouri, 1941; S.M., Massachusetts Institute of Technology, 1943; Ph.D., California Institute, 1948. Research Fellow, 1948-50; Assistant Professor, 1950-54; Associate Professor, 1954-61; Professor, 1961-.

Loring G. Craymer III, Ph.D., *Research Fellow in Biology*
B.S., California Institute, 1972; Ph.D., The University of Wisconsin, 1977. California Institute, 1977-.

Bruno Crosignani, Lib. Doc., *Visiting Associate in Electrical Engineering*

Ronald J. Crowley, Ph.D., *Visiting Associate in Physics* (PT)
B.S., University of Southern California, 1961; M.A., 1965; Ph.D., 1967. Professor, California State University (Fullerton), 1974-. California Institute, 1974-.

Joseph Cugnon, Ph.D., *Research Fellow in Physics*

Slobodan M. Cuk, Ph.D., *Assistant Professor of Electrical Engineering*
Dipl. Ing., Belgrade University, 1970; M.S.E.E., University of Santa Clara, 1974; Ph.D., California Institute, 1977. Lecturer (PT), 1977; Research Fellow, 1977; Assistant Professor, 1977-.

Fred E. C. Culick, Ph.D., *Professor of Applied Physics and Jet Propulsion*
S.B., S.M., Massachusetts Institute of Technology, 1957; Ph.D., 1961. Research Fellow in Jet Propulsion, California Institute, 1961-62; Assistant Professor, 1963-66; Associate Professor, 1966-71; Professor, 1971-78; Professor of Applied Physics and Jet Propulsion, 1978-.

Calvin John Curtis, Ph.D., *Research Fellow in Chemistry*

Eric Harris Davidson, Ph.D., *Professor of Biology*
B.A., University of Pennsylvania, 1958; Ph.D., The Rockefeller University, 1963. Visiting Assistant Professor, California Institute, 1970; Associate Professor, 1971-74; Professor, 1974-.

John Michael Davidson, Ph.D., *Senior Research Fellow in Physics*
A.B., University of California, 1966; M.S., University of Maryland, 1970; Ph.D., 1973. Research Fellow, California Institute, 1976-79; Senior Research Fellow, 1979-.

Norman Ralph Davidson, Ph.D., *Professor of Chemistry*
B.S., The University of Chicago, 1937; B.Sc., Oxford University, 1938; Ph.D., The University of Chicago, 1941. Instructor, California Institute, 1946-49; Assistant Professor, 1949-52; Associate Professor, 1952-57; Professor, 1957- Executive Officer for Chemistry, 1967-73.

Lance Edwin Davis, Ph.D., *Professor of Economics*

Leverett Davis, Jr., Ph.D., *Professor of Theoretical Physics*
B.S., Oregon State College, 1936; M.S., California Institute, 1938; Ph.D., 1941. Instructor, 1941-46; Assistant Professor, 1946-50; Associate Professor, 1950-56; Professor, 1956-.

Richard Albert Dean, Ph.D., *Professor of Mathematics*
B.S., California Institute, 1945; A.B., Denison University, 1947; M.S., The Ohio State University, 1948; Ph.D., 1953. Harry Bateman Research Fellow, California Institute, 1954-55; Assistant Professor, 1955-59; Associate Professor, 1959-66; Professor, 1966-.

E. J. M. de Boer, Ph.D., *Research Fellow in Chemistry*

Nicolaas Govert de Bruijn, Ph.D., *Visiting Professor of Mathematics*

William Michael DeCampili, Ph.D., *Weizmann Research Fellow in Astrophysics*
Laura de Francesco, Ph.D., Research Fellow in Biology
B.S., Tufts University, 1970; Ph.D., University of California (San Diego), 1975. California Institute, 1975-.

Shuji Deguchi, Ph.D., Research Fellow in Planetary Science

Frank de Haan, Ph.D., Visiting Associate in Chemistry

Ebbel de Jonge, Ph.D., Visiting Associate in Mathematics

Max Delbrück, Ph.D., Sc.D., Nobel Laureate, Board of Trustees Professor of Biology, Emeritus
Ph.D., University of Göttingen, 1931. Research Fellow, California Institute, 1937-39; Professor, 1947-71; Albert Billings Ruddock Professor of Biology, 1971-77; Board of Trustees Professor Emeritus, 1977-.

Pirot Dembek, Ph.D., Research Fellow in Chemistry

Morton M. Denn, Ph.D., Visiting Chevron Energy Professor

Charles Raymond De Prima, Ph.D., Professor of Mathematics
B.A., New York University, 1940; Ph.D., 1943. Assistant Professor of Applied Mechanics, California Institute, 1946-51; Associate Professor, 1951-56; Professor, 1956-64; Professor of Mathematics, 1964-.

Peter B. Dervan, Ph.D., Associate Professor of Chemistry
B.S., Boston College, 1967; Ph.D., Yale University, 1972. Assistant Professor, California Institute, 1973-79; Associate Professor, 1979-.

Riccardo Destro, Lib. Doc., Visiting Associate in Chemistry

K. R. Sandhya Devi, Ph.D., Research Fellow in Physics

George John Dick, Ph.D., Senior Research Fellow in Applied Physics
A.B., Bethel College, 1961; Ph.D., University of California, 1969. Research Fellow, California Institute, 1969-73; Senior Research Fellow in Physics, 1973-75; Senior Research Fellow in Applied Physics, 1975-.

Richard Earl Dickerson, Ph.D., Professor of Physical Chemistry
B.S., Carnegie Institute of Technology, 1953; Ph.D., University of Minnesota, 1957. Associate Professor, California Institute, 1963-68; Professor, 1968-.

Jean O. Dickey, Ph.D., Research Fellow in Physics
B.S., St. Francis College, 1967; M.S., Rutgers University, 1975; Ph.D., 1976. California Institute, 1977-.

Dennis Richard Dietz, Ph.D., Visiting Associate in Chemistry

Robert Palmer Dilworth, Ph.D., Professor of Mathematics
B.S., California Institute, 1936; Ph.D., 1939. Assistant Professor, 1943-45; Associate Professor, 1945-51; Professor, 1951-.

Paul Emmanuel Dimotakis, Ph.D., Assistant Professor of Aeronautics and Applied Physics
B.S., California Institute, 1968; M.S., 1969; Ph.D., 1973. Research Fellow, 1973-74; Research Fellow and Lecturer, 1974-75; Assistant Professor, 1975-.
Nicholas Bernard Dirks, Ph.D., Instructor in Asian History

Charles Hewitt Dix, Ph.D., Professor of Geophysics, Emeritus
B.S., California Institute, 1927; A.M., Rice Institute, 1928; Ph.D., 1931. Associate Professor, California Institute, 1948-54; Professor, 1954-73; Professor Emeritus, 1973-.

Anthony R. Dobrovolskis, Ph.D., Research Fellow in Planetary Science

Jerry Bruce Dodgson, Ph.D., Research Fellow in Chemistry
B.S., Michigan State University, 1969; Ph.D., University of Wisconsin, 1976. California Institute, 1976-.

Ellen R. Domb, Ph.D., Visiting Associate in Applied Physics
B.S., Massachusetts Institute of Technology, 1968; M.S., University of Pennsylvania, 1969; Ph.D., Temple University, 1974. Assistant Professor, Harvey Mudd College, 1976-. California Institute, 1977-.

Dennis Dougherty, Ph.D., Assistant Professor of Chemistry
B.S., M.S., Bucknell University, 1974; Ph.D., Princeton University, 1978. California Institute, 1979-.

Alan Michael Dressler, Ph.D., Senior Research Fellow in Astronomy
B.A., University of California, 1970; Ph.D., University of California (Santa Cruz), 1976. Research Fellow, California Institute, 1976-78; Senior Research Fellow, 1978-; Carnegie Fellow, Hale Observatories, 1978-.

Ronald William Prest Drever, Ph.D., Professor of Physics
B.Sc., Glasgow University, 1953; Ph.D., 1958. Visiting Associate, California Institute, 1977; Professor, 1979-.

William Jakob Dreyer, Ph.D., Professor of Biology
B.A., Reed College, 1952; Ph.D., University of Washington, 1956. California Institute, 1963-.

Robert B. Drezner, Ph.D., Lecturer in Psychology (PT)

Lee Alvin DuBridge, Ph.D., Sc.D., LL.D., President Emeritus
A.B., Cornell College (Iowa), 1922; A.M., University of Wisconsin, 1924; Ph.D., 1926. President, California Institute, 1946-69; President Emeritus, 1969-.

Ian W. Duncan, Ph.D., Research Fellow in Biology
B.Sc., The University of British Columbia, 1974; Ph.D., University of Washington (Seattle), 1978. California Institute, 1978-.

Susan Margaret Jean Dunn, Ph.D., Research Fellow in Chemistry
B.Sc., University of Strathclyde, 1975; Ph.D., National Institute for Medical Research (Mill Hill), 1978. California Institute, 1978-.

Pol Edgard Duwez, D.Sc., Professor of Applied Physics and Materials Science, Emeritus
Metallurgical Engineer, School of Mines (Mons, Belgium), 1932; D.Sc., University of Brussels, 1933. Research Engineer, California Institute, 1942-47; Associate Professor, 1947-52; Professor, 1952-78; Professor Emeritus, 1978-.

Christina Elisabeth Dyllick-Brenzinger, Ph.D., Research Fellow in Chemistry
B.Sc., Bristol University, 1972; Ph.D., Swiss Federal Institute of Technology, 1976. California Institute, 1978-.

Ranier Dyllick-Brenzinger, Ph.D., Research Fellow in Chemistry

Steven Edward Ealick, Ph.D., Research Fellow in Chemistry
B.S., Oklahoma State University, 1972; Ph.D., University of Oklahoma, 1976. California Institute, 1978-.
Jay Barry Edelman, Ph.D., Research Fellow in Chemistry

David Alvoid Edmonson, Ph.D., Research Fellow in Chemistry

Heinz E. Ellersteck, Ph.D., Associate Professor of History
A.B., University of California (Los Angeles), 1942; M.A., 1948; Ph.D., 1955. Instructor, California Institute, 1950-55; Assistant Professor, 1955-60; Associate Professor, 1960-.

David Clephan Elliot, Ph.D., Professor of History
M.A., St. Andrew’s University, 1939; A.M., Harvard University, 1948; Ph.D., 1951; M.A., Oxford University, 1956. Assistant Professor, California Institute, 1950-53; Associate Professor, 1953-60; Professor, 1960-; Executive Officer for the Humanities and Social Sciences, 1967-71.

Richard K. Ellis, D.Phil., Senior Research Fellow in Theoretical Physics
B.A., Oxford University, 1971; D.Phil., 1974. California Institute, 1979-.

Sterling Emerson, Ph.D., Professor of Genetics, Emeritus
B.Sc., Cornell University, 1922; M.A., University of Michigan, 1924; Ph.D., 1928. Assistant Professor, California Institute, 1928-37; Associate Professor, 1937-46; Professor, 1946-71; Professor Emeritus, 1971-.

Warren G. Emery, M.S., Director of Physical Education and Athletics
B.S., University of Nebraska, 1948; M.S., University of California (Los Angeles), 1959. Coach, California Institute, 1955; Assistant Director of Physical Education and Athletics, 1963-64; Director, 1964-.

Stuart Alan Ende, Ph.D., Associate Professor of English
A.B., Cornell University, 1965; M.A., New York University, 1966; Ph.D., Cornell University, 1970. Assistant Professor, California Institute, 1970-74; Associate Professor, 1974-.

Susan K. Ende, A.M., Lecturer in English
A.B., Cornell University, 1965; A.M., 1970. Lecturer, California State University (PT), 1975-77; California Institute, 1974-75; 1978.

Sverre T. Eng, Dr.Tech., Visiting Associate in Electrical Engineering
Dr.Tech., Chalmers University (Sweden), 1967. Professor, 1971-. California Institute, 1978-79.

Hermann F. Engelhardt, Ph.D., Senior Research Fellow in Geophysics
B.S., Munich Technical University, 1957; M.A., 1957; Ph.D., 1964. California Institute, 1976-.

Samuel Epstein, Ph.D., Professor of Geochemistry
B.Sc., University of Manitoba, 1941; M.Sc., 1942; Ph.D., McGill University, 1944. Research Fellow, California Institute, 1952-53; Senior Research Fellow, 1953-54; Associate Professor, 1954-59; Professor, 1959-.

Thomas Erneux, Ph.D., Research Fellow in Applied Mathematics

Beat Ernst, Ph.D., Research Fellow in Chemistry

Tezer Mehmet Esat, Ph.D., Research Fellow in Physics
B.Sc., University College (London), 1971; M.Sc., Queen’s University (Kingston), 1972; Ph.D., Australian National University, 1976. California Institute, 1976-.

Rolf Etter, Ph.D., Research Fellow in Chemistry

Barbara Raymond Hough Evans, Ph.D., Senior Research Fellow in Biology
B.A., Swarthmore College, 1945; M.A., Cornell University, 1948; Ph.D., State University of New York (Stony Brook), 1968. Research Fellow, California Institute, 1971-72; Senior Research Fellow, 1972-.

David A. Evans, Ph.D., Professor of Chemistry
A.B., Oberlin College, 1963; Ph.D., California Institute, 1968. Professor, 1974-.
Martin S. Ewing, Ph.D., Staff Member, Owens Valley Radio Observatory
  B.A., Swarthmore College, 1966; Ph.D., Massachusetts Institute of Technology, 1971. Research Fellow, California Institute, 1971-73; Staff Member, 1975.

Douglas McIntosh Fambrough, Jr., Ph.D., Gosney Visiting Associate in Biology

C. Bernard Farmer, Ph.D., Visiting Professor of Planetary Science
  B.Sc., University of London, 1952; Ph.D., 1958. Senior Member, Technical Staff, Jet Propulsion Laboratory, 1974-. California Institute, 1978-.

Barbara W. Fass, Ph.D., Lecturer in Psychology

Peter Ward Fay, Ph.D., Professor of History
  A.B., Harvard College, 1947; B.A., Oxford University, 1949; Ph.D., Harvard University, 1954. Assistant Professor, California Institute, 1955-60; Associate Professor, 1960-70; Professor, 1970-.

Thomas E. Felter, Ph.D., Research Fellow in Chemical Engineering
  B.S., University of California (Santa Cruz), 1970; M.Sc., Brown University, 1973; Ph.D., 1977. California Institute, 1978-.

Derek Henry Fender, Ph.D., Professor of Biology and Applied Science
  B.Sc., Reading University (England), 1939; M.Sc., 1946; Ph.D., 1956. Senior Research Fellow in Engineering, California Institute, 1961-62; Associate Professor of Biology and Electrical Engineering, 1962-66; Professor of Biology and Applied Science, 1966-.

John A. Ferejohn, Ph.D., Professor of Political Science
  B.A., San Fernando Valley State College, 1966; Ph.D., Stanford University, 1971. Assistant Professor, California Institute, 1971-74; Associate Professor, 1974-77; Professor 1977-.

Alberto Ferrus, Ph.D., Research Fellow in Biology

Richard Phillips Feynman, Ph.D., Nobel Laureate, Richard Chace Tolman Professor of Theoretical Physics
  B.S., Massachusetts Institute of Technology, 1939; Ph.D., Princeton University, 1942. Visiting Professor, California Institute, 1950; Professor, 1950-59; Tolman Professor, 1959-.

Richard D. Field, Jr., Ph.D., Richard Chace Tolman Research Associate
  B.S., University of California, 1966; Ph.D., 1971. Research Fellow, California Institute, 1973-75; Senior Research Fellow, 1975-78; Research Associate, 1978-79; Tolman Research Associate, 1979-.

Morris P. Fiorina, Ph.D., Professor of Political Science
  (LOA)
  B.A., Allegheny College, 1968; Ph.D., The University of Rochester, 1972. Assistant Professor, California Institute, 1972-74; Associate Professor, 1974-77; Professor, 1977-.

Richard Charles Flanagan, Ph.D., Assistant Professor of Environmental Engineering Science

Arne Woolsey Fliflet, Ph.D., Research Fellow in Chemistry
  B.Sc., Duke University, 1970; Ph.D., University of Virginia, 1975. California Institute, 1975-.

James L. Fobes, Ph.D., Research Fellow in Biology

Athanassios S. Fokas, Ph.D., Research Fellow in Applied Mathematics

Bengt Fornberg, Ph.D., Assistant Professor of Applied Mathematics
  B.S., Uppsala University, 1969; Ph.D., 1972. Bateman Research Instructor, California Institute, 1974-75; Assistant Professor, 1975-.

Robert Elliott Forsythe, Ph.D., Assistant Professor of Economics
  B.S., The Pennsylvania State University, 1970; M.S., Carnegie Institute of Technology, 1972; M.S., Graduate School of Industrial Administration, Carnegie-Mellon University, 1974; Ph.D., 1975. California Institute, 1975-.
William Alfred Fowler, Ph.D., D.Sc., *Institute Professor of Physics*

B.Eng.Phys., The Ohio State University, 1933; Ph.D., California Institute, 1936. Research Fellow, 1936-39; Assistant Professor, 1939-42; Associate Professor, 1942-46; Professor, 1946-70; Institute Professor, 1970.

Geoffrey Charles Fox, Ph.D., *Associate Professor of Theoretical Physics*

B.A., University of Cambridge, 1964; Ph.D., 1967. Robert Andrews Millikan Research Fellow, California Institute, 1970-71; Assistant Professor, 1971-74; Associate Professor, 1974-.

Joel N. Franklin, Ph.D., *Professor of Applied Mathematics*

B.S., Stanford University, 1950; Ph.D., 1953. Associate Professor of Applied Mechanics, California Institute, 1957-65; Professor of Applied Science, 1965-69; Professor of Applied Mathematics, 1969-.

Steven Clark Frautschi, Ph.D., *Professor of Theoretical Physics*

A.B., Harvard College, 1954; Ph.D., Stanford University, 1958. Assistant Professor, California Institute, 1962-64; Associate Professor, 1964-66; Professor, 1966-.

Patrice L. French, Ph.D., *Visiting Associate in Biology (PT)*

B.A., Vanderbilt University, 1971; Ph.D., University of Illinois (Champaign), 1974. Assistant Professor of Psychology, University of California (Los Angeles), 1977-. California Institute, 1978-.

Peretz Peter Friedmann, D.Sc., *Visiting Associate Professor of Aeronautics*


Edward Francis Fritsch, Ph.D., *Research Fellow in Biology*

B.S., Massachusetts Institute of Technology, 1972; Ph.D., The University of Wisconsin, 1977. California Institute, 1978-.

Michael Daniel Fryzuk, Ph.D., *Research Fellow in Chemistry*


Benno Fuchsteiner, Habil., *Visiting Professor of Mathematics*


Kazuya Fujita, Ph.D., *Research Fellow in Geophysics*


Francis Brock Fuller, Ph.D., *Professor of Mathematics*

A.B., Princeton University, 1949; M.A., 1950; Ph.D., 1952. Research Fellow, California Institute, 1952-55; Assistant Professor, 1955-59; Associate Professor, 1959-66; Professor, 1966-.

Eric A. Fyrberg, Ph.D., *Research Fellow in Chemistry*

B.S., University of Maine (Portland), 1973; Ph.D., Wesleyan University, 1978. California Institute, 1978-.

Edward S. Gaffney, Ph.D., *Visiting Associate in Geophysics*


Robert R. Gagné, Ph.D., *Assistant Professor of Chemistry*

B.S., Worcester Polytechnic Institute, 1969; Ph.D., Stanford University, 1974. Arthur Amos Noyes Research Instructor in Chemistry, California Institute, 1974-76; Assistant Professor, 1976-.

David Walter Galenson, Ph.D., *Assistant Professor of Social Science and History*


Paul Alban Galland, Ph.D., *Research Fellow in Biology*

Dipl., University of Freiburg (Germany), 1971; Ph.D., 1975. California Institute, 1978-79.

James M. Galigan, Ph.D., *Visiting Associate in Materials Science*


Barry Stuart Ganetzky, Ph.D., *Research Fellow in Biology*

B.S., University of Illinois, 1971; Ph.D., University of Washington, 1976. California Institute, 1976-.
David Arthur Garelick, Ph.D., *Visiting Associate in Physics*


Gordon Paul Garmire, Ph.D., *Professor of Physics*

A.B., Harvard College, 1959; Ph.D., Massachusetts Institute of Technology, 1962. Senior Research Fellow, California Institute, 1966-68; Associate Professor, 1968-72; Professor, 1972-.

Gregory Gartrell, Jr., Ph.D., *Weizmann Research Fellow in Environmental Engineering Science*


Edward Maurice Gates, Ph.D., *Visiting Associate in Mechanical Engineering*


Sylvester J. Gates, Jr., Ph.D., *Visiting Associate in Theoretical Physics*


Ian Gatley, Ph.D., *Research Fellow in Physics*

B.S., Imperial College, University of London, 1972; Ph.D., California Institute, 1978. Research Fellow, 1977-.

George Rousetos Gavalas, Ph.D., *Professor of Chemical Engineering*

B.S., Technical University of Athens, 1958; M.S., University of Minnesota, 1962; Ph.D., 1964. Assistant Professor, California Institute, 1964-67; Associate Professor, 1967-75; Professor, 1975-.

Thomas R. Geballe, Ph.D., *Senior Research Fellow in Astronomy*

Ph.D., University of California, 1974. Research Fellow, California Institute, 1977-78; Senior Research Fellow, 1978-; Hale Observatories, 1978-; Carnegie Fellow, Las Campanas Observatory, 1977-.

Valrie Ann Gerard, Ph.D., *Research Fellow in Environmental Engineering Science*


A.B., University of Washington, 1923; M.B.A., Harvard University, 1926. Assistant Professor, California Institute, 1929-30; Associate Professor, 1930-47; Professor, 1947-69; Professor Emeritus, 1969-.

Wayne Lewis Gladfelter, Ph.D., *Research Fellow in Chemistry*


M. Michael Glovsky, M.D., *Visiting Associate in Chemistry*

B.S., Tufts University, 1957; M.D., Tufts Medical School, 1962. Chief, Department of Allergy and Clinical Immunology, Kaiser Permanent Medical Group, 1974-; Associate Clinical Professor of Medicine, University of California (Los Angeles), 1976-. California Institute, 1977-.

William Andrew Goddard III, Ph.D., *Professor of Chemistry and Applied Physics*

B.S., University of California (Los Angeles), 1960; Ph.D., California Institute, 1965. Noyes Research Fellow in Chemistry, 1964-66; Noyes Research Instructor, 1966-67; Assistant Professor of Theoretical Chemistry, 1967-71; Associate Professor, 1971-74; Professor, 1974-78; Professor of Chemistry and Applied Physics, 1978-.

Jollie D. Godfrey, Jr., Ph.D., *Research Fellow in Chemistry*

John Walter Frank Goers, Ph.D., *Research Fellow in Chemistry*

Marvin Leonard Goldberger, Ph.D., *President; Professor of Physics*
(See page 54.)

Terrence J. Goldman, Ph.D., *Senior Research Fellow in Theoretical Physics*
B.Sc., University of Manitoba, 1968; Ph.D., Harvard University, 1973. California Institute, 1978-.

Peter Martin Goldreich, Ph.D., *Professor of Planetary Science and Astronomy*
B.S. Cornell University, 1960; Ph.D., 1963. Associate Professor, California Institute, 1966-69; Professor, 1969.

B.S., Purdue University, 1947; M.S., California Institute, 1959; Ph.D., 1962. Manager, Telecommunications Research Section, Jet Propulsion Laboratory, 1958-. Visiting Associate Professor of Planetary Science, California Institute, 1967-73; Research Associate, 1973-.

Ilan Golecki, Ph.D., *Research Fellow in Applied Physics*
B.Sc., Technion University (Haifa), 1970. M.Sc., 1974; Ph.D., Neuchatel University (Switzerland), 1978. California Institute, 1978-.

Ricardo Gomez, Ph.D., *Professor of Physics*
B.S., Massachusetts Institute of Technology, 1953; Ph.D., 1956. Research Fellow, California Institute, 1956-59; Senior Research Fellow, 1959-71; Associate Professor, 1971-77; Professor, 1977-.

Nestor F. Gonzales-Cadavid, Ph.D., *Gosney Visiting Associate in Biology*

David Louis Goodstein, Ph.D., *Professor of Physics and Applied Physics*
B.S., Brooklyn College, 1960; Ph.D., University of Washington, 1965. Research Fellow, California Institute, 1966-67; Assistant Professor of Physics, 1967-71; Associate Professor, 1971-75; Associate Professor of Physics and Applied Physics, 1975-76; Professor, 1976-.

Roy Walter Gould, Ph.D., *Professor of Applied Physics; Chairman of the Division of Engineering and Applied Science*
B.S., California Institute, 1949; M.S., Stanford University, 1950; Ph.D., California Institute, 1956. Assistant Professor of Engineering, 1955-58; Associate Professor, 1958-62; Professor of Physics, 1962-74; Professor of Applied Physics, 1974-; Executive Officer for Applied Physics, 1973-79; Chairman, 1979-.

Avraham Gover, Ph.D., *Visiting Associate in Applied Physics*
B.S., Tel Aviv University, 1968; M.S., 1971; Ph.D., California Institute, 1976. Assistant Professor, Tel Aviv University, 1977-. Visiting Associate, California Institute, 1978.

Michael J. Graetz, LL.B., *Professor of Law and Social Science* (PT)
B.B.A., Emory University, 1966; L.L.B., University of Virginia, 1969. Professor of Law, University of Southern California, 1979-. California Institute, 1979-.

Sidney W. Graham, Ph.D., *Bateman Research Instructor in Mathematics*
B.S., University of Oklahoma, 1971; M.S., University of Michigan, 1972; Ph.D., 1977. California Institute, 1977-.

Harry Barkus Gray, Ph.D., *William R. Kenan, Jr. Professor and Professor of Chemistry; Chairman of the Division of Chemistry and Chemical Engineering*
B.S., Western Kentucky College, 1957; Ph.D., Northwestern University, 1960. Visiting Professor of Inorganic Chemistry, California Institute, 1965; Professor of Chemistry, 1966-; Kenan Professor, 1976-; Division Chairman, 1978-.

John Peter Gray, Ph.D., *Research Associate in Computer Science*
B.Sc., University of Durham (England), 1964; Ph.D., University of Newcastle, 1967. Visiting Associate, California Institute, 1977-78; Research Associate, 1978-.

Richard R. Green, Ph.D., *Lecturer in Electrical Engineering* (PT)
Jesse Leonard Greenstein, Ph.D., *Lee A. DuBridge Professor of Astrophysics* (PT)
A.B., Harvard College, 1929; A.M., Harvard University, 1930; Ph.D., 1937. Associate Professor, California Institute, 1948-49; Professor, 1949-70; Staff Member, Hale Observatories, 1948-; Executive Officer for Astronomy, 1964-72; DuBridge Professor, 1970-.

Estelle H. Gregory, Ph.D., *Visiting Associate in Biomedical Engineering*
A.B., University of California, 1966; Ph.D., 1969. Associate Professor, California State University (Los Angeles), 1976-; California Institute, 1979-80.

David M. Grether, Ph.D., *Professor of Economics; Executive Officer for Social Sciences*
B.S., University of California, 1960; Ph.D., Stanford University, 1969. Associate Professor, California Institute, 1970-74; Professor, 1974-; Executive Officer, 1978-.

Joseph E. Griffith, Ph.D., *Research Fellow in Physics*

Jerrold R. Griggs, Ph.D., *Bateman Research Instructor in Mathematics*
B.A., Pomona College, 1973; Ph.D., Massachusetts Institute of Technology, 1977. California Institute, 1977-.

Leonid P. Grishchuk, Ph.D., *Visiting Associate in Physics*

Daniel Grosjean, Ph.D., *Visiting Associate in Chemical Engineering*
M.A., University of Paris, 1964; Ph.D., 1971. Program Manager, Statewide Air Pollution Research Center, University of California (Riverside), 1978-. Research Fellow in Environmental Science, California Institute, 1973-75; Visiting Associate in Chemical Engineering, 1979-80.

Timothy L. Grove, Ph.D., *Visiting Assistant Professor of Geology*

Robert H. Grubbs, Ph.D., *Professor of Chemistry*

John William Grula, Ph.D., *Research Fellow in Biology*

James Edward Gunn, Ph.D., *Professor of Astronomy*
B.A., Rice University, 1961; M.S., California Institute, 1965; Ph.D., 1966. Assistant Professor, 1970-72; Professor, 1972-; Staff Member, Hale Observatories, 1972-.

Mool Chand Gupta, Ph.D., *Senior Research Fellow in Aeronautics*

Jozsef Gyalai, Ph.D., *Visiting Associate in Applied Physics*

Paul Dieter Habich, Ph.D., *Research Fellow in Chemistry*

David Milton Hadley, Ph.D., *Visiting Associate in Geophysics*

Marshall Hall, Jr., Ph.D., *IBM Professor of Mathematics*
B.A., Yale University, 1932; Ph.D., 1936. Professor, California Institute, 1959-73; Executive Officer for Mathematics, 1966-69; IBM Professor, 1973-.

David Hamburg, M.D., *Visiting Associate in Social Sciences*
A.B., Indiana University, 1944; M.D., 1947. Professor of Psychiatry, Stanford University School of Medicine, 1964-; Chairman, Department of Psychiatry, 1969-. President of the Institute of Medicine of the National Academy of Sciences, 1976-. Sherman Fairchild Distinguished Scholar, California Institute, 1974-75; Visiting Associate, 1975-.
Charles Robert Hamilton, Ph.D., Research Associate in Biology

B.S., The University of the South, 1957; Ph.D., California Institute, 1964. Research Fellow, 1964-65; Senior Research Fellow, 1971-74; Research Associate, 1974-.

Alfred M. Handler, Ph.D., Research Fellow in Biology

B.S., State University of New York (Stony Brook), 1972; M.S., University of Oregon, 1974; Ph.D., 1977. California Institute, 1977-.

Ross C. Hardison, Ph.D., Research Fellow in Biology

B.A., Vanderbilt University, 1973; Ph.D., University of Iowa, 1977. California Institute, 1977-.

David Garrison Harkrider, Ph.D., Professor of Geophysics

B.A., Rice University, 1953; M.A., 1957; Ph.D., California Institute, 1963. Associate Professor, 1970-79; Professor, 1979-. Associate Director, Seismological Laboratory, 1977.

Earl C. Harrison, M.D., Visiting Associate in Chemical Engineering

B.A., Iowa State University, 1957; M.D., State University of Iowa Medical School, 1961. Research Affiliate, Jet Propulsion Laboratory, 1972-. Associate Professor of Medicine, Los Angeles County-University of Southern California Medical Center and Director of the Cardiac Clinics, 1971-. California Institute, 1976-.

Paul Richard Hartig, Ph.D., Research Fellow in Chemistry

A.B., St. Louis University, 1971; Ph.D., University of California, 1976. California Institute, 1976-.

Stephen Henry Hartzell, Ph.D., Weizmann Research Fellow in Geophysics


Nancy Ann Mullaney Harvey, Ph.D., Research Fellow in Chemistry


Kenshi Hayashi, Ph.D., Research Fellow in Chemistry

B.S., University of Tokyo, 1968; Ph.D., 1975. California Institute, 1978-.

William Hayes, Sc.D., Sherman Fairchild Distinguished Scholar


Thomas Harrison Heaton, Ph.D., Visiting Associate in Geophysics (PT)


Eri Heller, Ph.D., Spencer Senior Research Fellow in Biology

B.Sc., Israel Institute of Technology, 1964; M.Sc., Hebrew University of Jerusalem, 1965; Ph.D., Weizmann Institute of Science, 1969. Research Fellow, California Institute, 1969-73; Senior Research Fellow, 1973-75; 1977-.

Donald Vincent Helmerberger, Ph.D., Associate Professor of Geophysics

B.S., University of Minnesota, 1961; M.S., University of California (San Diego), 1965; Ph.D., 1967. Assistant Professor, California Institute, 1970-74; Associate Professor, 1974-.

Lambertus Hesselink, Ph.D., Research Fellow in Fluid Mechanics and Lecturer (PT) in Applied Physics

B.S., Twente Institute of Technology, 1970; M.S., California Institute, 1972; Eng., Twente Institute of Technology, 1974; Ph.D., California Institute, 1977. Research Fellow, 1977; Lecturer, 1978-.

Rodney M. Hewick, Ph.D., Visiting Associate in Biology


Yoshinori Hirata, Ph.D., Research Fellow in Chemistry


Jay Hirsch, Ph.D., Research Fellow in Chemistry

B.A., Northwestern University, 1971; Ph.D., Brandeis University, 1976. California Institute, 1976-.

David Hitlin, Ph.D., Associate Professor of Physics


Dennis James Hocevar, Ph.D., Visiting Associate in Biology

B.A., Denison University, 1970; Ph.D., Cornell University, 1978. Assistant Professor, University of Southern California, 1977-. California Institute, 1978-79.
Friedrich Michael Hoffman, Ph.D., *Research Fellow in Chemistry*

Michael J. Hoffmann, Ph.D., *Bateman Research Instructor in Mathematics*

Horst Hoffman, Habil., *Sherman Fairchild Distinguished Scholar*

Stephen John Hogan, Ph.D., *Research Fellow in Applied Mathematics*

Werner Hollander, Ph.D., *Research Fellow in Chemical Engineering*

Tai-Lin Hong, Ph.D., *Research Fellow in Geophysics*
B.S., National Tsing-Hua University, 1972; M.S., 1972; Ph.D., California Institute, 1978. Research Fellow, 1978-.

Leroy E. Hood, M.D., Ph.D., *Ethel Wilson Bowles and Robert Bowles Professor of Biology*
B.S., California Institute, 1960; M.D., The Johns Hopkins University, 1964; Ph.D., California Institute, 1968. Assistant Professor, 1970-73; Associate Professor, 1973-75; Professor, 1975-77; Bowles Professor, 1977-.

Norman Harold Horowitz, Ph.D., *Professor of Biology: Chairman of the Division of Biology*
B.S., University of Pittsburgh, 1936; Ph.D., California Institute, 1939. Research Fellow, 1940-42; Senior Research Fellow, 1946-47; Associate Professor, 1947-53; Professor, 1953--; Executive Officer for Biology, 1971-76; Acting Chairman, Division of Biology, 1973; Chairman, 1977-.

Yoshiki Hotta, M.D., *Gosney Visiting Associate in Biology*
M.D., University of Tokyo, 1963. Associate Professor, 1973-. Research Fellow, California Institute, 1968-72; Visiting Associate, 1979-80.

George William Housner, Ph.D., *Carl F Braun Professor of Engineering* (PT)
B.S., The University of Michigan, 1933; M.S., California Institute, 1934; Ph.D., 1941. Assistant Professor, 1945-49; Associate Professor, 1949-53; Professor, 1953-74; Braun Professor, 1974-.

Albert J. Howard, Jr., Ph.D., *Visiting Associate in Physics*
B.S., Yale University, 1958; M.S., 1959; Ph.D., 1963. Professor, Trinity College, 1974-. California Institute, 1979-80.

Robert Franklin Howard, Ph.D., *Staff Member, Hale Observatories*
B.A., Ohio Wesleyan University, 1954; Ph.D., Princeton University, 1957. Carnegie Fellow, Hale Observatories, 1957-59; Staff Member, 1961-.

Sir Fred Hoyle, D.Sc., *Visiting Associate in Physics*
M.A., University of Cambridge, 1939; D.Sc., University of Norwich, 1967; University of Leeds, 1969. Visiting Professor of Astronomy, California Institute, 1953; 1954; 1956; Addison White Greenway Visiting Professor of Astronomy; Staff Member, Hale Observatories, 1957-62; Visiting Associate, 1963; Sherman Fairchild Distinguished Scholar, 1974-75; Visiting Associate, 1978-79; 1979-80.

Charles Frank Hoyng, Ph.D., *Research Fellow in Chemistry*
B.S., Miami University (Ohio), 1972; Ph.D., Massachusetts Institute of Technology, 1976. California Institute, 1976-.

Henry Vincent Huang, Ph.D., *Research Fellow in Biology*
A.B., Occidental College, 1972; Ph.D., California Institute, 1977. Research Fellow, 1977-.

Donald Ellis Hudson, Ph.D., *Professor of Mechanical Engineering and Applied Mechanics*
B.S., California Institute, 1938; M.S., 1939; Ph.D., 1942. Instructor of Machine Design, 1942-43; Assistant Professor of Mechanical Engineering, 1943-49; Associate Professor, 1949-55; Professor, 1955-63; Professor of Mechanical Engineering and Applied Mechanics, 1963-.

A. James Hudspeth, M.D., Ph.D., *Associate Professor of Biology*
Edward Wesley Hughes, Ph.D., Senior Research Associate in Chemistry, Emeritus
B.Chem., Cornell University, 1924; Ph.D., 1935. Research Fellow, California Institute, 1938-43; Senior Research Fellow, 1945-46; Research Associate, 1946-74; Senior Research Associate, Emeritus, 1974-.

Thomas Joseph Hughes, Ph.D., Associate Professor of Structural Mechanics
B.S., Pratt Institute, 1965; M.S., University of California, 1974; Ph.D., 1974. Assistant Professor, California Institute, 1976-79; Associate Professor, 1979-.

Floyd Bernard Humphrey, Ph.D., Professor of Electrical Engineering and Applied Physics
B.S., California Institute, 1950; Ph.D., 1956. Senior Research Fellow, 1960-64; Associate Professor of Electrical Engineering, 1964-71; Professor, 1971-74; Professor of Electrical Engineering and Applied Physics, 1974-.

John Clifton Huneke, M.S., Research Associate in Geochemistry
B.S., University of Redlands, 1961; M.S., University of Minnesota, 1964. Senior Research Fellow, California Institute, 1972-78; Research Associate, 1978-.

Michael W. Hunkapiller, Ph.D., Senior Research Fellow in Biology
B.S., Oklahoma Baptist University, 1970; Ph.D., California Institute, 1974. Research Fellow in Chemistry, 1974-77; Research Fellow in Biology, 1977; Senior Research Fellow, 1977-.

Stirling L. Huntley, Ph.D., Lecturer in Drama; Associate Dean of Graduate Studies; Director of Admissions
B.A., University of California (Los Angeles), 1945; M.S., 1949; Ph.D., Stanford University, 1956. Associate Dean of Graduate Studies, California Institute, 1971-; Lecturer, 1973-; Director of Admissions and Financial Aid, 1973-76; Director of Admissions, 1976-.

Edward Hutchings, Jr., B.A., Lecturer in Journalism (PT)

Ardon Robin Hyland, Ph.D., Visiting Associate in Physics

Michael T. Hyson, Ph.D., Research Fellow in Biology

Andrew Perry Ingersoll, Ph.D., Professor of Planetary Science
B.A., Amherst College, 1960; A.M., Harvard University, 1961; Ph.D., 1966. Assistant Professor, California Institute, 1966-71; Associate Professor, 1971-76; Professor, 1976-; Staff Associate, Hale Observatories, 1971-.

Robert Ellsworth Ireland, Ph.D., Professor of Organic Chemistry
B.A., Amherst College, 1951; M.S., University of Wisconsin, 1953; Ph.D., 1954. California Institute, 1965-.

Frank Pieter Israel, Ph.D., Research Fellow in Radio Astronomy
Ph.D., Leiden State University, 1976. California Institute, 1977-.

Keiichi Itakura, Ph.D., Visiting Associate in Chemistry (PT)
B.Sc., Tokyo College of Pharmacy, 1965; M.Sc., 1967; Ph.D., 1970. Associate Research Scientist, City of Hope. California Institute, 1976-.

Wilfred Dean Iwan, Ph.D., Professor of Applied Mechanics
B.S., California Institute, 1957; M.S., 1958; Ph.D., 1961. Assistant Professor, 1964-67; Associate Professor, 1967-72; Professor, 1972-.

Seid Hossein Izadpanah, Ph.D., Visiting Associate in Applied Physics
B.S., Tehran University, 1964; M.Sc., University College (London), 1966; Ph.D., Sheffield University, 1969. Associate Professor, Pahlavi University, 1969-. California Institute, 1978-79.

Deane Brunton Jacques, M.D., Visiting Associate in Biomedical Engineering
B.S., Colorado State University, 1965; M.D., University of Colorado, 1969. Research Fellow in Biology, California Institute, 1975-79; Visiting Associate in Biomedical Engineering, 1979-.

Kenneth C. Janda, Ph.D., Arthur Amos Noyes Instructor in Chemical Physics
Augustus Josephus Elizabeth Maria Janssen, Ph.D., *Bateman Research Instructor in Mathematics*


Paul Christian Jennings, Ph.D., *Professor of Civil Engineering and Applied Mechanics; Executive Officer for Civil Engineering and Applied Mechanics*

B.S., Colorado State University, 1958; M.S., California Institute, 1960; Ph.D., 1963. Research Fellow in Civil Engineering, 1965; Assistant Professor of Applied Mechanics, 1966-68; Associate Professor, 1968-72; Professor, 1972-77; Professor of Civil Engineering and Applied Mechanics, 1977--; Executive Officer, 1975--.

Fritz John, Ph.D., *Sherman Fairchild Distinguished Scholar*

Ph.D., Göttingen University, 1933. Professor, Courant Institute of Mathematical Sciences, 1977-. California Institute, 1979-80.

Denis Johnson, Ph.D., *Visiting Associate in Mathematics* (PT)

Ph.D., University of California (Los Angeles), 1968. Senior Engineer, Jet Propulsion Laboratory, 1970-. California Institute, 1979-80.

Tracy Johnson, Ph.D., *Visiting Associate in Geophysics*


William Lewis Johnson, Ph.D., *Assistant Professor of Materials Science*

B.A., Hamilton College, 1970; Ph.D., California Institute, 1975. Assistant Professor, 1976-.

Louis Winchester Jones, A.B., *Dean of Admissions, Emeritus*

A.B., Princeton University, 1922. Instructor in English, California Institute, 1925-37; Assistant Professor, 1937-43; Registrar, 1942-52; Associate Professor, 1943-68; Dean of Admissions; Director of Undergraduate Scholarships, 1937-68; Dean Emeritus, 1968-.

William Thomas Jones, Ph.D., *Professor of Philosophy* (PT)

A.B., Swarthmore College, 1931; B.Litt., Oxford University, 1933; A.M., Princeton University, 1936; Ph.D., 1937. Visiting Professor, California Institute, 1970-72; Andrew W. Mellon Professor, 1972-73; Professor, 1973--.

James Schuyler Jordan, Jr., Ph.D., *Visiting Associate Professor of Economics*

B.A., Cornell University, 1970; Ph.D., Northwestern University, 1975. Assistant Professor, University of Minnesota, 1976-. California Institute, 1979-80.

Richard P. Junghans, Ph.D., *Research Fellow in Chemistry*

A.B., Harvard College, 1971; Ph.D., University of California, 1975. California Institute, 1976-.

David B. Kaback, Ph.D., *Research Fellow in Chemistry*

B.S., State University of New York, 1971; Ph.D., Brandeis University, 1976. California Institute, 1975-.

Leonard Konrad Kaczmarek, Ph.D., *Spencer Senior Research Fellow in Biology*


Thomas Kaiser, Ph.D., *Research Fellow in Geochemistry*

Ph.D., University of Bern (Switzerland), 1977. California Institute, 1978-79.

James T. Kajiya, Ph.D., *Assistant Professor of Computer Science*


Walter Barclay Kamb, Ph.D., *Professor of Geology and Geophysics; Chairman of the Division of Geological and Planetary Sciences*

B.S., California Institute, 1952; Ph.D., 1956. Assistant Professor of Geology, 1956-60; Associate Professor, 1960-62; Professor, 1962-63; Professor of Geology and Geophysics, 1963--; Division Chairman, 1972-.

Hiroo Kanamori, Ph.D., *Professor of Geophysics*

B.S., Tokyo University, 1959; M.S., 1961; Ph.D., 1964. Research Fellow, California Institute, 1965-66; Professor, 1972-.

Irving Kaplan, Ph.D., *Sherman Fairchild Distinguished Scholar*

B.A., University of Toronto, 1938; M.A., 1939; Ph.D., Harvard University, 1941. George Herbert Mead Distinguished Service Professor, The University of Chicago, 1968-. California Institute, 1979-80.
Sergei Fedor Karpenko, Ph.D., Visiting Associate in Geochemistry

Takushi Kasamatsu, M.D., Spencer Senior Research Fellow in Biology
B.S., Osaka University, 1959; M.D., 1963. California Institute, 1975-.

Lawrence Michael Kauvar, Ph.D., Research Fellow in Biology

Ralph William Kavanagh, Ph.D., Professor of Physics
B.A., Reed College, 1950; M.A., University of Oregon, 1952; Ph.D., California Institute, 1956. Research Fellow, 1956-58; Senior Research Fellow, 1958-60; Assistant Professor, 1960-65; Associate Professor, 1965-70; Professor, 1970-.

Alexander S. Kechris, Ph.D., Associate Professor of Mathematics
M.S., National Technological University (Athens), 1969; Ph.D., University of California (Los Angeles), 1972. Assistant Professor, California Institute, 1974-76; Associate Professor, 1976-.

Herbert Bishop Keller, Ph.D., Professor of Applied Mathematics
B.E.E., Georgia Institute of Technology, 1945; M.A., New York University, 1948; Ph.D., 1954. Visiting Professor of Applied Mathematics, California Institute, 1965-66; Professor, 1967-.

Vernal Harris Kenner, Ph.D., Senior Research Fellow in Aeronautics
B.S., University of California, 1965; M.S., 1967; Ph.D., 1971. California Institute, 1978-.

Rosemary G. Kennett, Ph.D., Research Fellow in Physics
B.Sc., Northwestern University, 1972; Ph.D., California Institute, 1979. Research Fellow, 1979-80.

Gregory Ketabgian, M.D., Director of Health Services
B.A., University of California (Los Angeles), 1959; M.D., University of Southern California Medical School, 1963. California Institute, 1973-.

Daniel Jerome Kevles, Ph.D., Professor of History: Executive Officer for the Humanities
A.B., Princeton University, 1960; Ph.D., 1964. Assistant Professor, California Institute, 1964-68; Associate Professor, 1968-78; Professor, 1978-; Executive Officer, 1978-.

D. Roderick Kiewiet, Ph.D., Assistant Professor of Political Science
B.A., University of Iowa, 1974; Ph.D., Yale University, 1979. California Institute, 1979-.

Karen Linnea Hartsuyker Kindle, Ph.D., Research Fellow in Chemistry
B.S., Cornell University, 1973; Ph.D., University of California (San Diego), 1978. California Institute, 1978-.

Thomas John Kirstenmacher, Ph.D., Visiting Associate in Chemistry
B.S., Iowa State University, 1965; Ph.D., University of Illinois, 1969. Associate Professor, The Johns Hopkins University, 1976-. Research Fellow, California Institute, 1969-71; Visiting Associate Professor, 1978-79; Visiting Associate, 1979.

Arthur Louis Klein, Ph.D., Professor of Aeronautics, Emeritus
B.S., California Institute, 1921; M.S., 1924; Ph.D., 1925. Research Fellow in Physics and Aeronautics, 1927-29; Assistant Professor of Aeronautics, 1929-34; Associate Professor, 1934-54; Professor, 1954-68; Professor Emeritus, 1968-.

Burton H. Klein, Ph.D., Professor of Economics
A.B., Harvard College, 1940; Ph.D., Harvard University, 1948. California Institute, 1967-.

Stanley A. Klein, Ph.D., Visiting Associate in Biology
B.S., California Institute, 1961; M.A., Brandeis University, 1965; Ph.D., 1967. Associate Professor, Claremont Colleges, 1967-. Visiting Associate, California Institute, 1974-.

William Anthony Kleschick, Ph.D., Research Fellow in Chemistry
B.S., North Carolina State University, 1972; Ph.D., University of California, 1976. California Institute, 1978-.

Gillian R. Knapp, Ph.D., Senior Research Fellow in Radio Astronomy
B.Sc., University of Edinburgh, 1966; Ph.D., University of Maryland, 1972. Research Fellow, California Institute, 1974-76; Senior Research Fellow, 1976-; Staff Member, Owens Valley Radio Observatory, 1976-.
Wolfgang Gustav Knauss, Ph.D., Professor of Aeronautics
B.S., California Institute, 1958; M.S., 1959; Ph.D., 1963. Research Fellow, 1963-65; Associate Professor, 1965-69; Associate Professor, 1969-78; Professor, 1978.

James Kenyon Knowles, Ph.D., Professor of Applied Mechanics
B.S., Massachusetts Institute of Technology, 1952; Ph.D., 1957. Assistant Professor, California Institute, 1958-61; Associate Professor, 1961-65; Professor, 1965-; Academic Officer, 1972-75.

Eric Ingrald Knudsen, Ph.D., Research Fellow in Biology
B.A., University of California (Santa Barbara), 1971; M.A., 1973; Ph.D., University of California (San Diego), 1976. California Institute, 1976-.

James Kenyon Knowles, Ph.D., Professor of Applied Mechanics
B.S., Massachusetts Institute of Technology, 1952; Ph.D., 1957. Assistant Professor, California Institute, 1958-61; Associate Professor, 1961-65; Professor, 1965-; Academic Officer, 1972-75.

Eric Ingrald Knudsen, Ph.D., Research Fellow in Biology
B.A., University of California (Santa Barbara), 1971; M.A., 1973; Ph.D., University of California (San Diego), 1976. California Institute, 1976-.

Joseph Blake Koepfli, D.Phil., Senior Research Associate in Chemistry; Emeritus
A.B., Dartmouth College, 1924; M.A., 1925; D.Phil., Oxford University, 1928. Research Associate, California Institute, 1928-71; Senior Research Associate Emeritus, 1971-.

Robert C.Y. Koh, Ph.D., Research Associate in Environmental Engineering Science

Edward W. Kolb, Ph.D., Research Fellow in Physics

Masakazu Konishi, Ph.D., Professor of Biology; Executive Officer for Biology
B.S., Hokkaido University, 1956; M.S., 1958; Ph.D., University of California, 1963. Professor, California Institute, 1975-78; Executive Officer, 1977-.

Ronald J. Konopka, Ph.D., Assistant Professor of Biology
B.S., University of Dayton, 1967; Ph.D., California Institute, 1972. Assistant Professor, 1975-.

Steven E. Koonin, Ph.D., Associate Professor of Physics
B.S., California Institute, 1972; Ph.D., Massachusetts Institute of Technology, 1975. Assistant Professor, California Institute, 1975-78; Associate Professor, 1978-.

Joseph Morgan Kousser, Ph.D., Professor of History
A.B., Princeton University, 1965; M.Phil., Yale University, 1968; Ph.D., 1971. Instructor, California Institute, 1969-71; Assistant Professor, 1971-74; Associate Professor, 1974-79; Professor, 1979-.

Robert Paul Kraft, Ph.D., Sherman Fairchild Distinguished Scholar

Heinz-Otto Kreiss, Dr.Tech., Docent, Professor of Applied Mathematics
Dipl., University of Hamburg, 1955; Lic., Royal Institute of Technology (Sweden), 1960; Dr.Tech., 1960; University of California, 1978-.

Joseph B. Krieger, Ph.D., Visiting Associate in Physics

Jerome Kristian, Ph.D., Staff Member, Hale Observatories
A.B., Shimer College (Illinois), 1953; M.S., The University of Chicago, 1956; Ph.D., 1962. Research Fellow in Astronomy, California Institute, 1967-68; Staff Member, Hale Observatories, 1968-.

John P. Kroeker, Ph.D., Research Fellow in Bioinformatics Systems

Hans-Jörn Kruse, Dr. rer. pol., Visiting Associate in Economics
Dipl., University of Hamburg, 1974; Dr. rer. pol., 1978. Visiting Associate, California Institute, 1979-80.

Toshi Kubota, Ph.D., Professor of Aeronautics
B.E., Tokyo University, 1947; M.S., California Institute, 1952; Ph.D., 1957-59; Assistant Professor, 1959-63; Associate Professor, 1963-71; Professor, 1971-.

Vijay Anand Kulkarny, Ph.D., Senior Research Fellow in Aeronautics
B.Tech., Indian Institute of Technology, 1969; Ph.D., California Institute, 1975. Research Fellow and Lecturer, 1975-76; Research Fellow, 1976-78; Senior Research Fellow, 1978.
Donna Marie Kunert, Ph.D., Research Fellow in Chemistry

Aron Kuppermann, Ph.D., Professor of Chemical Physics

Mark J. Kushner, Ph.D., Weizmann Research Fellow in Applied Physics

Vladimir Nikolayevich Kuzmin, Docent, Visiting Associate in Applied Physics

Jeniyoy La Belle, Ph.D., Associate Professor of English
B.A., University of Washington, 1965; Ph.D., University of California (San Diego), 1969. Assistant Professor, California Institute, 1969-76; Associate Professor, 1977-.

Barry James Labonte, Ph.D., Research Fellow in Astronomy

Klaus Stephan Lackner, Ph.D., Research Fellow in Theoretical Physics

Paco Axel Lagerstrom, Ph.D., Professor of Applied Mathematics
Fil.kand., University of Stockholm, 1935; Fil.lic., 1939; Ph.D., Princeton University, 1942. Research Associate in Aeronautics, California Institute, 1946-47; Assistant Professor, 1947-49; Associate Professor, 1949-52; Professor, 1952-66; Professor of Applied Mathematics, 1967-.

Aurora Mamaung Landel, Ph.D., Visiting Associate in Biomedical Engineering
B.S., University of the Philippines, 1949; M.S., The University of Wisconsin, 1952; Ph.D., 1955. Research Fellow in Chemistry, California Institute, 1968-71; Senior Research Fellow in Biomedical Engineering, 1975-78; Visiting Associate, 1978-.

Robert Vose Langmuir, Ph.D., Professor of Electrical Engineering
A.B., Harvard College, 1935; Ph.D., California Institute, 1943. Senior Research Fellow, 1948-50; Assistant Professor, 1950-52; Associate Professor, 1952-57; Professor, 1957-.

John W. Larimer, Ph.D., Visiting Professor of Geochemistry
B.A., Lehigh University, 1962; M.S., 1963; Ph.D., 1966. Professor and Associate Director of Center for Meteorite Studies, Arizona State University (Tempe), 1977-. California Institute, 1979.

Laurence A. Lasky, Ph.D., Research Fellow in Biology

Silvanus S. Lau, Ph.D., Senior Research Fellow in Applied Physics; Lecturer (PT) in Materials Science
B.S., University of California, 1964; M.S., 1966; Ph.D., 1969. Bechtel Instructor in Materials Science, California Institute, 1972-74; Senior Research Fellow in Applied Physics, 1974-; Lecturer in Materials Science, 1974-.

Richard M. Lawn, Ph.D., Research Fellow in Biology
M.A., University of Colorado, 1974; Ph.D., 1977. California Institute, 1977-.

Elias Lazarides, Ph.D., Assistant Professor of Biology
B.A., Wesleyan University, 1971; Ph.D., Harvard University, 1975. California Institute, 1977-.

Leslie Gary Leal, Ph.D., Professor of Chemical Engineering
B.S., University of Washington, 1965; Ph.D., Stanford University, 1969. Assistant Professor, California Institute, 1970-75; Associate Professor, 1975-78; Professor, 1978-.

Amy Shiu Lee, Ph.D., Senior Research Fellow in Biology
B.A., University of California, 1970; M.Sc., California Institute, 1972; Ph.D., 1975. Research Fellow, 1974-78; Senior Research Fellow, 1978-.

David M. Lee, Ph.D., Research Fellow in Earthquake Engineering

Jo Woong Lee, Ph.D., Visiting Associate in Chemistry
M.S., Seoul National University, 1964; Ph.D., California Institute, 1970. Assistant Professor, Seoul National University, 1972-. Visiting Associate, California Institute, 1979-80.
Paul L. S. Lee, Ph.D., Visiting Associate in Physics
B.S., California Institute, 1967; M.S., 1969; Ph.D., 1971. Assistant Professor, California State University (Northridge), 1975-. Research Fellow, California Institute, 1971-73; Visiting Associate, 1978.

Lester Lees, M.S., Professor of Environmental Engineering and Aeronautics
S.B., Massachusetts Institute of Technology, 1940; M.S., 1941. Associate Professor, California Institute, 1953-55; Professor, 1955-. Director, Environmental Quality Laboratory, 1971-74.

Robert Benjamin Leighton, Ph.D., Professor of Physics
B.S., California Institute, 1941; M.S., 1944; Ph.D., 1947. Research Fellow, 1947-49; Assistant Professor, 1949-53; Associate Professor, 1953-59; Professor, 1959-. Chairman, Division of Physics, Mathematics and Astronomy, 1970-75; Staff Member, Hale Observatories, 1963-. Staff Member, Owens Valley Radio Observatory, 1976-.

Jean-Pierre Gaston Lemaistre, Ph.D., Research Fellow in Chemistry

James R. Lesh, Ph.D., Lecturer in Electrical Engineering

Henry A. Lester, Ph.D., Associate Professor of Biology
A.B., Harvard College, 1966; Ph.D., The Rockefeller University, 1971. Assistant Professor, California Institute, 1973-76; Associate Professor, 1976-.

Leslie Sise Leutwiler, Ph.D., Research Fellow in Biology

Zeev Lev, Ph.D., Research Fellow in Biology
B.A., Tel Aviv University, 1972; Ph.D., Technion-Israel Institute of Technology (Haifa), 1977. California Institute, 1977-.

William Russell Levick, M.B.B.S., Sherman Fairchild Distinguished Scholar

Louise Leven, Ph.D., Weizmann Research Fellow in Geology

Michael E. Levine, J.D., Luce Professor of Law and Social Change (PT)
in the Technological Society
B.A., Reed College, 1962; J.D., Yale University, 1965. Professor of Law, University of Southern California, 1972-. California Institute, 1973-.

Rachmiel Levine, M.D., Visiting Associate in Chemical Engineering (PT)
B.A., McGill University, 1932; M.D., 1936. Director, City of Hope Medical Center (Duarte), 1971-. Visiting Associate in Biomedical Engineering, 1973-79; Visiting Associate in Chemical Engineering, 1979-.

Edward B. Lewis, Ph.D., Thomas Hunt Morgan Professor of Biology
B.A., University of Minnesota, 1939; Ph.D., California Institute, 1942. Instructor, 1946-48; Assistant Professor, 1948-49; Associate Professor, 1949-56; Professor, 1956-66; Morgan Professor, 1966-.

Stephen Howard Lieberman, Ph.D., Research Fellow in Environmental Engineering Science

Barry R. Lienert, Ph.D., Research Fellow in Geophysics
B.Sc., Victoria University of Wellington, 1969; M.Sc., 1972; Ph.D., The University of Texas (Dallas), 1976. California Institute, 1977-.

Hans Wolfgang Liepmann, Ph.D., Charles Lee Powell Professor of Fluid Mechanics and Thermodynamics; Director of the Graduate Aeronautical Laboratories; Executive Officer for Aeronautics
Ph.D., University of Zurich, 1938. Assistant Professor of Aeronautics, California Institute, 1939-46; Associate Professor, 1946-49; Professor of Aeronautics, 1949-74; Professor of Aeronautics and Applied Physics, 1974-76; Powell Professor, 1976-; Director, 1972-; Executive Officer, 1976-.
Sung Chang Lin, Ph.D., Research Fellow in Chemical Engineering
B.S., National Tsing-Hua University, 1970; M.S., Cleveland State University, 1974; Ph.D., University of Washington, 1978. California Institute, 1978-79.

Frederick Charles Lindvall, Ph.D., D.Sc., D.Eng., Professor of Engineering, Emeritus
B.S., University of Illinois, 1924; Ph.D., California Institute, 1928. Instructor in Electrical Engineering, 1930-31; Assistant Professor, 1931-37; Associate Professor of Electrical and Mechanical Engineering, 1937-41; Professor, 1942-70; Chairman, Division of Engineering and Applied Science, 1945-69; Professor Emeritus, 1970-.

Steven Arthur Lippman, Ph.D., Visiting Professor of Business Economics
A.B., University of California, 1964; M.S., Stanford University, 1967; Ph.D., 1968. Professor, Graduate School of Management, University of California (Los Angeles), 1976-. California Institute, 1979-80.

Ericson John List, Ph.D., Professor of Environmental Engineering Science
B.E., University of Auckland, 1961; M.E., 1962; Ph.D., California Institute, 1965. Research Fellow, 1965-66; Assistant Professor, 1969-72; Associate Professor, 1972-78; Professor, 1978-.

Kon-Kee Liu, Ph.D., Research Fellow in Geochemistry
B.S., National Tsing-Hua University (Taiwan), 1971; Ph.D., University of California (Los Angeles), 1979. California Institute, 1979-80.

Wing-Ki Liu, Ph.D., Visiting Associate in Chemistry

Kwok-Yung Lo, Ph.D., Senior Research Fellow in Radio Astronomy
S.B., Massachusetts Institute of Technology, 1969; Ph.D., 1974. California Institute, 1978-.

Joann S. Loehr, Ph.D., Visiting Associate in Chemistry
B.S., Cornell University, 1964; Ph.D., 1969. Associate Professor, Portland State University, 1976-. California Institute, 1978-79.

Thomas Michael Loehr, Ph.D., Visiting Associate in Chemistry
B.S., The University of Michigan, 1963; Ph.D., Cornell University, 1967. Associate Professor, Oregon Graduate Center, 1974-. California Institute, 1978-79.

James C. Long, Ph.D., Instructor in Electrical Engineering
B.S., California Polytechnic College (San Luis Obispo), 1969; M.S., Stanford University, 1972; Ph.D., 1976. California Institute, 1976-.

Michael S. Longuet-Higgins, Ph.D., Visiting Associate in Applied Mathematics (PT)

Gary A. Lorden, Ph.D., Professor of Mathematics
B.S., California Institute, 1962; Ph.D., Cornell University, 1966. Assistant Professor, California Institute, 1968-71; Associate Professor, 1971-77; Professor, 1977-.

Heinz Adolph Lowenstam, Ph.D., Professor of Paleoeology
Ph.D., The University of Chicago, 1939. California Institute, 1952-.

Peter Herman Lowy, Doctorandum, Research Associate in Biology
Doctorandum, University of Vienna, 1936. Research Fellow, California Institute, 1949-65; Senior Research Fellow, 1965-72; Research Associate, 1972-.

Jens Ludwig, Ph.D., Research Fellow in Physics
B.S., Technical University of Clausthal (Germany), 1969; M.S., University of Hamburg, 1973; Ph.D., 1977. California Institute, 1977-.

Vanessa Ruth Lum, Ph.D., Research Fellow in Chemistry
B.S., The University of Chicago, 1972; Ph.D., University of Southern California, 1978. California Institute, 1978-.

Rein Luus, Ph.D., Visiting Associate in Chemistry
Wilhemus A. J. Luxemburg, Ph.D., Professor of Mathematics; Executive Officer for Mathematics
B.A., University of Leiden, 1950; M.A., 1953; Ph.D., Delft Institute of Technology, 1955. Assistant Professor, California Institute, 1958-60; Associate Professor, 1960-62; Professor, 1962-; Executive Officer, 1970-.

George Eber MacGinitie, M.A., Professor of Biology, Emeritus
A.B., Fresno State College, 1925; M.A., Stanford University, 1928. California Institute, 1932-57; Professor Emeritus, 1957-.

Gordon Cameron Machray, Ph.D., Gosney Research Fellow in Biology
B.Sc., Glasgow University, 1974; Ph.D., Edinburgh University, 1977. California Institute, 1977-.

Edward S. Macias, Ph.D., Visiting Associate in Chemistry
A.B., Colgate University, 1966; Ph.D., Massachusetts Institute of Technology, 1970. Associate Professor, Washington University, 1976- California Institute, 1978-79.

Bruce Edward MacNeal, Ph.D., Research Fellow in Applied Physics (PT)

G. S. Maddala, Ph.D., Sherman Fairchild Distinguished Scholar

Martti Olavi Tuomas Maenpaa, Ph.D., Research Fellow in Applied Physics

Kiran Ramanlal Magiawala, Ph.D., Research Fellow in Jet Propulsion

Oscar Mandel, Ph.D., Professor of English
B.A., New York University, 1947; M.A., Columbia University, 1948; Ph.D., The Ohio State University, 1951. Visiting Associate Professor, California Institute, 1961-62; Associate Professor, 1962-68; Professor, 1968-.

Thomas P. Maniatis, Ph.D., Professor of Biology
B.A., University of Colorado, 1965; M.A., 1967; Ph.D., Vanderbilt University, 1971. Associate Professor, California Institute, 1977-79; Professor, 1979-.

Steven Leonard Manley, Ph.D., Research Fellow in Environmental Engineering Science

Frank Earl Marble, Ph.D., Professor of Jet Propulsion and Mechanical Engineering
B.S., Case Institute of Technology, 1940; M.S., 1942; A.E., California Institute, 1947; Ph.D., 1948. Instructor, 1948-49; Assistant Professor, 1949-53; Associate Professor, 1953-57; Professor, 1957-.

Rudolph A. Marcus, Ph.D., Arthur Amos Noyes Professor of Chemistry
B.Sc., McGill University, 1943; Ph.D., 1946. California Institute, 1978-.

Shlomo Margalit, D.Sc., Visiting Associate in Applied Physics

Shlomo Margel, Ph.D., Research Fellow in Chemistry
B.Sc., Bar Han University (Israel), 1970; M.Sc., Weizmann Institute of Science, 1972; Ph.D., 1976. California Institute, 1976-.

Vasilis Zisis Marmarelis, Ph.D., Visiting Associate in Bioinformation Systems

Kenneth Albert Marsh, Ph.D., Senior Research Fellow in Astronomy
B.Sc., University of Canterbury, 1970; M.Sc., 1971; Ph.D., York University, 1975. Research Fellow, California Institute, 1975-76; Senior Research Fellow, 1979-. Hale Observatories, 1975-.

Richard Edward Marsh, Ph.D., Research Associate in Chemistry
B.S., California Institute, 1943; Ph.D., University of California (Los Angeles), 1950. Research Fellow, California Institute, 1950-55; Senior Research Fellow, 1955-73; Research Associate, 1973-. 
Hardy Cross Martel, Ph.D., Associate Professor of Electrical Engineering; Executive Assistant to the President; Secretary of the Board of Trustees

B.S., California Institute, 1949; M.S., Massachusetts Institute of Technology, 1950; Ph.D., California Institute, 1956. Instructor, 1953-55; Assistant Professor, 1955-58; Associate Professor, 1958--; Executive Assistant to the President, 1969--; Secretary, 1973-.

Bahram Mashhoon, Ph.D., Research Fellow and Lecturer in Physics


Colin R. Masson, Ph.D., Research Fellow in Radio Astronomy


Akio Masuyama, Dr.Eng., Visiting Associate in Electrical Engineering


Jon Mathews, Ph.D., Professor of Theoretical Physics (LOA)

B.A., Pomona College, 1952; Ph.D., California Institute, 1957. Instructor, 1957-59; Assistant Professor, 1959-62; Associate Professor, 1962-66; Professor, 1966--; Executive Officer for Physics, 1970-76.

Osamu Matsubaya, Ph.D., Visiting Associate in Geochemistry

B.S., Tokyo Kyoiku University, 1963; Ph.D., 1969. Associate Professor, Institute for Thermal Spring Research, Okayama University, 1976-. California Institute, 1977-.

Samuel Eugene Matteson, Ph.D., Research Fellow in Applied Physics

B.S., Baylor University, 1969; Ph.D., 1976. California Institute, 1976-.

James Walter Mayer, Ph.D., Professor of Electrical Engineering; Master of Student Houses

B.S., Purdue University, 1952; Ph.D., 1959. Associate Professor, California Institute, 1967-71; Professor, 1971--; Master of Student Houses, 1975-.

George P. Mayhew, Ph.D., Professor of English (LOA)

A.B., Harvard College, 1941; M.A., Harvard University, 1947; Ph.D., 1953. Assistant Professor, California Institute, 1954-60; Associate Professor, 1960-68; Professor, 1968--.

James Oeland McCallin, Ph.D., Professor of Applied Physics and Electrical Engineering

B.A., The University of Texas, 1944; Ph.D., California Institute, 1954. Associate Professor of Applied Science, 1968-73; Professor of Applied Science and Electrical Engineering, 1973-76; Professor of Applied Physics and Electrical Engineering, 1976--.

Gilbert Donald McCann, Ph.D., Professor of Applied Science

B.S., California Institute, 1934; M.S., 1935; Ph.D., 1939. Associate Professor of Electrical Engineering, 1946-47; Professor, 1947-66; Professor of Applied Science, 1966--; Director, Willis H. Booth Computing Center, 1966-71.

Terrence J. McDonald, Ph.D., Mellon Postdoctoral Instructor in History


Thomas R. McDonough, Ph.D., Lecturer in Engineering (PT)


Thomas C. McGill, Ph.D., Professor of Applied Physics

B.S., Lamar State College of Technology, 1964; M.S., California Institute, 1965; Ph.D., 1969. Assistant Professor, 1971-74; Associate Professor, 1974-77; Professor, 1977-.

Jack Edward McKee, Sc.D., D.Eng., Professor of Environmental Engineering

B.S., Carnegie Institute of Technology, 1936; M.S., Harvard University, 1939; Sc.D., 1941. Associate Professor of Sanitary Engineering, California Institute, 1949-56; Professor, 1956-60; Professor of Environmental Health Engineering, 1960-70; Professor of Environmental Engineering, 1970-.

Richard D. McKeelvey, Ph.D., Professor of Political Science


Lionel W. McKenzie, Ph.D., Visiting Professor of Economics

Basil Vincent McKoy, Ph.D., Professor of Theoretical Chemistry  
B.S., Nova Scotia Technical College, 1960; Ph.D., Yale University, 1964. Noyes Research Instructor in Chemistry, California Institute, 1964-66; Assistant Professor of Theoretical Chemistry, 1967-69; Associate Professor, 1969-75; Professor, 1975-.

Minnie McMillan, Ph.D., Senior Research Fellow in Biology  
B.A., Somerville College, Oxford, 1964; B.Sc., 1965; Ph.D., 1967. Research Fellow, California Institute, 1969-73; Senior Research Fellow, 1975-.

Karen Cook McNally, Ph.D., Senior Research Fellow in Geophysics  
A.B., University of California, 1971; M.A., 1973; Ph.D., 1976. Research Fellow, California Institute, 1976-77; Senior Research Fellow, 1978-.

Sigrid R. McPherson, Ph.D., Lecturer in Psychology  

Carver Andress Mead, Ph.D., Professor of Computer Science and Electrical Engineering  
B.S., California Institute, 1956; M.S., 1957; Ph.D., 1960. Instructor in Electrical Engineering, 1958-59; Assistant Professor, 1959-62; Associate Professor, 1962-67; Professor, 1967-77; Professor of Computer Science and Electrical Engineering, 1977-.

David Lawrence Meier, Ph.D., Research Fellow in Theoretical Astrophysics  

George Robert Mellman, Ph.D., Research Fellow in Geophysics  

Pamela L. Mellon, Ph.D., Weizmann Research Fellow in Biology  
A.B., University of California (Santa Cruz), 1975; Ph.D., University of California, 1979. California Institute, 1979-80.

James Edgar Mercereau, Ph.D., D.Sc., Professor of Physics and Applied Physics  
B.A., Pomona College, 1953; M.S., University of Illinois, 1954; Ph.D., California Institute, 1959. Assistant Professor of Physics, 1959-62; Visiting Associate, 1964-65; Research Associate, 1965-69; Professor of Physics, 1969-74; Professor of Physics and Applied Physics, 1974-.

Christian Gottfried Merkel, Ph.D., Research Fellow in Biology  
B.A., University of Cincinnati, 1969; M.A., University of California (Santa Barbara), 1971; Ph.D., University of Cincinnati, 1976. California Institute, 1976-.

Robert Lee Messner, Ph.D., Research Fellow in Physics  

Richard Alvin Mewaldt, Ph.D., Senior Research Fellow in Physics  
B.A., Lawrence University, 1965; M.A., Washington University, 1967; Ph.D., 1971. Research Fellow, California Institute, 1971-75; Senior Research Fellow, 1975-.

David Joseph Meyer, Ph.D., Research Fellow in Biology  

Ronald Leo Meyer, Ph.D., Senior Research Fellow in Biology  
B.A., Don Bosco College, 1966; Ph.D., California Institute, 1974. Research Fellow, 1974-77; Senior Research Fellow, 1977-.

Elliot M. Meyerowitz, Ph.D., Assistant Professor of Biology  
A.B., Columbia University, 1973; M.Phil., Yale University, 1975; Ph.D., 1977. California Institute, 1979-.

Gabor Mezey, Ph.D., Research Fellow in Applied Physics  

Josef Michl, Ph.D., Visiting Professor of Chemistry  
M.S., Charles University (Prague), 1961; Ph.D., Czechoslovak Academy of Science (Prague), 1965. Professor, The University of Utah, 1975-. California Institute, 1979-80.

Alan Rolf Mickelson, Ph.D., Research Fellow in Electrical Engineering  
Robert David Middlebrook, Ph.D., Professor of Electrical Engineering
B.A., University of Cambridge, 1952; M.S., Stanford University, 1953; Ph.D., 1955. Assistant Professor, California Institute, 1955-58; Associate Professor, 1958-65; Professor, 1965-.

Julius Miklowitz, Ph.D., Professor of Applied Mechanics
B.S., The University of Michigan, 1943; Ph.D., 1949. Associate Professor, California Institute, 1956-62; Professor, 1962-.

Steven J. Milder, Ph.D., Research Fellow in Chemistry

Jean-Bernard Honoré Minster, Ph.D., Assistant Professor of Geophysics
Bacc., Académie de Grenoble, 1964; Ing., Ecole des Mines (Paris), 1969; Ph.D., California Institute, 1974; Doctorat d’Etat, University of Paris, 1974. Assistant Professor, California Institute, 1975-.

Charles R. Minter, Ph.D., Assistant Professor of Computer Science
B.A., Harvard University, 1968; M.S., Yale University, 1972; Ph.D., 1976. California Institute, 1977-.

Vincent Mark Miskowski, Ph.D., Research Fellow in Chemistry
B.S., Case Western Reserve University, 1968; Ph.D., California Institute, 1973. Research Fellow, 1977-.

Herschel Kenworthy Mitchell, Ph.D., Professor of Biology
B.S., Pomona College, 1936; M.S., Oregon State College, 1938; Ph.D., University of Texas, 1941. Senior Research Fellow, California Institute, 1946-49; Associate Professor, 1949-53; Professor, 1953-.

Akira Miyashita, Ph.D., Research Fellow in Chemistry

Stefan Mochnacki, Ph.D., Research Fellow in Astronomy

Alan Theodore Moffet, Ph.D., Professor of Radio Astronomy; Director of Owens Valley Radio Observatory
B.A., Wesleyan University, 1957; Ph.D., California Institute, 1961. Research Fellow, 1962-66; Assistant Professor, 1966-68; Associate Professor, 1968-71; Professor, 1971--; Director, 1975-.

Amr M. Mohsen, Ph.D., Lecturer in Electrical Engineering
B.Sc., Cairo University, 1968; M.Sc., American University in Cairo, 1970; Ph.D., 1973. Intel Corporation (Santa Clara), 1977-. Lecturer, California Institute, 1977-.

Antonio Montalvo-Correia, M.D., Visiting Associate in Biology

Anne Carolyn Moore, Ph.D., Research Fellow in Chemistry
B.A., Carleton College, 1970; Ph.D., University of California, 1976. California Institute, 1976-.

Gordon Paul Moore, Ph.D., Research Fellow in Biology
B.A., Brandeis University, 1972; Ph.D., Syracuse University, 1977. California Institute, 1977-.

Kevin William Moore, Ph.D., Research Fellow in Biology
A.B., Princeton University, 1974; Ph.D., California Institute, 1979. Research Fellow, 1979-80.

Ronald Lee Moore, Ph.D., Senior Research Fellow in Astrophysics
B.S., Purdue University, 1964; Ph.D., Stanford University, 1972. Research Fellow, California Institute, 1972-74; Senior Research Fellow, 1974--; Hale Observatories, 1974-.

James John Morgan, Ph.D., Professor of Environmental Engineering Science; Executive Officer for Environmental Engineering Science
B.C.E., Manhattan College, 1954; M.S.E., The University of Michigan, 1956; M.A., Harvard University, 1962; Ph.D., 1964. Associate Professor, California Institute, 1965-69; Professor, 1969--; Academic Officer for Environmental Engineering Science, 1971-72; Dean of Students, 1972-75; Executive Officer, 1974-.
Fernando Bernardo Morinigo, Ph.D., *Visiting Professor of Physics* (PT)
B.S., University of Southern California, 1957; Ph.D., California Institute, 1963. Professor, California State College (Los Angeles), 1971-; Research Fellow, California Institute, 1962-63; Visiting Associate, 1975-77; Visiting Professor, 1977-78.

David W. Morrisroe, M.B.A., *Lecturer in Business Economics (PT); Vice President for Business and Finance and Treasurer*
B.A., Manhattan College, 1954; M.A., Columbia University, 1956; M.B.A., Harvard School of Business Administration, 1964. Director of Financial Services, California Institute, 1969-74; Lecturer, 1971-; Vice President for Financial Affairs and Treasurer, 1974-78; Vice President for Business and Finance and Treasurer, 1978-

Richard Patrick Morton, Ph.D., *Bateman Research Instructor in Mathematics*

Monica Mottes, Ph.D., *Research Fellow in Biology*

Jonathan Craig Mudge, Ph.D., *Visiting Associate Professor of Computer Science*

Duane Owen Muhlenman, Ph.D., *Professor of Planetary Science*
B.S., University of Toledo, 1953; Ph.D., Harvard University, 1963. Associate Professor, California Institute, 1967-71; Professor, 1971-

James Ivan Mullins, Ph.D., *Research Fellow in Chemistry*
B.A., University of South Florida, 1974; Ph.D., University of Minnesota (St. Paul), 1978. California Institute, 1978-.

Edwin Stanton Munger, Ph.D., *Professor of Geography*
M.S., The University of Chicago, 1948; Ph.D., 1951. Visiting Lecturer, American Universities Field Staff, California Institute, 1954; 1957; 1960; Professor, 1961-

Walter H. Munk, Ph.D., *Sherman Fairchild Distinguished Scholar*
B.S., California Institute, 1939; M.S., 1940; Ph.D., University of California, 1947. Professor, University of California (San Diego), 1954-; Director, Institute of Geophysics, 1959-. California Institute, 1979-80.

Bruce Churchill Murray, Ph.D., *Professor of Planetary Science; Director of Jet Propulsion Laboratory*
S.B., Massachusetts Institute of Technology, 1953; S.M., 1954; Ph.D., 1955. Research Fellow in Space Science, California Institute, 1960-63; Associate Professor of Planetary Science, 1963-68; Professor, 1968-. Director, 1976-

James D. Murray, Ph.D., D.Sc., *Visiting Associate in Applied Mathematics*
B.Sc., St. Andrew's University, 1953; Ph.D., 1956; M.A., Oxford University, 1961; D.Sc., 1968. Fellow and Tutor, Corpus Christi College, Oxford University, 1970-; University Reader, 1972-. California Institute, 1979.

Joel Myerson, Ph.D., *Spencer Research Fellow in Biology*
B.A., University of Michigan, 1967; Ph.D., Arizona State University, 1972. California Institute, 1976-

Menasche M. Nass, Ph.D., *Senior Research Fellow in Biology*
B.S., Cooper Union, 1970; M.S., Brown University, 1973; Ph.D., 1975. Research Fellow, California Institute, 1977-79; Senior Research Fellow, 1979-

Edwin Leroy Neal, M.A., *Coach*
B.A., Occidental College, 1964; M.A., California State University (San Diego), 1971. California Institute, 1973-

Philip Malcolm Neches, M.S., *Instructor in Computer Science* (PT)

Henry Victor Neher, Ph.D., Sc.D., *Professor of Physics, Emeritus*
A.B., Pomona College, 1926; Ph.D., California Institute, 1931. Research Fellow, 1931-33; Instructor, 1933-37; Assistant Professor, 1937-40; Associate Professor, 1940-44; Professor, 1944-70; Professor Emeritus, 1970-.
Forrest D. Nelson, Ph.D., Assistant Professor of Economics
B.S., Colorado State University, 1968; M.S., The University of Rochester, 1973; Ph.D., 1975. California Institute, 1975-.

Jeanne Marie Nerbonne, Ph.D., Research Fellow in Biology

Gerry Neugebauer, Ph.D., Professor of Physics
A.B., Cornell University, 1954; Ph.D., California Institute, 1960. Assistant Professor, 1962-65; Associate Professor, 1965-70; Professor, 1970-. Staff Member, Hale Observatories, 1970-.

Charles Newton, Ph.B., Lecturer in English, Emeritus
Ph.B., University of Chicago, 1933. Assistant to the President, California Institute, 1948-66; Director of Development, 1961-66; Lecturer, 1955; 1960-62; 1966-75; Lecturer Emeritus, 1975-.

Marc-Aurele Nicolet, Ph.D., Professor of Electrical Engineering
Ph.D., University of Basel, 1958. Assistant Professor, California Institute, 1959-65; Associate Professor, 1965-73; Professor, 1973-.

Franz Rudolf Niederer, Ph.D., Research Fellow in Geochemistry

Wendy Irene Noall, Ph.D., Research Fellow in Chemistry

Susumu Nohda, Ph.D., Visiting Associate in Geochemistry
B.S., University of Kyoto, 1966; M.S., 1968; Ph.D., 1972. Assistant Professor, Kyoto Sanyo University, 1975-. California Institute, 1979-80.

Roger Gordon Noll, Ph.D., Professor of Economics; Chairman of the Division of the Humanities and Social Sciences
B.S., California Institute, 1962; A.M., Harvard University, 1965; Ph.D., 1967. Instructor, California Institute, 1965-67; Assistant Professor, 1967-69; Associate Professor, 1969-71; Professor, 1973-; Chairman, 1978-.

Wheeler James North, Ph.D., Professor of Environmental Science
B.S., California Institute, 1944; M.S., 1950; Ph.D., University of California, 1953. Visiting Assistant Professor of Biology, California Institute, 1962; Associate Professor of Environmental Health Engineering, 1963-68; Professor of Environmental Science, 1968-.

John Andrew Nousek, Ph.D., Research Fellow in Physics

Frank Obermeier, Ph.D., Visiting Associate in Applied Mathematics

Clare M. O’Connor, Ph.D., Research Fellow in Biology
B.S., Purdue University, 1972; Ph.D., 1977. California Institute, 1978-.

Thomas E. Ogden, M.D., Ph.D., Visiting Associate in Biomedical Engineering
A.B., University of California (Santa Barbara), 1950; M.D., University of California (San Francisco), 1954; Ph.D., 1962. Professor of Physiology, University of Southern California, 1975-. California Institute, 1976-.

John Beverley Oke, Ph.D., Professor of Astronomy
A.B., University of Toronto, 1949; M.A., 1950; Ph.D., Princeton University, 1953. Assistant Professor, California Institute, 1958-61; Staff Member, Hale Observatories, 1958-; Associate Professor, 1961-64; Professor, 1964-; Associate Director, 1970-78.

John D. O’Keeffe, Ph.D., Visiting Associate in Planetary Science
B.S., California State University (Long Beach), 1962; M.S., University of Southern California, 1965; M.S., University of California (Los Angeles), 1971; Ph.D., 1977. Senior Scientist, Optical Sciences Department, TRW Systems Group, 1976-. California Institute, 1977-.

Makoto Okuno, Ph.D., Research Fellow in Biology
B.A., University of Tokyo, 1971; M.A., 1974; Ph.D., 1977. California Institute, 1977-.
Daniel Marcus Oldenziel, Ph.D., Visiting Associate in Mechanical Engineering

Marianne E. Olds, Ph.D., Research Associate in Biology
B.A., Smith College, 1947; M.A., Radcliffe College, 1950; Ph.D., 1951. Senior Research Fellow, California Institute, 1969-72; Research Associate, 1972-.

Robert Warner Oliver, Ph.D., Professor of Economics
A.B., University of Southern California, 1943; A.M., Princeton University, 1950; Ph.D., 1957. Assistant Professor, California Institute, 1959-61; Associate Professor, 1961-74; Professor, 1974-.

Richard P. O’Toole, Ph.D., Visiting Associate in Economics (PT)

Manfred Karl Otto, Ph.D., Research Fellow in Biology
Dipl., University of Stuttgart, 1974; Ph.D., University of Holenstein (West Germany), 1977. California Institute, 1977-.

Ray David Owen, Ph.D., Sc.D., Professor of Biology; Vice President for Student Affairs and Dean of Students
B.S., Carroll College, 1937; Ph.M., University of Wisconsin, 1938; Ph.D., 1941. Gosney Fellow, California Institute, 1946-47; Associate Professor, 1947-53; Professor, 1953-; Division Chairman, 1961-68; Vice President for Student Affairs and Dean of Students, 1975-.

Noboru Oyama, Ph.D., Research Fellow in Chemistry
B.S., Ibaraki University, 1970; M.S., 1972; Ph.D., Tokyo Institute of Technology, 1977. California Institute, 1977-.

Ronald J. Pace, Ph.D., Research Fellow in Chemistry

Richmond Talbot Page, Ph.D., Research Associate in Economics
B.A., Harvard University, 1962; Ph.D., Cornell University, 1972. Visiting Associate, California Institute, 1977-78; Research Associate, 1979-.

Bruce M. Paine, Ph.D., Research Fellow in Physics

Nick Demetrious Panagiotacopoulos, Ph.D., Visiting Associate in Bioinformation Systems (PT)
B.S., University of Athens, 1957; Dipl., Von Karman Institute for Fluid Mechanics (Belgium), 1961; M.S., California Institute, 1965; Ph.D., Free University of Brussels, 1978. Member, Technical Staff, Jet Propulsion Laboratory, 1970-. Visiting Associate in Aeronautics, California Institute, 1976-79; Visiting Associate in Bioinformation Systems, 1979-.

Dimitri A. Papanastassiou, Ph.D., Research Associate in Geochemistry
B.S., California Institute, 1965; Ph.D., 1970. Research Fellow in Physics, 1970-72; Senior Research Fellow in Planetary Science, 1972-76; Research Associate, 1976-.

Charles Herach Papas, Ph.D., Professor of Electrical Engineering
B.S., Massachusetts Institute of Technology, 1941; M.S., Harvard University, 1946; Ph.D., 1948. Lecturer, California Institute, 1952-54; Associate Professor, 1954-59; Professor, 1959-.

Jon R. Pariser, M.A., Lecturer in Russian

Gary Parker, Ph.D., Visiting Associate in Hydraulics

Edward F. Pate, Ph.D., Visiting Associate in Biology
B.S., Rensselaer Polytechnic Institute, 1971; M.S., 1973; Ph.D., 1976. Member of the Technical Staff, Data Concepts and Analysis Department, Aerospace Corporation (El Segundo), 1977-. California Institute, 1979-80.
Clair Cameron Patterson, Ph. D., Senior Research Associate in Geochemistry  
A.B., Grinnell College, 1943; M.S., University of Iowa, 1944; Ph.D., University of Chicago, 1951.  
Research Fellow, California Institute, 1952-53; Senior Research Fellow, 1953-71; Research Associate, 1971-73; Senior Research Associate, 1973-.

Rodman Wilson Paul, Ph. D., Edward S. Harkness Professor of History  
A.B., Harvard College, 1936; M.A., Harvard University, 1937; Ph.D., 1943. Associate Professor, California Institute, 1947-51; Professor, 1951-72; Harkness Professor, 1972-; Acting Chairman, Division of the Humanities and Social Sciences, 1978.

B.S., Oregon State College, 1922; Ph.D., California Institute, 1925. Research Associate, 1926-27; 1964-71; Assistant Professor, 1927-29; Associate Professor, 1929-31; Professor, 1931-64; Chairman of the Division of Chemistry and Chemical Engineering, 1936-58; Professor Emeritus, 1971-.

David G. Payne, Ph.D., Research Fellow in Theoretical Astrophysics  
B.Sc., University of Waterloo, 1974; Ph.D., Yale University, 1979. California Institute, 1979-80.

Timothy John Pearson, Ph.D., Research Fellow in Radio Astronomy  

Charles William Peck, Ph.D., Professor of Physics  
B.S., New Mexico College of Agricultural and Mechanical Arts, 1956; Ph.D., California Institute, 1964. Research Fellow, 1964-65; Assistant Professor, 1965-69; Associate Professor, 1969-77; Professor, 1977-.

Marie Jeanne Peltre, Ph.D., Visiting Associate in Chemical Engineering  
Ph.D., Université Pierre et Marie Curie, 1976. Master Assistant, 1976-. California Institute, 1977-.

S. Eric Persson, Ph.D., Staff Member, Hale Observatories  
B.Sc., McGill University, 1966; Ph.D., California Institute, 1972. Staff Member, Hale Observatories, 1975-.

Nancy Sue Petersen, Ph.D., Gosney-Spencer Senior Research Fellow in Biology  
B.S., Harvey Mudd College, 1965; M.S., Brandeis University, 1968; Ph.D., University of California (Irvine), 1972. California Institute, 1977-.

John D. Pettigrew, M.D., Associate Professor of Biology  
B.Sc.; University of Sydney, 1966; M.Sc.; 1966; M.D., 1968. Assistant Professor, California Institute, 1973-76; Associate Professor, 1976-.

Thomas G. Phillips, Ph.D., Visiting Associate in Radio Astronomy  
B.A., Oxford University, 1961; M.A., 1964; Ph.D., 1964. Member, Technical Staff, Bell Laboratories, 1968-. California Institute, 1978-; Staff Member, Owens Valley Radio Observatory, 1978-.

William Hayward Pickering, Ph.D., D.Sc., D.Eng., Professor of Electrical Engineering, Emeritus  
B.S., California Institute, 1932; M.S., 1933; Ph.D., 1936. Instructor, 1936-40; Assistant Professor, 1940-45; Associate Professor, 1945-47; Professor, 1947-79; Professor Emeritus, 1979-; Director, Jet Propulsion Laboratory, 1954-76.

Ruggiero Lino Piantoni, Ph.D., Visiting Associate in Biomedical Engineering  

John Robinson Pierce, Ph.D., D.Sc., D.Eng., E.D., LL.D., Professor of Engineering (PT)  
B.S., California Institute, 1933; M.S., 1934; Ph.D., 1936. Professor, 1971-: Executive Officer for Electrical Engineering, 1975-77; Jet Propulsion Laboratory (PT), 1977-.

George Wood Pigman III, Ph.D., Assistant Professor of English  
A.B., Harvard University, 1973; Ph.D., Yale University, 1977. California Institute, 1977-.

Lajos Piko, D. V.M., Visiting Associate in Biology  
Dipl., University of Agricultural Science, Budapest-Godollo, 1956; D.V.M., Veterinary School of Aflort (France), 1957. Chief, Developmental Biology Laboratory, Veterans Administration Hospital (Los Angeles), 1966-. Research Fellow, California Institute, 1959-65; Senior Research Fellow, 1965-77; Visiting Associate, 1977-.
Jerome Pine, Ph.D., Professor of Physics
B.A., Princeton University, 1949; Ph.D., Cornell University, 1956. Associate Professor, California Institute, 1963-67; Professor, 1967-.

Stanley H. Pine, Ph.D., Visiting Associate in Chemistry

Cornelius John Pings, Ph.D., Professor of Chemical Engineering and Chemical Physics; Vice Provost and Dean of Graduate Studies
B.S., California Institute, 1951; M.S., 1952; Ph.D., 1955. Associate Professor of Chemical Engineering, 1959-64; Professor, 1964-70; Professor of Chemical Engineering and Chemical Physics, 1970-; Executive Officer for Chemical Engineering, 1969-73; Vice Provost and Dean of Graduate Studies, 1971-.

Milton S. Plesset, Ph.D., Professor of Engineering Science, Emeritus
B.S., University of Pittsburgh, 1929; Ph.D., Yale University, 1932. Associate Professor of Applied Mechanics, California Institute, 1948-51; Professor, 1951-63; Professor of Engineering Science, 1963-78; Professor Emeritus, 1978-.

Charles Raymond Plott, Ph.D., Professor of Economics
B.S., Oklahoma State University, 1961; M.S., 1964; Ph.D., University of Virginia, 1965. California Institute, 1971-.

Judith Carol Poe, M.Sc., Visiting Associate in Chemistry

Micha Polak, Ph.D., Research Fellow in Chemical Engineering
B.Sc., Tel Aviv University, 1968; M.Sc., 1971; Ph.D., 1975. California Institute, 1977-.

Hugh David Politzer, Ph.D., Professor of Theoretical Physics
B.S., The University of Michigan, 1969; Ph.D., Harvard University, 1974. Visiting Associate, California Institute, 1975-76; Associate Professor, 1976-79; Professor, 1979-.

Chung-Kwong Poon, Ph.D., Visiting Associate in Chemistry
B.Sc., University of Hong Kong, 1963; Ph.D., University College, University of London, 1967. Reader, Department of Chemistry, University of Hong Kong, 1977-. California Institute, 1979.

Frank Clifford Porter, Ph.D., Weizmann Research Fellow in Physics
B.S., California Institute, 1972; Ph.D., University of California, 1977. California Institute, 1977-.

Edward C. Posner, Ph.D., Visiting Professor of Electrical Engineering
B.A., The University of Chicago, 1952; M.S., 1953; Ph.D., 1957. Manager, Advanced Projects, Jet Propulsion Laboratory, 1973-; Lecturer, California Institute, 1970; 1973; 1974; Visiting Associate Professor, 1977-79; Visiting Professor, 1979-.

Christine Ann Powell, Ph.D., Visiting Associate in Geophysics

Richard James Powers, Ph.D., Research Associate in Physics (LOA)

Edward T. Preisler, B.A., Coach
B.A., San Diego State College, 1941. California Institute, 1947-.

David Presti, Ph.D., Weizmann Research Fellow in Biology
B.S., Butler University, 1974; M.S., California Institute, 1975; Ph.D., 1978. California Institute, 1978-.

George Worral Preston III, Ph.D., Assistant Director and Staff Member, Hale Observatories
B.S., Yale University, 1952; Ph.D., University of California, 1959. Research Fellow in Astronomy, California Institute, 1959-60; Staff Member, Hale Observatories, 1968-; Assistant Director, 1976-.

Aimée Brown Price, Ph.D., Lecturer in Art History
Thomas A. Prince, Ph.D., Research Fellow in Physics

Nicholas J. Proudfoot, Ph.D., Senior Research Fellow in Biology
B.Sc., University of London, 1972; Ph.D., University of Cambridge, 1975. California Institute, 1979-.

Ulrich Herbert Quast, Ph.D., Research Fellow in Chemistry
M.A., Technical University of Aachen, 1972; Ph.D., University of Basel, 1974. California Institute, 1976-.

James P. Quirk, Ph.D., Professor of Economics

Arthur Raefsky, Ph.D., Research Fellow in Geophysics

Michael Augustine Raftery, Ph.D., D. Sc., Professor of Chemical Biology
B.Sc., National University of Ireland, 1956; Ph.D., 1960; D.Sc., 1971. Noyes Research Instructor in Chemistry, California Institute, 1964-66; Assistant Professor of Chemical Biology, 1967-69; Associate Professor, 1969-72; Professor, 1972-.

Marc H. Raibert, Ph.D., Lecturer in Computer Science
B.S., Northeastern University, 1973; Ph.D., Massachusetts Institute of Technology, 1977. Senior Engineer, Jet Propulsion Laboratory, 1977-. California Institute, 1979-.

Fredric Raichen, Sc.D., Professor of Civil Engineering
B.E., The Johns Hopkins University, 1953; S.M., Massachusetts Institute of Technology, 1955; Sc.D., 1962. Assistant Professor, California Institute, 1962-67; Associate Professor, 1967-72; Professor, 1972-.

Susan A. Raikes, Ph.D., Research Fellow in Geophysics

Vilayanur S. Ramachandran, Ph.D., Research Fellow in Biology

Ramakrishna Ramaswamy, Ph.D., Research Fellow in Chemistry

Simon Ramo, Ph.D., Visiting Associate in Engineering; Visiting Professor of Management Science
B.S., The University of Utah, 1933; Ph.D., California Institute, 1936. Director, and Chairman of the Science and Technology Committee, TRW, Inc. Research Associate, California Institute, 1946-74; Visiting Associate, 1974-; Visiting Professor, 1977-.

Pierre Ramond, Ph.D., Research Associate in Theoretical Physics
B.S., New York College of Engineering, 1965; Ph.D., Syracuse University, 1969. Visiting Associate in Theoretical Physics, California Institute, 1975-76; Senior Research Fellow, 1976-79; Research Associate, 1979-.

W. Duncan Rannie, Ph.D., Robert H. Goddard Professor of Jet Propulsion and Professor of Mechanical Engineering
B.A., University of Toronto, 1936; M.A., 1937; Ph.D., California Institute, 1951. Assistant Professor of Mechanical Engineering, 1947-51; Associate Professor, 1951-55; Robert H. Goddard Professor of Jet Propulsion, 1955-78; Robert H. Goddard Professor of Jet Propulsion and Professor of Mechanical Engineering, 1978-.
Harihar Rao, Lecturer in Music
Visiting Lecturer, California Institute, 1978-79; Lecturer, 1979.

Lawrence L. Rauch, Ph.D., Visiting Professor of Electrical Engineering
A.B., University of Southern California, 1941; A.M., Princeton University, 1947; Ph.D., 1949. Chairman, Program Computer, Information and Control Engineering, University of Michigan, 1971-77; California Institute, 1977-.

Charles van Blekkingh Ray, M.S., Lecturer in Computer Science (PT); Director, Willis H. Booth Computing Center

Charles F. Raymond, Ph.D., Visiting Associate in Geophysics
A.B., University of California, 1961; Ph.D., California Institute, 1969. Associate Professor, University of Washington, 1973-; Visiting Associate, California Institute, 1978-79.

Anthony Christopher Sanford Readhead, Ph.D., Research Associate in Radio Astronomy
B.Sc., University of Witwatersrand, 1968; Ph.D., University of Cambridge, 1972. Research Fellow, California Institute, 1974-75; Senior Research Fellow, 1976-79; Research Associate, 1979-.

Carol Winifred Readhead, Ph.D., Research Fellow in Biology
B.Sc., University of Witwatersrand, 1970; Ph.D., University of Cambridge, 1977. California Institute, 1977-.

H. Hollis Reamer, M.S., Senior Research Fellow in Chemical Engineering
A.B., University of Redlands, 1937; M.S., California Institute, 1938. Research Assistant, 1938-52; Research Fellow, 1952-58; Senior Research Fellow, 1958-.

Jennifer F. Reinganum, Ph.D., Assistant Professor of Economics
B.A., Oberlin College, 1976; M.S., Northwestern University, 1978; Ph.D., 1979. California Institute, 1979-.

Martin Rem, Ph.D., Visiting Associate Professor of Computer Science
B.S., University of Amsterdam, 1971; Ph.D., Eindhoven University of Technology, 1976. Associate Professor, 1971-; Visiting Assistant Professor, California Institute, 1977-78; Visiting Associate Professor, 1978-.

Michael A. Reuben, Ph.D., Research Fellow in Chemistry

Jean-Paul Revel, Ph.D., Albert Billings Ruddock Professor of Biology
B.Sc., University of Strasbourg, 1949; Ph.D., Harvard University, 1957. Professor of Biology, California Institute, 1971-78; Albert Billings Ruddock Professor, 1978-.

John Hall Richards, Ph.D., Professor of Organic Chemistry
B.A., University of California, 1951; B.Sc., Oxford University, 1953; Ph.D., University of California, 1955. Assistant Professor, California Institute, 1957-61; Associate Professor, 1961-70; Professor, 1970-.

Charles Francis Richter, Ph.D., Professor of Seismology, Emeritus
A.B., Stanford University, 1920; Ph.D., California Institute, 1928. Assistant Professor, 1937-47; Associate Professor, 1947-52; Professor, 1952-70; Professor Emeritus, 1970-.

John D. Roberts, Ph.D., Dr. rer. nat., Sc.D., Institute Professor of Chemistry
B.A., University of California (Los Angeles), 1941; Ph.D., 1944. Professor, California Institute, 1953-72; Chairman, Division of Chemistry and Chemical Engineering, 1963-68; Institute Professor, 1972-; Acting Chairman, 1972-73.

John W. Roberts, Ph.D., Senior Research Fellow in Biology

Charles Rockland, Ph.D., Visiting Associate in Mathematics
B.A., Harvard University, 1969; Ph.D., Princeton University, 1972. Assistant Professor, Brandeis University, 1974-. California Institute, 1978-79.

Kathleen Linda Skiba Rockland, Ph.D., Research Fellow in Biology
Walter Georg Roewekamp, Ph.D., Visiting Associate in Biology
Ph.D., Philips University (West Germany), 1973. Member, German National Cancer Center (Heidelberg), 1978-. California Institute, 1979.

Janet M. Roman, Ph.D., Senior Research Fellow in Biology
B.S., The Ohio State University, 1966; M.S., Purdue University, 1968; Ph.D., 1974. California Institute, 1979-80.

Paul G. Rooney, Ph.D., Visiting Associate in Mathematics
B.Sc., University of Alberta, 1949; Ph.D., California Institute, 1952. Professor, University of Toronto, 1962-; Visiting Associate, California Institute, 1978-79.

Robert Allan Rosenstone, Ph.D., Professor of History
B.A., University of California (Los Angeles), 1957; Ph.D., 1965. Visiting Assistant Professor, California Institute, 1966-68; Assistant Professor, 1968-69; Associate Professor, 1969-75; Professor, 1975-.

Anatol Roshko, Ph.D., Professor of Aeronautics
B.Sc., University of Alberta, 1945; M.S., California Institute, 1947; Ph.D., 1952. Research Fellos, 1952-54; Senior Research Fellow, 1954-55; Assistant Professor, 1955-58; Associate Professor, 1958-62; Professor, 1962-.

Douglas A. Ross, Ph.D., Senior Research Fellow in Theoretical Physics
B.A., Oxford University, 1969; Ph.D., 1972. California Institute, 1978-.

George Robert Rossman, Ph.D., Associate Professor of Mineralogy
B.S., Wisconsin State University, 1966; Ph.D., California Institute, 1971. Instructor, 1971; Assistant Professor, 1972-77; Associate Professor, 1977-.

Robert Roth, Ph.D., Bateman Research Instructor in Mathematics
B.Sc., Massachusetts Institute of Technology, 1974; Ph.D., The Ohio State University, 1979. California Institute, 1979-80.

Avigdor Victor Rutenberg, D.Sc., Visiting Associate in Civil Engineering

Herbert John Ryser, Ph.D., Professor of Mathematics
B.A., University of Wisconsin, 1945; Ph.D., 1948. California Institute, 1967-.

Rolf Heinrich Sabersky, Ph.D., Professor of Mechanical Engineering
B.S., California Institute, 1942; M.S., 1943; Ph.D., 1949. Assistant Professor, 1949-55; Associate Professor, 1955-61; Professor, 1961-.

Inge-Juliana Sackmann, Ph.D., Senior Research Fellow in Physics
B.A., University of Toronto, 1963; M.A., 1965; Ph.D., 1968. Research Fellow, California Institute, 1971-74; Visiting Associate, 1974-76; Senior Research Fellow, 1976-.

Philip Geoffrey Saffman, Ph.D., Professor of Applied Mathematics
B.A., Trinity College, University of Cambridge, 1953; M.A., Ph.D., 1956. Professor of Fluid Mechanics, California Institute, 1964-70; Professor of Applied Mathematics, 1970-.

Bruce Hornbrook Sage, Ph.D., Eng.D., Professor of Chemical Engineering, Emeritus
B.S., New Mexico State College, 1929; M.S., California Institute, 1931; Ph.D., 1934. Research Fellow, 1934-35; Senior Research Fellow in Chemical Research, 1935-37; Assistant Professor of Chemical Engineering, 1937-39; Associate Professor, 1939-44; Professor, 1944-69; Research Associate, 1969-74; Professor Emeritus, 1974-.

Jason Saleeby, Ph.D., Associate Professor of Geology
B.S., California State University (Northridge), 1972; Ph.D., University of California (Santa Barbara), 1975. California Institute, 1978-.

Ilan Samid, Ph.D., Visiting Associate in Applied Physics

Sten Otto Samson, Fil.Dr., Research Associate in Chemistry
Fil.kand., University of Stockholm, 1953; Fil.lic., 1956; Fil.Dr., 1968. Research Fellow, California Institute, 1953-56; 1957-61; Senior Research Fellow, 1969-72; Research Associate, 1973-.
Allan Rex Sandage, Ph.D., Sc.D., D.Sc., LL.D., Staff Member, Hale Observatories
A.B., University of Illinois, 1948; Ph.D., California Institute, 1953; Sc.D., Yale University, 1966.
Staff Member, Hale Observatories, 1948-.

David G. Sandler, Ph.D., Research Fellow in Physics

Gregorio G. Santillan, Ph.D., Visiting Associate in Chemistry

Anneila I. Sargent, Ph.D., Research Fellow in Astronomy

Wallace Leslie William Sargent, Ph.D., Professor of Astronomy; Executive Officer for Astronomy
B.Sc., Manchester University, 1956; M.Sc., 1957; Ph.D., 1959. Research Fellow, California Institute, 1959-62; Assistant Professor, 1966-68; Associate Professor, 1968-71; Professor, 1971-. Staff Member, Hale Observatories, 1966--; Executive Officer, 1975--; Staff Member, Owens Valley Radio Observatory, 1978-.

William Palzer Schaefer, Ph.D., Research Associate in Chemistry
B.S., Stanford University, 1952; M.S., University of California (Los Angeles), 1954; Ph.D., 1960. Instructor, California Institute, 1960-62; Assistant Professor, 1962-66; Senior Research Fellow, 1968-77; Research Associate, 1977-. Assistant Director of Admissions, 1968-73; Registrar, 1971-77; Director of Financial Aid, 1973-77.

James F. Scheimer, Ph.D., Visiting Associate in Geophysics

Anton Roelef Schep, Ph.D., Instructor in Mathematics
B.Sc., University of Leiden, 1974; Ph.D., 1977. California Institute, 1977-.

Peter A. G. Scheuer, Ph.D., Sherman Fairchild Distinguished Scholar

Maartten Schmidt, Ph.D., Sc.D., Professor of Astronomy; Director of the Hale Observatories
Ph.D., University of Leiden, 1956; Sc.D., Yale University, 1966. Associate Professor, California Institute, 1959-64; Professor, 1964--; Executive Officer for Astronomy, 1972-75; Chairman, Division of Physics, Mathematics and Astronomy, 1975-78; Carnegie Fellow, Hale Observatories, 1956-58; Staff Member, 1959--; Director, 1978-.

Raymond L. Schmidt, Ph.D., Visiting Associate in Chemical Engineering
B.S., Florida Presbyterian College, 1964; Ph.D., Emory University, 1967. Associate Professor, University of New Orleans, 1972-. Research Fellow, California Institute, 1968-70; Visiting Associate, 1977-.

Elma Schonbach, B.M., Lecturer in Music

Walter Adolph Schroeder, Ph.D., Research Associate in Chemistry
B.Sc., University of Nebraska, 1939; M.A., 1940; Ph.D., California Institute, 1943. Research Fellow, 1943-46; Senior Research Fellow, 1946-56; Research Associate, 1956-.

Joseph R. Schuh, Ph.D., Research Fellow in Chemistry
B.S., Manhattan College, 1973; Ph.D., Cornell University, 1978. California Institute, 1978-.

Alan Schwartz, LL.B., Visiting Professor of Law and Social Science
B.S., Bates College, 1961; LL.B., Yale University, 1964. Professor of Law, University of Southern California, 1977-. California Institute, 1979-80.

John Henry Schwarz, Ph.D., Research Associate in Theoretical Physics
Frank Joseph Sciulli, Ph.D., Professor of Physics
A.B., University of Pennsylvania, 1960; M.S., 1961; Ph.D., 1965. Research Fellow, California Institute, 1966-68; Assistant Professor, 1969-71; Associate Professor, 1971-76; Professor, 1976-.

Ronald Fraser Scott, Sc.D., Professor of Civil Engineering
B.Sc., Glasgow University, 1951; S.M., Massachusetts Institute of Technology, 1953; Sc.D., 1955. Assistant Professor, California Institute, 1958-62; Associate Professor, 1962-67; Professor, 1967-.

Thayer Scudder, Ph.D., Professor of Anthropology
A.B., Harvard College, 1952; Ph.D., Harvard University, 1960. Assistant Professor, California Institute, 1964-66; Associate Professor, 1966-69; Professor, 1969-.

Eleanor M. Searle, Ph.D., D.Sc., Professor of History
A.B., Radcliffe College, 1948; Ph.D., Pontifical Institute of Medieval Studies, 1961. California Institute, 1979-.

Leonard Searle, Ph.D., Staff Member, Hale Observatories
Ph.D., Princeton University, 1956. Senior Research Fellow in Astronomy, California Institute, 1960-63; Staff Member, Hale Observatories, 1968-.

Ernest Edwin Sechler, Ph.D., Professor of Aeronautics, Emeritus
B.S., California Institute, 1928; M.S., 1929; Ph.D., 1934. Instructor, 1930-37; Assistant Professor, 1937-40; Associate Professor, 1940-46; Professor, 1946-76; Executive Officer for Aeronautics, 1966-71; Professor Emeritus, 1976-.

George Andrew Seielstad, Ph.D., Research Associate in Radio Astronomy
A.B., Dartmouth College, 1959; Ph.D., California Institute, 1963. Research Fellow, 1964-67; Senior Research Fellow, 1967-72; Research Associate, 1972-.

Christian Seigurn, Ph.D., Research Fellow in Chemical Engineering

John Hersh Seinfeld, Ph.D., Professor of Chemical Engineering; Executive Officer for Chemical Engineering
B.S., The University of Rochester, 1964; Ph.D., Princeton University, 1967. Assistant Professor, California Institute, 1967-70; Associate Professor, 1970-74; Professor, 1974-. Acting Executive Officer for Chemical Engineering, 1973-74; Executive Officer, 1974-.

Charles L. Seitz, Ph.D., Research Associate in Computer Science

Ayuusman Sen, Ph.D., Research Fellow in Chemistry

Michael Herman Shaevitz, Ph.D., Senior Research Fellow in Physics
B.Sc., The Ohio State University, 1969; Ph.D., 1975. Research Fellow, California Institute, 1975-78; Senior Research Fellow, 1978-.

Fredrick Harold Shair, Ph.D., Professor of Chemical Engineering
B.S., University of Illinois, 1957; Ph.D., University of California, 1963. Assistant Professor, California Institute, 1965-69; Associate Professor, 1969-76; Professor, 1976-.

Mark Howard Shapiro, Ph.D., Visiting Associate in Physics
A.B., University of California, 1962; M.S., University of Pennsylvania, 1963; Ph.D., 1966. Associate Professor, California State University (Fullerton), 1973-. Visiting Associate, 1976-.

B. D. Sharma, Ph.D., Visiting Associate in Chemistry

Robert Phillip Sharp, Ph.D., Professor of Geology, Emeritus
B.S., California Institute, 1934; M.S., 1935; A.M., Harvard University, 1936; Ph.D., 1938. Professor, California Institute, 1947-78; The Robert P. Sharp Professor of Geology, 1978-79; Professor Emeritus, 1979-. Chairman, Division of Geology, 1952-68.

Stephen A. Shechtman, Ph.D., Staff Member, Hale Observatories
B.S., Yale University, 1969; Ph.D., California Institute, 1973. Staff Member, Hale Observatories, 1975-.

Officers and Faculty 93
Charles Hunter Shelden, M.D., *Visiting Associate in Biomedical Engineering*
B.S., The University of Wisconsin, 1928; M.D., University of Pennsylvania, 1932. Chief of Neurosurgery, Huntington Memorial Hospital, 1940; Professor, University of Southern California Medical Center, 1968-. California Institute, 1978-.

Che-Kun James Shen, Ph.D., *Research Fellow in Biology*
B.S., Taiwan University, 1971; Ph.D., University of California, 1978. California Institute, 1978-.

Takeshi Shimomura, Ph.D., *Research Fellow in Chemistry*

Eugene Merle Shoemaker, Ph.D., Sc.D., *Professor of Geology*
B.S., California Institute, 1947; M.S., 1948; M.S., Princeton University, 1954; Ph.D., 1960. Visiting Professor of Geology, California Institute, 1962; Research Associate in Astrogeology, 1964-68; Professor, 1969-; Chairman, Division of Geology, 1969-72.

Mavis Shure, Ph.D., *Visiting Associate in Chemistry*
B.S., Yale University, 1974; Ph.D., California Institute, 1978. Visiting Associate, 1978-79.

Kerry Edward Sieh, Ph.D., *Assistant Professor of Geology*
A.B., University of California (Riverside), 1972; Ph.D., Stanford University, 1977. California Institute, 1977-.

Armando F. Silva Moreira, Ph.D., *Visiting Associate in Physics*
B.S., California Institute, 1970; M.S., University of Southern California, 1972; Ph.D., State University of Campinas (São Paulo), 1977. Assistant Professor, 1977-. Visiting Associate, California Institute, 1978-.

Leon Theodore Silver, Ph.D., *Professor of Geology*
B.S., University of Colorado, 1945; M.S., University of New Mexico, 1948; Ph.D., California Institute, 1955. Assistant Professor, 1955-62; Associate Professor, 1962-65; Professor, 1965-.

Marvin K. Simon, Ph.D., *Lecturer in Electrical Engineering* (PT)

Seymour Jonathan Singer, Ph.D., *Sherman Fairchild Distinguished Scholar*

Stuart Allan Sipkin, Ph.D., *Research Fellow in Geophysics*
B.S., California Institute, 1971; M.A., Princeton University, 1975; Ph.D., University of California (San Diego), 1978. Research Fellow, California Institute, 1979-80.

Karl Marvin Sirotkin, Ph.D., *Research Fellow in Chemistry*
B.S., Michigan State University, 1972; Ph.D., 1978. California Institute, 1978-.

Eric J. Siskind, Ph.D., *Assistant Professor of Physics*
B.A., Cornell University, 1974; Ph.D., California Institute, 1979. Research Fellow, 1978-79; Assistant Professor, 1979-.

Donald W. Skelton, M.S., *Lecturer in Physics* (PT)
B.A., California State College (Los Angeles), 1963; M.S., 1965. California Institute, 1977-.

Stephen Hugh Smallcombe, Ph.D., *Visiting Associate in Chemistry* (PT)
B.S., Alma College, 1965; Ph.D., University of California (Irvine), 1970. NMR Research Chemist, Varian Instrument Division (Palo Alto), 1974-. Research Fellow, California Institute, 1970-73; Senior Research Fellow, 1973-74; Visiting Associate, 1977-.

Annette Jacqueline Smith, Ph.D., *Lecturer in French*
B.A., University of Paris (Sorbonne), 1947; M.A., 1950; Ph.D., 1970. Visiting Assistant Professor, California Institute, 1970-71; Lecturer, 1971-.

Darryl L. Smith, Ph.D., *Assistant Professor of Applied Physics*
B.A., St. Mary's College, 1968; M.S., University of Illinois, 1971; Ph.D., 1974. Ramo Instructor in Applied Physics, California Institute, 1974-76; Assistant Professor, 1976-. 
David Rodman Smith, Ph.D., Associate Professor of English

Hallett D. Smith, Ph.D., L.H.D., Professor of English, Emeritus
B.A., University of Colorado, 1928; Ph.D., Yale University, 1934. Professor, California Institute, 1949-75; Professor Emeritus, 1975-. Chairman, Division of the Humanities and Social Sciences, 1949-70.

Thomas Joseph Smith, Ph.D., Visiting Associate in Chemistry

William Ralph Smythe, Ph.D., Professor of Physics, Emeritus
A.B., Colorado College, 1916; A.M., Dartmouth College, 1919; Ph.D., University of Chicago, 1921. National Research Fellow, California Institute, 1923-26; Research Fellow, 1926-27; Assistant Professor, 1927-34; Associate Professor, 1934-40; Professor, 1940-64; Professor Emeritus, 1964-.

Baruch Thomas Soifer, Ph.D., Senior Research Fellow in Physics
B.S., California Institute, 1968; Ph.D., Cornell University, 1972. Senior Research Fellow, California Institute, 1978-; Staff Associate, Hale Observatories, 1978-.

Malcolm Robert Somerville, Ph.D., Research Fellow in Geophysics
B.Sc., University of New England (Australia), 1966; Ph.D., University of California, 1977. California Institute, 1978-.

David Sonnabend, Ph.D., Lecturer in Systems Engineering (PT)
B.Sc., University of California (Los Angeles), 1955; M.S., Stanford University, 1976; Ph.D., 1979. California Institute, 1978-.

Edwin V. Spencer, Jr., B.S., Coach
B.S., North Carolina State University, 1964. California Institute, 1973-.

Roger Wolcott Sperry, Ph.D., D.Sc., Hixon Professor of Psychobiology
A.B., Oberlin College, 1935; A.M., 1937; Ph.D., The University of Chicago, 1941. California Institute, 1954-.

Lyman Spitzer, Jr., Ph.D., D.Sc., L.L.D., Sherman Fairchild Distinguished Scholar

Randolph N. Splitter, Ph.D., Assistant Professor of English
A.B., Hamilton College, 1968; Ph.D., University of California, 1974. California Institute, 1975-.

Michael E. Squillacote, Ph.D., Research Fellow in Chemistry
B.S., The University of Chicago, 1972; Ph.D., University of California (Los Angeles), 1977. California Institute, 1977-.

William A. Squires, Ph.D., Bateman Research Instructor in Mathematics

Gabriel H. Strouhi, Ph.D., Research Fellow in Chemistry
B.S., Ouachita University, 1972; University of Tennessee (Knoxville), 1975; Ph.D., Emory University, 1978. California Institute, 1978-.

Maureen B. Steiner, Ph.D., Senior Research Fellow in Geology and Geophysics
B.S., Southern Methodist University, 1965; M.S., 1967; Ph.D., The University of Texas (Dallas), 1974. Research Fellow, California Institute, 1977-78; Senior Research Fellow, 1978-.

Gregory N. Stephanopoulos, Ph.D., Assistant Professor of Chemical Engineering

Alfred Stern, Ph.D., Professor of Philosophy, Emeritus
Ph.D., University of Vienna, 1923. Instructor, California Institute, 1947-48; Lecturer, 1948-50; Assistant Professor, 1950-53; Associate Professor, 1953-60; Professor, 1960-68; Professor Emeritus, 1968-.
Eli Sternberg, Ph.D., D.Sc., Professor of Mechanics
B.C.E., University of North Carolina. 1941; M.S., Illinois Institute of Technology. 1942; Ph.D., 1945. Professor of Applied Mechanics, California Institute. 1964-70; Professor of Mechanics, 1970-.

Paul R. Stevens, Ph.D., Senior Research Fellow in Theoretical Physics
B.S., University of California (Los Angeles). 1965; M.S., 1966; Ph.D., 1969. Research Fellow, California Institute, 1972; 1974-75; Senior Research Fellow, 1975-.

Homer Joseph Stewart, Ph.D., Professor of Aeronautics
B.Aero.E., University of Minnesota, 1936; Ph.D., California Institute, 1940. Instructor, 1939-42; Assistant Professor, 1942-46; Associate Professor, 1946-49; Professor, 1949-.

Edward M. Stolper, Ph.D., Assistant Professor of Geology
A.B., Harvard College, 1974; M.Phil., University of Edinburgh, 1976; Ph.D., Harvard University, 1979. California Institute, 1979-.

Edward Carroll Stone, Jr., Ph.D., Professor of Physics
M.S., The University of Chicago, 1957; Ph.D., 1963. Research Fellow, California Institute, 1964-66; Senior Research Fellow, 1967; Assistant Professor, 1967-71; Associate Professor, 1971-76; Professor, 1976-.

Ellen Glowacki Strauss, Ph.D., Senior Research Fellow in Biology
B.A., Swarthmore College, 1960; Ph.D., California Institute, 1966. Research Fellow, 1969-73; Senior Research Fellow, 1973-.

James Henry Strauss, Ph.D., Associate Professor of Biology
B.S., Saint Mary's University, 1960; Ph.D., California Institute, 1967. Assistant Professor, 1969-75; Associate Professor, 1975-.

Thomas Foster Strong, M.S., Dean of Freshmen, Emeritus
B.S., The University of Wisconsin, 1922; M.S., California Institute, 1937. Assistant Professor of Physics, 1944-65; Associate Professor. 1965-69; Dean of Freshmen, 1946-68; Dean Emeritus, 1969-.

Gary Steven Strumolo, Ph.D., Research Fellow in Applied Mathematics

Felix Strumwasser, Ph.D., Professor of Biology
B.A., University of California (Los Angeles), 1953; Ph.D., 1957. Associate Professor, California Institute, 1964-69; Professor, 1969-.

Bradford Sturtevant, Ph.D., Professor of Aeronautics
B.E., Yale University, 1955; M.S., California Institute, 1956; Ph.D., 1960. Research Fellow, 1960-62; Assistant Professor, 1962-66; Associate Professor, 1966-71; Professor, 1971-; Executive Officer for Aeronautics, 1972-76.

Ivan E. Sutherland, Ph.D., Fletcher Jones Professor of Computer Science
B.S., Carnegie Institute of Technology, 1959; M.S., California Institute, 1960; Ph.D., Massachusetts Institute of Technology, 1963. Professor of Computer Science, California Institute, 1976-77; Fletcher Jones Professor, 1977-.

Ryo Suzuki, Ph.D., Visiting Associate in Applied Physics

Coenraad Albert Swarts, Ph.D., IBM Research Fellow in Applied Physics

James E. Swartz, Ph.D., Research Fellow in Chemistry
B.S., Stanislaus State College, 1973; Ph.D., University of California (Santa Cruz), 1978. California Institute, 1978-.

Alan R. Sweezy, Ph.D., Professor of Economics, Emeritus
B.A., Harvard College, 1929; Ph.D., Harvard University, 1934. Visiting Professor, California Institute, 1949-50; Professor, 1950-77; Professor Emeritus, 1977-.

Ernest Haywood Swift, Ph.D., LL.D., Professor of Analytical Chemistry, Emeritus
B.S., University of Virginia, 1918; M.S., California Institute, 1920; Ph.D., 1924. Instructor, California Institute, 1920-28; Assistant Professor, 1928-39; Associate Professor, 1939-43; Professor, 1943-67; Professor Emeritus, 1967-. Chairman, Division of Chemistry and Chemical Engineering, 1958-63.
Officers and Faculty

Michael Tabor, Ph.D., Research Fellow in Chemistry

Johanna E. Tallman, Certificate in Librarianship, Director of Libraries
A.B., University of California, 1936; Certificate in Librarianship, 1937. California Institute, 1973-.

Yoram Tambour, Ph.D., Research Fellow in Chemical Engineering
B.Sc., Israel Institute of Technology (Haifa), 1972; Ph.D., 1977. California Institute, 1978-.

Shoji Tanaka, Ph.D., Research Fellow in Chemistry

Steven Paul Tanis, Ph.D., Research Fellow in Chemistry
B.A., Rutgers University, 1974; Ph.D., Columbia University, 1978. California Institute, 1978-.

Mark Allen Tanouye, Ph.D., Research Fellow in Biology

Vladimir Matveevich Tapilin, Cand., Visiting Associate in Chemical Engineering

Hugh Pettingill Taylor, Jr., Ph.D., Professor of Geology
B.S., California Institute, 1954; A.M., Harvard University, 1955; Ph.D., California Institute, 1959. Assistant Professor, 1959-61; Research Fellow, 1961; Assistant Professor, 1962-64; Associate Professor, 1964-69; Professor, 1969-.

Murray F. Teitell, Ph.D., Research Fellow in Biology
B.A., Temple University, 1969; Ph.D., University of Texas, 1977. California Institute, 1977-.

Valentine L. Telegdi, Ph.D., Sherman Fairchild Distinguished Scholar

Matilde Pasqua Teleman, Laurea, Visiting Associate in Physics
Laurea, Rome University, 1970. Italian Public Education Ministry Associate, 1975-. California Institute, 1977-.

Neculai Teleman, Ph.D., Bateman Research Instructor in Mathematics
M.S., Bucharest University, 1967; Ph.D., Massachusetts Institute of Technology, 1977. California Institute, 1977-.

Katsuaki Terasawa, Ph.D., Lecturer in Economics
B.A., University of Washington (Seattle), 1966; Ph.D., University of Kansas (Lawrence), 1972. California Institute, 1979.

Daniele Thierry-Mieg, Doctorat d'Etat, Visiting Associate in Biology

Jean Thierry-Mieg, Doctorat d'Etat, Research Fellow in Theoretical Physics

Terry Lyde Thomas, Ph.D., Research Fellow in Biology
B.S., University of Georgia, 1972; Ph.D., 1975. California Institute, 1975-.

Bozena Henisz-Dostert Thompson, Ph.D., Research Associate in Linguistics
M.A., University of Warsaw, 1956; M.S., Georgetown University, 1961; Ph.D., 1965. Lecturer in English, California Institute, 1969; Senior Research Fellow, 1969-73; Research Associate, 1973-.

Frederick Burtis Thompson, Ph.D., Professor of Applied Philosophy and Computer Science
A.B., University of California (Los Angeles), 1946; M.A., 1947; Ph.D., University of California, 1952. Professor of Applied Science and Philosophy, California Institute, 1965-77; Professor of Applied Philosophy and Computer Science, 1977-.

John G. Thompson, Ph.D., Sherman Fairchild Distinguished Scholar
Wayne J. Thompson, Ph.D., *Research Fellow in Chemistry*  

Kip Stephen Thorne, Ph.D., *Professor of Theoretical Physics*  
B.S., California Institute, 1962; Ph.D., Princeton University, 1965. Research Fellow in Physics, California Institute, 1966-67; Associate Professor of Theoretical Physics, 1967-70; Professor, 1970-.

John Todd, B.Sc., *Professor of Mathematics*  
B.Sc., Queen’s University (Ireland), 1931. California Institute, 1957-. (PT)

Olga Taussky Todd, Ph.D., *Professor of Mathematics, Emeritus*  
Ph.D., University of Vienna, 1930; M.A., University of Cambridge, 1937. Research Associate, California Institute, 1957-71; Professor, 1971-77; Professor Emeritus, 1977-.

Thomas Anthony Tombrello, Jr., Ph.D., *Professor of Physics*  
B.A., Rice University, 1958; M.A., 1960; Ph.D., 1961. Research Fellow, California Institute, 1961-62; 1964-65; Assistant Professor, 1965-67; Associate Professor, 1967-71; Professor, 1971-.

James H. Trainor, Ph.D., *Visiting Associate in Physics*  

John T. Trauger, Ph.D., *Senior Research Fellow in Planetary Science*  

Nicholas William Tschoegl, Ph.D., *Professor of Chemical Engineering*  
B.Sc., New South Wales University of Technology, 1954; Ph.D., University of New South Wales, 1958. Associate Professor of Materials Science, California Institute, 1965-67; Professor of Chemical Engineering, 1967-.

David L. Tubbs, Ph.D., *Research Fellow in Physics*  

John Augustus Turner, Ph.D., *Research Fellow in Chemistry*  
B.S., Idaho State University, 1971; Ph.D., Colorado State University, 1977. California Institute, 1977-.

David Ralph Tyler, Ph.D., *Research Fellow in Chemistry*  
B.S., Purdue University, 1975; Ph.D., California Institute, 1979. Research Fellow, 1979.

Ray Edward Untereiner, J.D., Ph.D., *Professor of Economics, Emeritus*  
A.B., University of Redlands, 1920; M.A., Harvard University, 1921; J.D., Mayo College of Law, 1925; Ph.D., Northwestern University, 1932. Professor, California Institute, 1925-68; Professor Emeritus, 1968-.

Stephen C. Unwin, Ph.D., *Research Fellow in Radio Astronomy*  

David C. Van Essen, Ph.D., *Associate Professor of Biology*  
B.S., California Institute, 1967; Ph.D., Harvard University, 1971. Assistant Professor, California Institute, 1976-79; Associate Professor, 1979-.

Antoine Van Harreveld, Ph.D., M.D., *Professor of Physiology, Emeritus*  
B.A., University of Amsterdam, 1925; M.A., 1928; Ph.D., 1929; M.D., 1931. Research Assistant, California Institute, 1934-35; Instructor, 1935-40; Assistant Professor, 1940-42; Associate Professor, 1942-47; Professor, 1947-74; Professor Emeritus, 1974-.

Vito August Vanoni, Ph.D., *Professor of Hydraulics, Emeritus*  
B.S., California Institute, 1926; M.S., 1932; Ph.D., 1940. Assistant Professor, 1942-49; Associate Professor, 1949-55; Professor, 1955-74; Professor Emeritus, 1974-.

Arthur Harris Vaughan, Jr., Ph.D., *Staff Member, Hale Observatories; Assistant Director, Las Campanas Observatory*  
B.E., Cornell University, 1938; Ph.D., The University of Rochester, 1964. Research Fellow, California Institute, 1964-66; Staff Associate, Hale Observatories, 1966-67; Staff Member, 1967-; Assistant Director, 1976-.

Alan August Vetter, Ph.D., *Research Fellow in Applied Physics*  
B.E.S., State University of New York (Stony Brook), 1968; M.S., California Institute, 1969; Ph.D., 1975. Research Fellow, 1977-.
Jean Paul Nicolas Vevert, Doctorat d'Etat, Research Fellow in Chemistry

Victor V. Veysey, M.B.A., Lecturer in Business Economics; Director, Industrial Relations Center
B.S., California Institute, 1936; M.B.A., Harvard Graduate School of Business Administration, 1938; Lecturer, California Institute, 1977-. Director, 1977-.

William H. Vine, M.D., Ph.D., Research Fellow in Chemistry
A.B., Washington University, 1969; M.D., Ph.D., 1975. California Institute, 1976-.

Petr Vogel, Ph.D., Research Associate in Physics
Ph.D., Joint Institute of Nuclear Research (USSR), 1966. Senior Research Fellow in Physics, California Institute, 1970-75; Research Associate, 1975-.

Rochus E. Vogt, Ph.D., Professor of Physics; Chairman of the Division of Physics, Mathematics and Astronomy
S.M., The University of Chicago, 1957; Ph.D., 1961. Assistant Professor, California Institute, 1962-65; Associate Professor, 1965-70; Professor, 1970-; Chairman, 1978-.

Martin F. von Allmen, Ph.D., Visiting Associate in Applied Physics

Hermann Christian von Seefeld, Ph.D., Research Fellow in Applied Physics

Thad Vreeland, Jr. Ph.D., Professor of Materials Science
B.S., California Institute, 1949; M.S., 1950; Ph.D., 1952. Research Fellow in Engineering, 1952-54; Assistant Professor of Mechanical Engineering, 1954-58; Associate Professor, 1958-63; Associate Professor of Materials Science, 1963-67; Professor, 1968-.

Makoto Wada, Ph.D., Research Fellow in Chemistry

David Bertram Wales, Ph.D., Professor of Mathematics; Associate Dean of Students
B.S., University of British Columbia, 1961; M.A., 1962; Ph.D., Harvard University, 1967. Bateman Research Fellow, California Institute, 1967-68; Assistant Professor, 1968-71; Associate Professor, 1971-77; Professor, 1977-; Associate Dean, 1976-.

Robert Craig Walker, Ph.D., Research Fellow in Radio Astronomy
B.A., University of California (San Diego), 1971; Ph.D., Massachusetts Institute of Technology, 1977. California Institute, 1977-.

Robert Lee Walker, Ph.D., Professor of Physics; Executive Officer for Physics
B.S., University of Chicago, 1941; Ph.D., Cornell University, 1948. Assistant Professor, California Institute, 1949-53; Associate Professor, 1953-59; Professor, 1959-; Executive Officer, 1976-.

Robert Bruce Wallace, Ph.D., Visiting Associate in Biology
B.Sc., Simon Fraser University, 1972; Ph.D., McMaster University, 1975. Research Fellow, California Institute, 1975-79; Visiting Associate, 1979-.

Keh-Chung Wang, Ph.D., Research Fellow in Physics
B.S., National Taiwan University, 1972; Ph.D., California Institute, 1979. Research Fellow, 1979-80.

Peter Wannier, Ph.D., Associate Professor of Radio Astronomy
B.S., Stanford University, 1968; Ph.D., Princeton University, 1974. Assistant Professor, California Institute, 1976-79; Associate Professor, 1979-; Staff Member, Owens Valley Radio Observatory, 1976-.

Robert Rodger Wark, Ph.D., Lecturer in Art

Gerald J. Wasserburg, Ph.D., Professor of Geology and Geophysics
S.B., University of Chicago, 1951; S.M., 1952; Ph.D., 1954. Assistant Professor of Geology, California Institute, 1955-59; Associate Professor, 1959-62; Professor, 1962-63; Professor of Geology and Geophysics, 1963-.
Deborah Kay Watson, Ph.D., Research Fellow in Chemistry

J. Harold Wayland, Ph.D., D.Sc., Professor of Engineering Science, Emeritus
B.S., University of Idaho, 1931; M.S., California Institute, 1935; Ph.D., 1937. Research Fellow in Mathematics, 1939-41; Associate Professor of Applied Mechanics, 1949-57; Professor, 1957-63; Professor of Engineering Science, 1963-79; Professor Emeritus, 1979-.

Stephen V. Weber, Ph.D., Weizmann Research Fellow in Astrophysics

William Henry Weinberg, Ph.D., Professor of Chemical Engineering and Chemical Physics
B.S., University of South Carolina, 1966; Ph.D., University of California, 1970. Assistant Professor of Chemical Engineering, California Institute, 1972-74; Associate Professor, 1974-77; Professor, 1977-78; Professor of Chemical Engineering and Chemical Physics, 1978-.

Alan Weinstein, Ph.D., Professor of Mathematics
S.B., Massachusetts Institute of Technology, 1964; M.A., University of California, 1966; Ph.D., 1967. California Institute, 1979-.

Martin M. Weinstock, Ph.D., Research Fellow in Biology

David Franklin Welch, I.D., Associate Professor of Engineering Design
A.B., Stanford University, 1941; I.D., California Institute, 1943. Instructor in Engineering Graphics, 1943-51; Assistant Professor, 1951-61; Associate Professor of Engineering Design, 1961-.

James G. Wendel, Ph.D., Visiting Professor of Mathematics
B.A., Reed College, 1943; Ph.D., California Institute, 1948. Professor, The University of Michigan, 1961-; Visiting Professor, California Institute, 1979.

James Adolph Westphal, B.S., Professor of Planetary Science
B.S., University of Tulsa, 1954. Senior Research Fellow, California Institute, 1966-71; Associate Professor, 1971-76; Professor, 1976-; Staff Associate, Hale Observatories, 1966-74; Staff Member, 1974-.

Ward Whaling, Ph.D., Professor of Physics
B.S., Rice University, 1944; M.A., 1947; Ph.D., 1949. Research Fellow, California Institute, 1949-52; Assistant Professor, 1952-58; Associate Professor, 1958-62; Professor, 1962-.

Gerald Beresford Whitham, Ph.D., Professor of Applied Mathematics; Executive Officer for Applied Mathematics
B.Sc., University of Manchester, 1948; M.Sc., 1949; Ph.D., 1953. Visiting Professor of Applied Mechanics, California Institute, 1961-62; Professor of Aeronautics and Mathematics, 1962-67; Professor of Applied Mathematics, 1967-; Executive Officer, 1971-.

Ralph Wiggins, Ph.D., Visiting Professor of Geophysics

John Edward Wiktorowicz, Ph.D., Research Fellow in Biology
B.S., Illinois Institute of Technology, 1974; Ph.D., The University of Texas (Galveston), 1977. California Institute, 1978-.

Craig S. Wilcox, Ph.D., Research Fellow in Chemistry

Louis L. Wilde, Ph.D., Associate Professor of Economics
B.A., University of Iowa, 1972; M.A., The University of Rochester, 1975; Ph.D., 1976. Assistant Professor, California Institute, 1976-79; Associate Professor, 1979-.

Francois Xavier Wilhelm, Ph.D., Sherman Fairchild Distinguished Scholar

Marcelle Wilhelm, Ph.D., Visiting Associate in Biology

Ian Stuart Williams, Ph.D., Research Fellow in Geology
B.Sc., Australian National University, 1974; Ph.D., 1977. California Institute, 1977-.