

BROWN



Catalogue of the University
for the years
1983-85

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Catalogue of the University
for the years
1983-85

Foreword

Brown University is located in the City of Providence, the capital of Rhode Island, at the head of Narragansett Bay. The main campus of the University is on College Hill in a residential area overlooking the center of the city.

In the words of Dr. Henry Merritt Wriston, Brown's eleventh President (1937-55), "The central business of the University is the increase of knowledge, the inculcation of wisdom, the refinement of emotional responses, and the development of spiritual awareness." The Corporation of the University, in fulfilling this purpose, continues to follow the policy of maintaining a university-college of liberal arts, securing at Brown many of the advantages of both the small college and the large university.

In its administrative structure, Brown University is divided into the *Graduate School* and the undergraduate *College*, both co-educational. However, faculty members teach both undergraduate and graduate level courses.

The history of Brown reaches back over more than two centuries and tells of a university constantly undergoing change. Brown was established with a charter from the Colony's General Assembly in 1764 as the seventh college in America, and the third in New England. In September 1765 the first men registered at the college, then known as Rhode Island College and located in Warren, Rhode Island. In 1770 the school was moved to a hill in Providence and in 1804 its name was changed to Brown University in recognition of the contributions of Nicholas Brown.

The historical growth of the institution is described in greater detail in this catalogue on pages 74-80.

In the 1880's graduate courses were first offered and the Graduate School was established in 1927.

The first women were admitted in 1891 when the establishment of the Women's College in Brown University marked the beginning of eighty years of a coordinate structure for educating women within the University. In 1928 the name of the Women's College was changed to Pembroke College. For many years the women had a separate campus and extracurricular life while participating in classes with the men and earning Brown degrees.

In recent years the University has grown physically to encompass the Main Campus, the Pembroke Campus and the East Campus (formerly Bryant College), as well as other sections of College Hill. The two undergraduate colleges were merged on July 1, 1971, by a vote of the Brown Corporation. In the spring of 1973, the Corporation approved a Medical Education Program leading to the degree of Doctor of Medicine.

Brown is now a coeducational institution drawing men and women from all over the United States and many foreign countries to participate in the academic and extracurricular life of an Ivy League university, with a faculty concerned about the intellectual growth of its students, and an attractive campus close to an urban center.

Contents

FOREWORD	3
UNIVERSITY CALENDAR	6
OFFICERS OF THE UNIVERSITY.....	9
Corporation	9
Fellows and Trustees Emeriti.....	10
FACULTY AND ADMINISTRATION	12
Officers Emeriti	12
Officer of the Administration.....	14
Officers of Instruction	28
COMMITTEES.....	67
Standing Committees of the Corporation	67
Standing Committees of the Faculty.....	70
HISTORY	74
GENERAL REGULATIONS	81
Admission—The College	81
Resumed Education Program.....	88
Course Registration and Enrollment—The College	89
Attendance-Grading-Examinations.....	89
Academic Status—The College	92
Discipline	93
Academic Freedom	99
Counseling	100
Student Support Program	100
The Family Education Rights and Privacy Act of 1974	101
Equal Employment Opportunity	101
Career Planning Services	101
Requirements for Baccalaureate Degrees	102
Requirements for Combined Degree Programs	124
Medical Education Program Leading to the Doctor of Medicine Degree.....	126
Full-time Enrollment	129
Degrees with Distinction	129
Guidelines for Study Elsewhere.....	129
GRADUATE SCHOOL	132
FINANCIAL INFORMATION.....	145
Tuition	145
Tuition Regulations—The College	145
Student Charges—The College	147
Payment of Charges—The College	148
Refund of Annual Charges—The College	149
Tuition Regulations—The Graduate School	150
Student Charges—The Graduate School.....	153
Student Charges—Program in Medicine.....	154
Refund of Annual Charges—Program in Medicine	155
Payment of Charges—The Graduate School and Program in Medical Education	156
Financial Aid—The College.....	156

DEPARTMENTS, DIVISIONS, CENTERS, PROGRAMS	161
Departmental Courses	162
Extradepartmental Courses	463
Seminar Courses for Freshmen and Sophomores	480
Foundations Courses	484
Independent Study Plans	488
UNIVERSITY LIBRARIES.....	489
University Library	489
John Carter Brown Library	493
The Annmary Brown Memorial.....	494
Providence Libraries.....	494
UNIVERSITY MUSEUMS	497
UNIVERSITY LABORATORIES	498
PHYSICAL PLANT	501
UNIVERSITY HEALTH SERVICE	502
STUDENT LIFE AND ORGANIZATIONS	504
Worship	504
The Office of the Chaplain.....	504
Adviser to Foreign Students and Faculty	504
University Food Services	505
Student Residences	505
Faunce House Student Center	506
Picture Lending Library	506
Brown Resource Center	507
Sarah Doyle Women's Center	507
Physical Education—Men and Women	507
Student Organizations—Undergraduate	508
Brown University Bookstore	508
OTHER UNIVERSITY ACTIVITIES	509
Arrangements with Other Institutions	509
Concerts	511
Preparation of Teachers	511
Graphic Services	512
Public Lectures	512
PRIZES, PREMIUMS, AND HONORS.....	514
Prizes for Excellence in Preparatory Studies	514
Advanced Awards	519
Honorary Societies.....	519
Rosenberger Medal	522
Summary of Degrees	522
Honorary Degrees.....	522
ASSOCIATED ALUMNI OF BROWN UNIVERSITY	524
SUMMARY OF ENROLLMENT	526
GEOGRAPHICAL DISTRIBUTION	528
INDEX	529

University Calendar

1983-84

1983

JUNE 15-JULY 22	<i>Wednesday to Friday.</i> Graduate Summer School for Teachers.
AUGUST 1	<i>Thursday.</i> Last day for payment of charges.
AUGUST 31-SEPTEMBER 2	<i>Wednesday through Friday.</i> Registration of new graduate students.
AUGUST 31	<i>Wednesday.</i> Orientation Program begins (<i>Wednesday before first Monday in September</i>).
SEPTEMBER 6	<i>Tuesday.</i> Opening of the 1983-84 Academic Year (<i>Tuesday following first Monday in September</i>). Convocation.
SEPTEMBER 6	<i>Tuesday.</i> Classes of the first semester begin.
SEPTEMBER 7	<i>Wednesday.</i> Annual Meeting of the Corporation (<i>first Wednesday in September</i>).
OCTOBER 10	<i>Monday.</i> Columbus Day Holiday. No University exercises.
OCTOBER 15	<i>Saturday.</i> Mid-semester (<i>third Saturday in October</i>).
NOVEMBER 23-28	<i>Wednesday, 12:00 noon, to Monday, 8:00 a.m.</i> Thanksgiving recess (<i>including fourth Thursday</i>).
DECEMBER 7	<i>Wednesday.</i> Beginning of Reading Period.
DECEMBER 10	<i>Saturday.</i> Classes of Semester I end.
DECEMBER 12-20	<i>Monday through Tuesday.</i> Final Examination Period.

1984

JANUARY 5	<i>Thursday.</i> Last day for submission of Semester I grades.
JANUARY 15	<i>Sunday.</i> Applications due for fellowships, scholarships, assistantships for 1984-1985 in the Graduate School.
JANUARY 18-24	<i>Wednesday through Tuesday.</i> Registration of new and readmitted graduate students for the second semester.
JANUARY 25	<i>Wednesday, 8:00 a.m.</i> Classes of the second semester begin (<i>Wednesday preceding last Sunday in January</i>).
FEBRUARY 18-21	<i>Saturday through Tuesday.</i> Long weekend. No University exercises (<i>fourth Monday and Tuesday of Semester II</i>).
MARCH 10	<i>Saturday.</i> Mid-semester (<i>Saturday preceding second Sunday in March</i>).
MARCH 16	<i>Friday.</i> Semi-final copy of theses of candidates for the degree of Doctor of Philosophy in June due.
MARCH 24-APRIL 2	<i>Saturday to Monday, 8:00 a.m.</i> Spring recess (<i>including last Wednesday in March</i>).
APRIL 2	<i>Monday.</i> Theses of candidates for Masters degree in June due.
APRIL 26	<i>Thursday.</i> Classes end for those courses in which the Reading Period will be observed.
APRIL 23	<i>Monday.</i> Final copies of theses of candidates for the degree of Doctor of Philosophy in May due.

APRIL 27	<i>Friday. Beginning of Reading Period.</i>
MAY 8	<i>Tuesday, 6 p.m. Classes of second semester end. (Tuesday preceding second Friday in May).</i>
MAY 9-18	<i>Wednesday to Friday, inclusive, omitting Sundays. Final examinations of the second semester (ending on third Friday in May).</i>
MAY 25	<i>Friday. Meeting of the Board of Fellows.</i>
MAY 26	<i>Saturday. Annual Meeting of Phi Beta Kappa.</i>
MAY 26	<i>Saturday. Commencement Meeting of the Corporation.</i>
MAY 27	<i>Sunday, 3:00 p.m. Baccalaureate Service.</i>
MAY 28	<i>Monday. Commencement (last Monday in May).</i>

1984-1985

1984

JUNE 20-JULY 27	<i>Wednesday to Friday. Graduate Summer School for Teachers.</i>
AUGUST 1	<i>Wednesday. Last day for payment of charges.</i>
AUGUST 29	<i>Wednesday. Orientation Program begins (Wednesday before first Monday in September).</i>
AUGUST 29-31	<i>Wednesday through Friday. Registration of graduate students.</i>
SEPTEMBER 4	<i>Tuesday. Opening of the 1984-85 Academic Year (Tuesday following first Monday in September). Convocation.</i>
SEPTEMBER 4	<i>Tuesday. Classes of the first semester begin.</i>
SEPTEMBER 5	<i>Wednesday. Annual Meeting of the Corporation (first Wednesday in September).</i>
OCTOBER 8	<i>Monday. Columbus Day Holiday.</i>
OCTOBER 20	<i>Saturday. Mid-semester (third Saturday in October).</i>
NOVEMBER 21-26	<i>Wednesday, 12:00 noon, to Monday 8:00 a.m. Thanksgiving recess (including fourth Thursday).</i>
DECEMBER 7	<i>Friday. Beginning of Reading Period.</i>
DECEMBER 12-20	<i>Wednesday through Thursday. Final Examination Period.</i>

1985

JANUARY 4	<i>Friday. Last day for submission of Semester I grades.</i>
JANUARY 15	<i>Tuesday. Applications for fellowships, scholarships, and assistantships for 1985-86 in the Graduate School due.</i>
JANUARY 16-22	<i>Wednesday through Tuesday. Registration of new and readmitted graduate students for the second semester.</i>
JANUARY 22	<i>Tuesday. Last day for registration for Semester II.</i>
JANUARY 23	<i>Wednesday, 8:00 a.m. Classes for the second semester begin (Wednesday preceding last Sunday in January).</i>
FEBRUARY 16-19	<i>Saturday through Monday. Long weekend. No University exercises (fourth Monday and Tuesday of Semester II.)</i>
MARCH 9	<i>Saturday. Mid-semester (Saturday preceding second Sunday in March).</i>
MARCH 15	<i>Friday. Semi-final copy of theses of candidates for the degree of Doctor of Philosophy in June due.</i>
MARCH 23-APRIL 1	<i>Saturday to Monday, 8:00 a.m. Spring recess (including last Wednesday in March).</i>

8 / University Calendar

APRIL 1	<i>Monday.</i> Theses of candidates for Masters degrees in June due.
APRIL 26-MAY 7	<i>Friday through Tuesday.</i> Reading Period.
MAY 7	<i>Tuesday, 6 p.m.</i> Classes of the second semester end (<i>Tuesday preceding second Friday in May</i>).
MAY 8-17	<i>Wednesday to Friday, inclusive, omitting Sundays.</i> Final examinations of the second semester (<i>ending on third Friday in May</i>).
MAY 24	<i>Friday.</i> Meeting of the Board of Fellows.
MAY 25	<i>Saturday.</i> Annual Meeting of Phi Beta Kappa.
MAY 25	<i>Saturday.</i> Commencement Meeting of the Corporation.
MAY 26	<i>Sunday, 3 p.m.</i> Baccalaureate Service.
MAY 27	<i>Monday.</i> Commencement (<i>last Monday in May</i>).

1985-1986

1985

SEPTEMBER 3	<i>Tuesday.</i> Opening of the 1985-86 Academic Year (<i>Tuesday following first Monday in September</i>).
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 PAQUI M. CAMPBELL, M.S., *Pharmacist, Health Services*
 NANCY CHERICO, B.A., *Psychotherapist, Psychological Services*
 PATRICIA A. COLE, M.A., *Manager Residential Programs, Residential Life; Associate Director, Student Activities*
 DONALD G. DESROCHERS, B.A., *Assistant Director, Residential Life*
 ANNE S. DEWART, A.M., *Associate Dean of Students*

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MARLENE T. ECKERLE, M.D., *Staff Physician, Health Services*
ROSA J. EMORY, *Health Education Specialist, Health Services*
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LOUIS A. FRAGOLA, M.D., *Dermatologist, Health Services*
ARTHUR J. GALLAGHER, M.A., *Director of Residential Life/Associate Dean of Students Life*
RITA A. HINCKLEY, *Administrative Office Manager, Health Services*
CAROLYN HISCOX, M.Sc., *Health Care Advocate, Health Services*
SUMNER H. HOFFMAN, M.D., *Director of Health Services*
DAVID A. INMAN, Ph.D., *Director Student Activities*
BELINDA JOHNSON, Ph.D., *Assistant Director Psychological Services*
FERDINAND JONES, Ph.D., *Director, Psychological Services*
JOHN A. KUPREVICH, M.A., *Director of Police and Security Services*
KENNETH E. LIFFMANN, M.D., *Surgeon, Health Services*
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DANIEL MOORE, JR., M.D., *Internist, Health Services*
GABRIEL A. NAJERA, M.D., *Psychiatrist, Health Services*
GLENN R. NORMILE, B.A., *Manager of Security Services*
DOLORES NORTON, *Nurse Practitioner, Health Services*
DAVID G. QUIGLEY, M.D., *Orthopedist, Health Services*
JOHN ROBINSON, M.Ed., *Dean of Students and Associate Dean of Student Life*
ROBIN L. ROSE, Ph.D., *Assistant Director Psychological Services*
HELEN SATULA, B.S., *Nursing Supervisor*
TOBY B. SIMON, M.Ed., *Director Office of Health Education, Health Services*
ROBERT TEFFT, M.D., *Internist, Health Services*
GERTRUDE TRUMPY, B.A., *Physician's Assistant, Health Services*
EDWARD A. WHEELER, JR., M.D., *Staff Physician, Health Services*
JIMMIE L. WHITE, M.S.W., *Psychotherapist, Psychological Services*
RICHARD J. ZICCARDI, *Field Supervisor, Police and Security*

Athletics and Physical Education

JOHN C. PARRY, M.B.A., *Director of Athletics*

DAVID B. AMATO, M.S., *Head Coach, Wrestling*
JOHN W. ANDERSON, Sc.B., *Head Coach, Football*
EDWARD J. BARRY, JR., A.B., *Support Services Manager*
RONALD A. BROWN, M.P.H., *Assistant Football Coach*
JACK F. CHARNEY, M.S., *Assistant Football Coach*
MICHAEL CINGISER, B.A., *Head Coach, Men's Basketball*
JACQUELINE P. COURT, B.S., *Head Coach, Women's Gymnastics*
JULIE DICKSON, M.Ed., *Head Coach, Field Hockey*
JEAN M. ELLIOTT, M.Ed., *Sports Information Assistant*
MAUREEN P. ENOS, M.Ed., *Head Coach, Women's Basketball*

CATHY FULFORD, B.A., *Head Coach, Women's Volleyball*
 FRANCIS J. GEORGE, Sc.B., *Head Trainer*
 THEODORE M. GIBBONS, B.S., *Head Coach, Field Events Men and Women*
 STEPHEN GLADSTONE, B.A., *Director of Crew Operations*
 MICHAEL GOLDBERGER, B.A., *Assistant to Athletic Director*
 ARLENE E. GORTON, Ed.M., *Associate Director of Athletics*
 HERBERT B. HAMMOND, M.Ed., *Head Coach, Men's Ice Hockey*
 JONATHAN HIRD, M.Ed., *Head Coach, Women's Cross Country/Track and Field*
 PHILIP K. LANGAN, A.B., *Director of Sports Information*
 JOHN B. LOVETT, JR., M.Ed., *Assistant Football Coach*
 JANET LUTZ, M.S., *Physical Education Associate*
 PAUL A. MOSES, J.D., *Head Coach, Women's Tennis/Squash*
 KARL N. NADEAU, *Ticket Office Manager*
 PHILIP NESS, B.A., *Assistant Coach, Men's Basketball*
 PHILIAS E. PINCINCE, JR., B.S., *Head Coach, Women's Soccer/Softball*
 EDWARD W. RAYNOR, JR., M.Ed., *Assistant Coach, Men's Basketball*
 EDWARD W. REED, JR., M.S., *Head Coach, Men's Swimming/Water Polo*
 DAVID ROACH, M.S., *Head Coach, Women's Swimming*
 ROBERT ROTHENBERG, M.A.T., *Track Coordinator*
 CANDIS E. RUSSELL, M.S., *Head Coach, Women's Lacrosse*
 RICHARD C. SARDELLA, B.S., *Associate Athletic Director*
 WILLIAM F. SCOGGINS, M.A., *Freshman Crew Coach*
 STEPHEN SHEA, B.A., *Head Coach, Women's Ice Hockey*
 DAVID SIAS, M.A.T., *Head Coach, Diving*
 DOMINIC STARSIA, A.B., *Head Coach, Men's Lacrosse*
 DAVID STENHOUSE, B.S., *Head Coach, Baseball*
 CLIFFORD STEVENSON, M.A., *Head Coach, Soccer*
 CYNTHIA J. STEWART, B.S., *Assistant Coach, Women's Basketball*
 JOAN W. TAYLOR, B.S., *Assistant Athletic Director*
 RAMOND TELLIER, B.S., *Offensive Coordinator, Football*
 DOUG TERRY, M.A., *Head Coach, Men's Track and Field*
 JAMES TRESSLER, M.A., *Assistant Football Coach*
 D.M. TRIVETT, B.A., *Assistant Ice Hockey Coach*
 GAVIN VIANO, A.B., *Head Coach, Women's Crew*
 MARK WHIPPLE, B.A., *Assistant Football Coach*
 JOSEPH A. WIRTH, B.S., *Defensive Coordinator, Football*
 ROBERT A. WOODS, JR., B.S.B.A., *Head Coach, Men's Tennis*

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 HELEN ANTONIZIO, *Production Services Manager, Management Information Services*

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MATTHEW BARROS, *Custodial Services Manager, Plant Operations*

ALICE N. BARRY, *Student Accounts Receivable Manager, Bursar*

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TIMOTHY J. BROWN, *Food Services Manager*

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RALPH CARUSO, *Electrical Supervisor, Plant Operations*

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JOEL CHARPENTIER, *Chef, Faculty Club*

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GINO CORELLI, *Executive Chef, Food Services*

WALTER C. CORLEY, *Manager, Plant Operations*

WILLIAM L. COYLE, *Custodial Supervisor, Plant Operations*

HORACE H. CRAIG, *Director, Rental Facilities*

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RICHARD S. DANNER, B.S., *Chief Engineer, Plant Operations*

ANTHONY E. DETRI, *Food Services Manager*

LOUIS M. DIDONATO, *Custodial Supervisor, Plant Operations*

MARIE D. DUHAIME, *Associate Director, Management Information Services*

HENRY DUMOUSAUD, *Plumbing Supervisor, Plant Operations*

DEBORAH S. DZIEM, *Catering Manager, Food Services*

ROBERT S. FALLOW, *Custodial Supervisor, Plant Operations*

ROBERT E. FORTIN, B.S., *Chief Accountant, Controller*

SUSAN M. GAGNON, B.S., *Accounts Payable Coordinator, Controller*

OTIS W. GAMBLE, *Custodial Supervisor, Plant Operations*

THEODORE G. GARILLE, B.S., *Assistant Director, Plant Operations*

SUSAN T. GORRIE, B.A., *Payroll Coordinator, Controller*

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 DANIEL P. MCCARTHY, PH.D., *Staff Development and Training Specialist, Personnel Office*
 BERTHA MCCAUGHEY, *Bursar*
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 JOHN F. McDERMOTT, *Fire Marshall, Safety Services*
 MICHAEL D. McDONALD, A.B., *Publications Coordinator, Graphic Services-Administration*
 WILLIAM MCKENNA, M.B.A., *Manager of Textbook Department, Bookstore*
 CHARLES R. MCKENRICK, *Technical Support Manager, Management Information Services*
 DOLORES A. MCSWEENEY, *Administrative Office Manager, Management Information Services*
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 GAIL E. MEDBURY, *Assistant Director, Rental Facilities*
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 WILLIAM A. POOLE, *Painting Supervisor, Plant Operations*
 STEPHEN C. POPOVICH, B.S., *Food Production Manager, Food Services*
 MARLENE A. RAPELYE, B.S., *Assistant Food Services Supervisor*
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26 / Officers of Administration

LAWRENCE V. ROBINSON, JR., M.A., *Deputy Treasurer, Treasurer's Office*

BENJAMIN T. RUTH, *Head Baker, Food Services*

MICHAEL H. RYALS, B.S., *Heating, Ventilation and Air Conditioning Supervisor, Plant Operations*

FRANK R. SACCOCCIO, M.A., *Planning Manager, Physical Planning*

JOSE SANTOS, *Custodial Supervisor, Plant Operations*

THOMAS M. SNEDDON, B.A., *Grounds Superintendent, Plant Operations*

PHILIP A. SOUSA, *Food Services Supervisor*

JOHN B. SPEAKER, JR., B.S., *Director of Plant Operations*

JOHN M. STEWART, *Assistant Director of Food Services*

ANTHONY M. STOLARZ, M.A., *Associate Director of Food Services*

SANDRA J. STRAND, B.F.A., *Graphic Designer, Design Services*

DEBORAH A. STRAUSS, B.A., *Salary Analyst, Personnel Office*

ANTHONY R. TANZI, M.B.A., *Director of Telecommunications, Business Manager-Services*

JANICE TEOLIS, B.S., *Purchasing Agent, Purchasing*

THOMAS F. TORTORELLA, B.S., *Controller*

ALFRED R. TOWLE, M.B.A., *Assistant Director, Plant Operations*

MOLLY M. TRAHAN, *Purchasing Agent, Purchasing*

NORMAN I. TURNER, *Food Services Supervisor, Newscounter*

SHEILA J. VARKONYI, B.A., *Manager Campus Shop, Bookstore*

KEVIN M. VENTURINI, B.S., *Accountant, Controller*

KENNETH H. WALKER, M.Sc., *Director of Summer and Special Programs, Office of Associate Vice President-Administration*

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GRETCHEN M. WILLIS, B.S., *Food Services Supervisor, Food Services*

ALLEN Y. WONG, B.A., *Graphic Designer, Design Services*

PEARL K. WOOLF, B.S., *Work Control Center Manager Plant Operations, Office of Associate Vice President-Administration*

CAROL L. WOOTEN, M.Arch., *Director of Physical Planning*

FRED C. YATTAW, *Mailroom Supervisor, University Mail Room*

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TRUDEE S. EPSTEIN, B.A., *Assistant to Director, Financial Recording, Alumni and Development Information Services*

CONSTANCE F. EVRARD, M.A., *Senior Planned Giving Officer*

LYNNE FRASER, B.A., *Assistant Director, Brown Fund*

ELKE S. FRECCIA, M.S., *Project Manager, Brown Fund*

ROSETTE GARABEDIAN, *Associate Director, Brown Fund*
SUSAN GEARY, PH.D., *Associate Director, Brown Fund*
EVA M. GERGORA, *Director, Brown Fund*
JOHN G. LEWIS, A.B., *Co-Director, Planned Giving*
JOHN E. LIEBMANN, B.A., *Senior Planned Giving Officer*
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CAROL D. SHOLLER, A.B., *Senior Planned Giving Officer*
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H. SCOTT THOMSON, B.A., *Senior Planned Giving Officer*
MARJORIE S. TOMAS, *Assistant Director, Donor Relations*
LESLIE T. WENDEL, B.A., *Director of Communications and Donor Programs*
NANCY R. WOLPERT, A.B., *Assistant Director, Brown Fund*
DAVID J. ZUCCONI, A.B., *Senior Planned Giving Officer*

University Relations

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SANDRA B. DELANY, B.F.A., *Graphic Designer, News and Information Services*
DON DEMAIO, B.A., *Assistant Director, News and Information Services*
ANNE E. DIFFILY, A.B., *Managing Editor, Brown Alumni Monthly*
JOHN FORASTE, A.B., *Photographer, University Relations*
JOAN C. FRADLEY, B.S., *Management Assistant, University Relations*
JOHN HAMOLSKY, B.A., *Manager, Audio-Visual Services*
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ANCELIN V. LYNCH, B.A., *Associate Director, University Relations*
MARK NICKEL, M.A., *Assistant Director, News and Information Services*
ROBERT M. RHODES, A.B., *Senior Editor, Brown Alumni Monthly*
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WILLIAM J. SLACK, A.B., *Associate Director of University Relations*
ESTHER A. TRACY, B.A., *Assistant Director, Alumni Relations*

Officers of Instruction

The following is a list as of September 1, 1983, in alphabetical sequence, of all Officers of Instruction holding appointments as Instructor or above by action of the Corporation of Brown University. Titles given are those held as of September 1, 1983.

- ROY K. AARON, M.D., *Assistant Professor of Surgery (Orthopedic Surgery)*
 DAVID B. ABRAMS, PH.D., *Assistant Professor of Community Health (Research)*
 DIANNE ABUELO, M.D., *Clinical Assistant Professor of Pediatrics*
 J. GARY ABUELO, M.D., *Assistant Professor of Medicine*
 ROBERT D. ACCOLA, PH.D., *Professor of Mathematics*
 DIANA F. ACKERMAN, PH.D., *Associate Professor of Philosophy*
 THOMAS R. ADAMS, A.M., *John Hay Professor of Bibliography, University
 Bibliographer*
 KAILASH C. AGARWAL, PH.D., *Associate Professor of Medical Science (Research)*
 EDWARD J. AHEARN, PH.D., *Professor of Comparative Literature and French Studies*
 DAVID K. AHERN, PH.D., *Instructor in Psychiatry and Human Behavior*
 KWANG W. AHN, M.D., *Clinical Assistant Professor of Medicine*
 SAUL J. AHOLA, M.D., *Clinical Instructor in Medicine*
 MAURICE M. ALBALA, M.D., *Associate Professor of Medicine (Hematology)*
 PAUL E. ALEXANDER, M.D., *Clinical Assistant Professor of Psychiatry and Human
 Behavior*
 CATHERINE F. ALLEN-ROWLANDS, M.S., *Assistant Professor of Surgery (Research)*
 DEWITT ALLEN, PH.D., *Instructor in English*
 ONESIMO T. ALMEIDA, PH.D., *Assistant Professor of Portuguese and Brazilian Studies*
 JOSEPH C. ALPER, M.D., *Assistant Professor of Medicine (Dermatology)*
 GILBERT J. ALTONGY, M.D., *Clinical Instructor in Medicine*
 MARY W. AMBLER, M.D., *Associate Professor of Pathology*
 HOWARD I. AMOLS, PH.D., *Assistant Professor of Radiation Medicine*
 JOSE AMOR Y VAZQUEZ, PH.D., *Professor of Hispanic and Italian Studies*
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 DOUGLAS D. ANDERSON, PH.D., *Professor of Anthropology*
 GEORGE W. ANDERSON, M.D., *Lecturer in Obstetrics and Gynecology*
 JAMES A. ANDERSON, PH.D., *Associate Professor of Neural Science and Psychology*
 PHILIP M. ANDERSON, PH.D., *Assistant Professor of Education*
 THOMAS J. ANTON, PH.D., *A. Alfred Taubman Professor of American Institutions,
 Professor of Political Science*
 REX W. APPENFELLER, M.D., *Clinical Instructor in Medicine*
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 ORLANDO M. ARMADA, M.D., *Clinical Assistant Professor of Medicine*
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 BETTY E. ARONSON, M.D., *Clinical Assistant Professor of Pediatrics*
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 JOSEPH P. BELLINO, M.D., *Clinical Assistant Professor of Surgery (Otolaryngology)*
 JOHN W. BENDER, M.D., *Clinical Instructor in Pediatrics*

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JONATHAN K. WAAGE, PH.D., *Associate Professor of Biology*

THOMAS J. WACHTEL, M.D., *Assistant Professor of Community Health*

SAFA F. WAGDI, M.D., *Clinical Assistant Professor of Surgery (Ophtalmology)*

FLORENCE H. WAGG, M.A., *Visiting Instructor of Hispanic Studies*

RAYMOND W. WAGGONER, JR., M.D., *Associate Professor of Psychiatry and Human Behavior*

IVAN F. WALDBAUER, PH.D., *Associate Professor of Music*

BERNARD K. WALDROP, PH.D., *Professor of English*

BARBARA B. WALKER, PH.D., *Assistant Professor of Psychology (Research)*

J. MICHAEL WALKER, PH.D., *Assistant Professor of Psychology*

ANTHONY A. WALSH, PH.D., *Adjunct Professor of the Child Study Center*

HAROLD R. WARD, PH.D., *Professor of Chemistry*

ROBERT G. WARNOCK, PH.D., *Professor of German*

WILLIAM H. WARREN, JR., PH.D., *Assistant Professor of Psychology*

STEVEN A. WARTMAN, M.D., *Assistant Professor of Community Health*

WILLIAM J. WATERS, PH.D., *Clinical Instructor in Community Health*

MICHAEL J. WEAVER, M.D., *Clinical Instructor in Surgery*

THOMPSON WEBB, III, PH.D., *Associate Professor of Geological Sciences*

ELIZABETH WEED, PH.D., *Adjunct Lecturer in French Studies*

BANICE M. WEBBER, M.D., *Clinical Associate Professor of Medicine*

PETER WEGNER, PH.D., *Professor of Computer Science*

KAREN WEIHS, M.D., *Instructor in Family Medicine*

MARC S. WEINBERG, M.D., *Assistant Professor of Medicine*

JEROME H. WEINER, PH.D., *Professor of Engineering, L. Herbert Ballou University Professor*

WAYNE H. WEINREB, M.D., *Instructor in Medicine*

ARNOLD L. WEINSTEIN, PH.D., *Professor of Comparative Literature and French*

ROBERT F. WEISBERG, PH.D., *Clinical Instructor in Community Health*

JAY S. WEISFELD, M.D., M.P.H., *Clinical Instructor in Community Health*

BARRIE L. WEISMAN, M.D., *Clinical Assistant Professor of Family Medicine*

PAUL T. WELCH, M.D., *Clinical Assistant Professor of Surgery (Neurosurgery)*

JOEL K. WELTMAN, M.D., *Clinical Associate Professor of Medicine*

JOHN WERMER, PH.D., *Professor of Mathematics*

CONRAD W. WESSELHOEFT, M.D., *Clinical Associate Professor of Surgery (Pediatric Surgery)*

ALBERT F. WESSEN, PH.D., *Professor of Medical Science, Professor of Sociology*

DARRELL M. WEST, PH.D., *Assistant Professor of Political Science*

PETER J. WESTERVELT, PH.D., *Professor of Physics*

ROBERT J. WESTLAKE, M.D., *Associate Professor of Psychiatry and Human Behavior*

WILLIAM M. WEXLER, M.D., *Clinical Instructor in Surgery (Otolaryngology)*

ALBERT K. WEYMAN, M.D., *Clinical Assistant Professor of Surgery (Cardiothoracic Surgery)*

KENNETH T. WHEELER, JR., PH.D., *Associate Professor of Radiation Medicine (Research)*

KENNETH F. WHITAKER, M.D., *Clinical Instructor in Obstetrics and Gynecology*

JULIE M. WHITE, M.ED., *Adjunct Lecturer in Linguistics*

SHELDON S. WHITE, SC.D., *Adjunct Professor of Engineering*

STEPHEN L. WHITE, M.S.W., M.P.A., *Clinical Instructor in Psychiatry and Human Behavior*

HENRY L. WHITED, M.D., *Clinical Instructor in Medicine*

VAN R. WHITING, JR., PH.D., *Assistant Professor of Political Science*

ANNIE J. WIART, A.B., *Lecturer in French*

MILDRED WIDGOFF, PH.D., *Professor of Physics*

ERIC G. WIDMER, PH.D., *Lecturer in History, Dean of Student Life*

JOHN A. WIDNESS, M.D., *Assistant Professor of Pediatrics (Research)*

MICHAEL C. WIEMANN, M.D., *Assistant Professor of Medicine*

DAVID E. WILCOX, M.D., *Clinical Instructor in Surgery*

ROBERT O. WILHELM, M.D., *Clinical Assistant Professor of Family Medicine (Emergency)*

DAVID O. WILLIAMS, M.D., *Associate Professor of Medicine*

LEA E. WILLIAMS, PH.D., *Professor of History, Professor of East Asian Language*

RICHARD K. WILLIAMS, M.D., *Clinical Instructor in Medicine*

PAUL G. WILLIARD, PH.D., *Assistant Professor of Chemistry*

DON B. WILMETH, PH.D., *Professor of Theatre Arts and English*

JULIE M. WILSON, R.N., M.S., *Clinical Instructor in Family Medicine*

LIONEL WILSON, PH.D., *Visiting Associate Professor of Geological Sciences*

JOHN P. WINCZE, PH.D., *Professor of Psychiatry and Human Behavior, Adjunct Professor of Psychology*

RUDOLF M. WINKES, PH.D., *Associate Professor of Art*

NEIL WINTFELD, PH.D., *Assistant Professor of Political Science*

GARY B. WITMAN, M.D., *Clinical Assistant Professor of Medicine*

EDWARD G. WITTELS, M.D., *Assistant Professor of Medicine*

AARON WOLD, PH.D., *Vernon K. Kreible Professor of Chemistry, Professor of Chemistry and Engineering*

PATRICIA N. WOLD, M.D., *Clinical Assistant Professor of Psychiatry and Human Behavior*

ALFRED W. WOLFSOHN, M.D., *Clinical Instructor in Medicine*

WILLIAM A. WOLOVICH, PH.D., *Professor of Engineering*

E. JONATHAN WOLSTON, M.D., *Clinical Assistant Professor of Psychiatry and Human Behavior*

GORDON S. WOOD, PH.D., *Professor of History*

HAROLD A. WOODCOME, JR., M.D., *Clinical Assistant Professor of Surgery (Ophthalmology)*
 SUSANNE WOODS, PH.D., *Professor of English*
 BILLY R. WOOTEN, PH.D., *Associate Professor of Psychology*
 JOHN R. WORKMAN, PH.D., *Professor of Classics*
 JAMES J. WRENN, PH.D., *Professor of Linguistics*
 CAROLYN D. WRIGHT, M.A., *Assistant Professor of English*
 JACQUES C. WRIGHT, PH.D., *Instructor in Psychology*
 DONNA M. WULFF, PH.D., *Assistant Professor of Religious Studies*
 WILLIAM F. WYATT, JR., PH.D., *Professor of Classics*
 ZAI-XIN XU, *Visiting Associate Professor of Physics*
 TAKASHI YAMAKI, M.D., *Clinical Assistant Professor of Surgery*
 KIKUKO YAMASHITA, PH.D., *Lecturer in Japanese*
 RONALD A. YANKEE, M.D., *Professor of Medicine*
 JAMES J. YASHAR, M.D., *Clinical Assistant Professor of Surgery (Cardiothoracic Surgery)*
 JOHN YASHAR, M.D., *Clinical Assistant Professor of Surgery (Thoracic Surgery)*
 AKIO YASUHARA, PH.D., *Assistant Professor of Economics*
 SEE-CHEN YING, PH.D., *Professor of Physics*
 HEBER W. YOUNGKEN, JR., PH.D., *Lecturer in Medicine*
 ANTHONY T. YU, M.D., *Assistant Professor of Radiation Medicine*
 RICHARD A. YUND, PH.D., *Professor of Geological Sciences*
 SUMNER I. ZACKS, M.D., *Professor of Pathology*
 ZBIGNIEW A. ZAWADZKI, M.D., *Associate Professor of Medicine (Research)*
 STANLEY M. ZDONIK, JR., PH.D., *Assistant Professor of Computer Science*
 VINCENT ZECCHINO, M.D., *Clinical Instructor in Orthopaedics*
 CATHERINE ZERNER, PH.D., *Associate Professor of Art*
 BASIL G. ZIMMER, PH.D., *Professor of Sociology*
 STANLEY ZIMMERING, PH.D., *Professor of Biology*
 MICHAEL J. ZIMMERMAN, PH.D., *Assistant Professor of Philosophy*
 STEPHEN H. ZINNER, M.D., *Professor of Medicine*
 MYEONG-HAN ZOH, PH.D., *Visiting Professor of Cognitive Science and Linguistics*
 JOSEPH M. ZUCKER, M.D., *Clinical Assistant Professor of Psychiatry and Human Behavior*
 ALAN S. ZUCKERMAN, PH.D., *Professor of Political Science*

List of Officers of Instruction who did not appear in the 1981-1983 Catalogue

LORELEI ALLEN, PH.D., *Visiting Lecturer in German, September 1, 1982-January 31, 1983*
 NICHOLAS D. ALTERI, JR., M.D., *Visiting Associate Professor of Biochemical Pharmacology (Research), January 1, 1983-June 30, 1983*
 BRIAN ANDERSON, PH.D., *Visiting Professor of Engineering (Research), May 2, 1982-June 16, 1982*
 DOMINIQUE ANXOLABEHERE, THÈSE DE DOCTORAT D'ETAT (T.H.) *Visiting Assistant Professor of Biology (Research), July 1, 1982-March 31, 1983*
 SHIGERU AOKI, PH.D., *Visiting Associate Professor of Engineering (Research), September 20, 1981-July 19, 1982*
 MICHAEL A. ARMSTRONG-JAMES, *Visiting Professor of Medical Science (Research), July 1, 1982-June 30, 1983*

- ANTHONY J. ARNOLD, *Visiting Assistant Professor of Geological Sciences, September 1, 1981-January 31, 1982*
- ARTHUR L. BASHAM, PH.D., *Visiting Professor of Religious Studies, July 1, 1982-June 30, 1983*
- SANDHYA BASU, PH.D., *Visiting Associate Professor (Research), September 1, 1982-January 15, 1983*
- ROBERT E. BECKER, M.D., *Clinical Professor of Psychiatry and Human Behavior, January 1, 1983-June 30, 1983*
- MARY T. BEHR, H.S.D., *Instructor in Community Health (Research), January 1, 1983-June 30, 1983*
- LUIS M. BELEZA, PH.D., *Visiting Assistant Professor of Economics, September 1, 1982-June 30, 1983*
- ELLISON BERNIS, M.D., *Instructor in Medicine, July 1, 1982-June 30, 1983*
- WILLIAM R. BIRS, PH.D., *Visiting Professor of Old World Archaeology and Art, September 20, 1982-February 1, 1983*
- GRAHAM F. BODEN, PH.D., *Visiting Associate Professor of Chemistry, September 1, 1981-August 31, 1982*
- MARA BONFIOLI, *Visiting Professor of Classical Archaeology, March 17, 1982-May 8, 1982*
- ALICIA BORINSKY, *Visiting Associate Professor of Hispanic Studies, February 1, 1983-February 28, 1983*
- EDWARD BORTNICHAK, PH.D., *Instructor in Community Health (Research), January 1, 1982-June 30, 1983*
- KATHLEEN V. BOSSY, PH.D., *Adjunct Assistant Professor of Medical Science, July 1, 1982-June 30, 1983*
- DAG BRATLID, M.D., PH.D., *Visiting Associate Professor of Pediatrics, December 1, 1981-October 31, 1982*
- ROBERT D. BUHR, PH.D., *Visiting Assistant Professor of Linguistics, July 1, 1982-June 30, 1983*
- WILLIAM L. CANAK, PH.D., *Visiting Assistant Professor of Sociology, September 1, 1981-June 30, 1983*
- GLENN R. CARROLL, PH.D., *Assistant Professor of Sociology, January 1, 1982-June 30, 1982*
- JACK CARROLL, M.A., *Visiting Assistant Professor of English, September 1, 1981-June 30, 1982*
- THOMAS E. CECIL, PH.D., *Visiting Associate Professor of Mathematics (Research), September 1, 1982-August 31, 1983*
- MICHEL CHIPOT, DOCTORAT D'ETAT (FRANCE), *Visiting Assistant Professor of Applied Mathematics (Research), September 1, 1981-August 31, 1982*
- DONATO CIOLI, M.D., *Visiting Associate Professor of Microbiology, April 16, 1983-August 31, 1983*
- ANTHONY A. CLIFFORD, PH.D., *Visiting Associate Professor of Engineering (Research), August 1, 1982-July 31, 1983*
- WILLIAM S. COBB, PH.D., *Adjunct Professor of Anthropology, January 1, 1982-June 30, 1983*
- MILTON W. COLE, PH.D., *Visiting Professor of Physics and Chemistry, March 1, 1982-August 31, 1982*
- CONRADO COLLAZO, *Visiting Instructor in Hispanic Studies, February 1, 1983-May 31, 1983*
- JAY A. COUGHTRY, PH.D., *Adjunct Assistant Professor of Afro-American Studies, January 1, 1982-June 30, 1982*

- VIOLET DANIEL, PH.D., *Visiting Associate Professor of Medical Science, August 1, 1982-July 31, 1983*
- ROBERT M. DANNIN, PH.D., *Visiting Assistant Professor of Anthropology, February 1, 1982-June 30, 1982*
- LANKTREE J. DAVIES, M.D., PH.D., *Visiting Assistant Professor of Family Medicine, November 1, 1981-February 28, 1982*
- BARRY R. DAVIS, PH.D., *Assistant Professor of Applied Mathematics (Research), July 1, 1982-June 30, 1983*
- RODNEY DELASANTA, PH.D., *Visiting Associate Professor of English, February 1, 1983-June 30, 1983*
- RONALD J. DI PERNA, PH.D., *Visiting Professor of Applied Mathematics (Research), January 1, 1982-March 31, 1982*
- EDWARD T. DOWNING, *Instructor in Medicine*
- ARTURO ECHAVARRIA-FERRARI, PH.D., *Visiting Associate Professor of Hispanic Studies, February 1, 1983-May 31, 1983*
- WILLIAM F. EDDY, PH.D., *Visiting Associate Professor of Applied Mathematics, September 1, 1981-August 31, 1982*
- CONSTANTIN ERETESCU, PH.D., *Adjunct Associate Professor of Semiotics Research, January 1, 1983-June 30, 1983*
- MARK I. FAGAN, M.D., *Instructor of Medicine, July 1, 1982-June 30, 1983*
- WILLIAM M. FLEISCHMAN, PH.D., *Visiting Professor of Applied Mathematics, September 1, 1981-August 31, 1982*
- SANDY FLITTERMAN, PH.D., *Visiting Assistant Professor of Semiotics, July 1, 1982-June 30, 1983*
- KENNETH G. FOOTE, PH.D., *Visiting Assistant Professor of Physics, September 1, 1982-August 31, 1983*
- MICHAEL J. FOX, M.D., *Assistant Professor of Medicine, July 1, 1982-August 24, 1982*
- RICHARD FRANCE, *Visiting Lecturer in Theatre Arts, February 1, 1983-May 31, 1983*
- FRANTISEK W. GALAN, PH.D., *Adjunct Assistant Professor of Semiotics Research, January 1, 1983-June 30, 1983*
- BARRY GARFINKEL, M.D., *Assistant Professor of Psychiatry and Human Behavior, July 1, 1982-August 15, 1983*
- FRANCIS L. GARRITY, PH.D., *Adjunct Assistant Professor of Microbiology, February 1, 1983-June 30, 1983*
- LARRY G. GERBER, PH.D., *Assistant Professor of History, July 1, 1982-June 30, 1983*
- MOHAMMAD B. GHAFARI, *Adjunct Lecturer in Theatre Arts and Anthropology, September 1, 1981-August 31, 1982*
- ROBERT T. GLASSEY, PH.D., *Visiting Professor of Applied Mathematics, September 1, 1982-December 31, 1982*
- LYNDA J. GOFF, PH.D., *Visiting Associate Professor of Biology, December 1, 1982-July 3, 1983*
- YADIN GOLDSCHMIDT, PH.D., *Assistant Professor of Physics (Research), August 1, 1982-July 31, 1983*
- CARL V. GRANGER, M.D., *Professor of Community Health, July 1, 1982-June 30, 1983*
- WALTER H. GROSS, *Visiting Professor of Classical Archaeology, February 1, 1982-June 30, 1982*
- CHARLES M. HAUSER, B.A., *Adjunct Associate Professor of English, September 1, 1981-January 31, 1982*
- MIRIAM HITCHCOCK, M.F.A., *Visiting Lecturer in Art, February 1, 1983-June 30, 1983*
- JEFFREY HOFFSTEIN, PH.D., *Assistant Professor of Mathematics (Research), July 1, 1982-August 31, 1982*

- LING HSIAO, A.B., *Visiting Associate Professor of Applied Mathematics (Research), September 1, 1981-January 31, 1982*
- STEPHEN A. HSIEH, PH.D., *Visiting Professor of Chemistry, July 1, 1982-December 31, 1982*
- SAMUEL P. HUNT, M.D., *Clinical Associate Professor of Psychiatry and Human Behavior, July 1, 1982-June 30, 1983*
- JOHN W. HUTCHINSON, PH.D., *Visiting Professor of Engineering, September 1, 1981-January 31, 1982*
- CHII-RUEY HWANG, PH.D., *Visiting Assistant Professor of Applied Mathematics (Research), September 1, 1981-November 30, 1981*
- KOJI INADA, PH.D., *Visiting Professor of Economics, April 1, 1982-March 31, 1983*
- K. L. JOHNSON, PH.D., *Visiting Professor of Engineering (Research), May 16, 1982-June 30, 1982*
- JUNE KANE, PH.D., *Visiting Lecturer in French Studies, February 1, 1982-June 30, 1982*
- TAKAO KATO, PH.D., *Visiting Associate Professor (Research), Mathematics, September 1, 1982-June 30, 1983*
- MALVIN S. KELLER, M.D., *Instructor in Medicine, October 1, 1982-June 30, 1983*
- CHRISTOPHER D. KENYON, PH.D., *Assistant Professor of Pathology (Research), July 1, 1982-June 30, 1983*
- KYUNG S. KIM, PH.D., *Visiting Assistant Professor of Engineering (Research), July 15, 1982-August 31, 1982*
- IN GYU KOH, PH.D., *Visiting Assistant Professor of Physics (Research), January 1, 1982-February 28, 1982*
- JOEL C. KUIPERS, M. PHIL., *Visiting Assistant Professor of Anthropology, September 1, 1981-February 28, 1982*
- MARIAN KWAPISZ, PH.D., *Visiting Associate Professor of Applied Mathematics (Research), September 1, 1981-October 31, 1981*
- JAMES LAUGHLIN, A.B., *Adjunct Professor of English, January 1, 1983-June 30, 1983*
- ERIC M. LEIFER, *Visiting Instructor in Sociology, January 1, 1983-June 30, 1983*
- MARILYN LENKOWSKY, B.F.A., *Visiting Lecturer, February 1, 1982-June 30, 1982*
- CHARLES S. LIEBMAN, PH.D., *Visiting Professor of Religious Studies and Judaic Studies, February 1, 1983-June 30, 1983*
- LUCE LOPEZ-BARALT, PH.D., *Visiting Associate Professor of Hispanic Studies, February 1, 1983-May 31, 1983*
- REDA MANKBADI, PH.D., *Visiting Assistant Professor of Engineering (Research), June 15, 1982-September 30, 1982*
- JOHN B. MARTIN, PH.D., *Visiting Professor of Engineering, May 26, 1983-June 20, 1983*
- ELISABETH J. MC GREGOR, PH.D., *Visiting Assistant Professor of English, September 21, 1981-January 31, 1982*
- LEE-OR MERKINE, PH.D., *Visiting Associate Professor of Engineering, June 1, 1982-September 30, 1982*
- SAMUEL D. MESSER, M.F.A., *Visiting Lecturer in Art, September 1, 1981-January 31, 1982*
- FUMITAKE MIMURA, PH.D., *Visiting Associate Professor of Economics, September 1, 1981-July 31, 1982*
- ALAIN MOLINARI, PH.D., *Visiting Assistant Professor of Engineering (Research), October 1, 1982-October 31, 1982*
- ROSS G. MOON, M.D., *Visiting Assistant Professor of Family Medicine, March 1, 1982-August 31, 1982*
- ALAN MOSKOWITZ, M.D., *Instructor in Medicine, May 1, 1982-June 30, 1982*
- ROBERT MOTHERWELL, *Visiting Professor of Art, September 1, 1981-May 31, 1982*

- LYSBETH W. MUNCY, PH.D., *Adjunct Professor of History, September 1, 1982-January 31, 1983*
- DAVID MURRAY, M.A., *Visiting Assistant Professor of Anthropology, July 1, 1982-June 30, 1983*
- MIHAI NADIN, PH.D., *Adjunct Professor of Semiotics, March 1, 1983-June 30, 1983*
- MAKIKO NISIO, PH.D., *Visiting Professor of Applied Mathematics (Research), February 1, 1982-February 28, 1982*
- WALDYR M. OLIVA, PH.D., *Visiting Professor of Applied Mathematics, January 1, 1982-March 31, 1982*
- JOAN PETTIGREW, PH.D., *Visiting Assistant Professor of English, October 15, 1981-December 31, 1981*
- JOSEPH PISCHEL, *Visiting Professor of German, September 1, 1981-January 31, 1982*
- CLARKSON POTTER, B.A., *Adjunct Associate Professor of English, February 1, 1982-June 30, 1982*
- ELIZABETH RAPAPORT, PH.D., *Visiting Associate Professor of Philosophy, February 1, 1982-June 30, 1982*
- SUNG T. RO, PH.D., *Visiting Associate Professor of Engineering (Research), January 1, 1983-February 28, 1983*
- WARD T. ROBINSON, *Visiting Professor of Chemistry, February 1, 1983-May 30, 1983*
- SANDOR ROT, PH.D., *Visiting Professor of Slavic Languages, September 1, 1981-January 31, 1982*
- KRZYSZTOF RYBAKOWSKI, PH.D., *Visiting Assistant Professor of Applied Mathematics (Research), August 1, 1982-December 31, 1982*
- JURGEN SCHEURLE, PH.D., *Visiting Assistant Professor of Applied Mathematics (Research), December 1, 1982-July 31, 1983*
- THOMAS P. SCHONBEK, PH.D., *Visiting Associate Professor of Mathematics (Research), September 1, 1982-June 30, 1983*
- PHILIP SCHWARTAU, PH.D., *Visiting Assistant Professor of Mathematics, July 1, 1982-June 30, 1983*
- SHUENN-JYI SHEU, PH.D., *Visiting Assistant Professor of Applied Mathematics (Research), June 1, 1982-June 30, 1983*
- ROBERT K. SHOPE, PH.D., *Visiting Professor of Philosophy, February 1, 1982-May 31, 1982*
- THOMAS C. SIDERIS, PH.D., *Visiting Assistant Professor of Applied Mathematics (Research), September 1, 1981-August 31, 1982*
- JAMES D. SIMON, PH.D., *Assistant Professor of Medicine (Research), July 1, 1982-October 5, 1982*
- CAROL SIMPSON, PH.D., *Visiting Assistant Professor of Geological Sciences, June 1, 1982-December 31, 1982*
- THEODORE SIZER, PH.D., *Visiting Professor of Education, February 1, 1983-May 31, 1983*
- MARCIA R. SMILACK, PH.D., *Visiting Assistant Professor of English, September 1, 1981-December 31, 1981*
- ALFREDO SOMOLINOS, PH.D., *Visiting Associate Professor of Applied Mathematics (Research), September 1, 1981-May 31, 1983*
- MELVIN S. STEINBERG, PH.D., *Visiting Associate Professor of Physics, January 15, 1983-June 30, 1983*
- JOHN F. STEVENSON, PH.D., *Visiting Associate Professor of Psychiatry and Human Behavior, January 1, 1982-June 30, 1982*
- LESLIE F. STEVENSON, *Visiting Associate Professor of Philosophy, January 1, 1983-June 30, 1983*

- MICHAEL J. STUTZER, PH.D., *Visiting Assistant Professor of Economics*, September 1, 1982-June 30, 1983
- RITA TERRAS, PH.D., *Visiting Associate Professor of German*, February 1, 1982-June 30, 1982
- VINCENZO TUSA, *Parker Visiting Professor of Old World Archaeology and Art*, February 2, 1983-May 27, 1983
- PAUL D. VAN DER MERWE, PH.D., *Visiting Professor of Physics*, August 1, 1982-December 31, 1982
- ALESSANDRA VENTURINI, DOCTOR OF THE LAUREA, *Visiting Assistant Professor of Economics*, January 1, 1982-June 30, 1982
- GEORGE B. VON DER LIPPE, PH.D., *Visiting Lecturer in German*, February 2, 1982-June 30, 1982
- WILLIAM A. WAKEHAM, PH.D., *Visiting Assistant Professor of Engineering (Research)*, January 1, 1982-December 31, 1982
- ROSMARIE WALDROP, PH.D., *Visiting Associate Professor of English*, January 1, 1983-June 30, 1983
- DONALD H. WEINGARTEN, PH.D., *Visiting Professor of Physics*, June 1, 1983-August 11, 1983
- KEITH D. WHITE, PH.D., *Visiting Associate Professor of Psychology (Research)*, July 1, 1983-July 31, 1983
- RONALD M. WINTROB, M.D., *Visiting Professor of Psychiatry and Human Behavior*, June 1, 1982-June 30, 1983
- ANDRZEJ WOLFF, PH.D., *Visiting Assistant Professor of Engineering*, October 9, 1981-January 31, 1982
- GLENN WRIGHT, PH.D., *Visiting Assistant Professor of English*, September 1, 1981-January 1, 1982
- XUE-WEN WU, PH.D., *Visiting Associate Professor of Physics*, August 1, 1982-July 31, 1983
- MICHIO YANO, M.A., *Visiting Associate Professor of History of Mathematics*, July 1, 1982-August 31, 1982
- SHUJI YASUI, PH.D., *Visiting Professor of Economics*, January 1, 1983-March 31, 1983
- XITE C. ZHENG, PH.D., *Visiting Associate Professor of Physics (Research)*, February 1, 1983-February 28, 1983

Committees

Standing Committees of the Corporation¹

Committee on Admission and Financial Aid

The PRESIDENT, *ex officio*.

Members 1982-83: Mrs. EKSTROM, Messrs. ITTLESON, NEWMAN, WILLIAMS, ALDEN (Chairman), CHOQUETTE, TAYLOR, WALLERSTEIN, CUTLER, MAGAZINER, MASSEY, NICKOLL, and Mrs. WHITTAKER.

Members 1983-84: Messrs. ALDEN (Chairman), CHOQUETTE, TAYLOR, and WALLERSTEIN (to 1984); Messrs. CUTLER, MAGAZINER, MASSEY, NICKOLL, and Mrs. WHITTAKER (to 1985); Mrs. EKSTROM, Messrs. ITTLESON, ROBINSON, WANG, and WILLIAMS (to 1986).

Advisory and Executive Committee

The PRESIDENT (Chairman), the CHANCELLOR, the VICE CHANCELLOR, the SECRETARY, and the TREASURER, all *ex officio*. MR. MCINTYRE (Secretary).

Members 1982-1983: Mr. LIPPITT, Mrs. POLLOCK, Mr. WAY, Ms. BUC, Messrs. BUTCHER, ITTLESON, LICHT, SHARPE, and TILLINGHAST.

Members 1983-1984: Ms. BUC, Messrs. BUTCHER and ITTLESON (to 1984); Messrs. LICHT, SHARPE, and TILLINGHAST (to 1985); Mrs. LEONARD, Messrs. LIPPITT and MACMILLAN (to 1986).

Athletic Advisory Council²

Three officers of administration designated by the President.

Members 1982-83: Messrs. McCULLOUGH, D. H. HIRSCH, Mrs. N. F. NEFF, Messrs. WILLIAMS, S. K. F. KARLSSON, T. W. HOAGLAND (Chairman), Mrs. LEONARD, Messrs. J. R. WORKMAN, and R. G. FLANDERS, JR.

Committee on Athletics³

Members 1983-84: Mrs. FAIRCHILD, Messrs. McCULLOUGH and WILLIAMS (to 1984); Messrs. DOWLING (Chairman), R. G. FLANDERS, JR., and HANSEN (to 1985); Mr. CAROLAN, Mrs. K. B. GUNDERSEN, Messrs. A. W. JOUKOWSKY and TAURO (to 1986).

Audit Committee

The TREASURER, nonvoting, *ex officio*.

Members 1982-83: Messrs. TAURO, McCULLOUGH, Ms. LANGLOIS (Chairman), and Mr. MAGAZINER.

Members 1983-84: Mr. McCULLOUGH (to 1984); Ms. LANGLOIS (Chairman) and Mr. MAGAZINER (to 1985); and Mrs. LEONARD (to 1986).

Committee on Budget and Finance

The PRESIDENT, the CHANCELLOR, and the TREASURER, all *ex officio*.

Members 1982-83: Messrs. MACMILLAN, WAY, BUTCHER (Chairman), EHRLICH, MAGAZINER, HARMON, Ms. LANGLOIS, and Mr. TILLINGHAST.

Members 1983-84: Messrs. BUTCHER, EHRLICH, and MAGAZINER (to 1984); Mr. HARMON, Ms. LANGLOIS, and Mr. TILLINGHAST (to 1985); Messrs. MACMILLAN and WAY (Chairman) (to 1986).

¹ All terms expire on June 30; chairmen are appointed or elected annually.

² Discontinued as standing committee, June 30, 1983.

³ Committee established July 1, 1983.

Committee for Consultation Between the Corporation and the Faculty

The SECRETARY OF THE CORPORATION (Chairman), *ex officio*.

Members 1982-83: Messrs. MARSHALL, JOSLIN, TUKEY, and YANKELOVICH; the EXECUTIVE COMMITTEE OF THE FACULTY POLICY GROUP.

Members 1983-84: Mr. JOSLIN (to 1984); Messrs. TUKEY and YANKELOVICH (to 1985); the EXECUTIVE COMMITTEE OF THE FACULTY POLICY GROUP.

*Committee on Development*¹

The PRESIDENT, the CHANCELLOR, the TREASURER, the CHAIRMAN OF THE COMMITTEE ON BUDGET AND FINANCE, and the SENIOR COCHAIRMAN OF THE BROWN FUND, all *ex officio*, 1982-83.

Members 1982-83: Miss MOSBACHER, Messrs. RESS, SHARPE (Chairman), TILLINGHAST, HARMON, LIPPITT, PENNER, TAYLOR, CARNEY, Ms. LEVEN, Mr. SWIG, and Mrs. WOLF.

The PRESIDENT, the CHANCELLOR, the TREASURER, the CHAIRMAN OF THE COMMITTEE ON BUDGET AND FINANCE, the CHAIRMAN OF THE INVESTMENT COMMITTEE, the PRESIDENT OF THE ASSOCIATED ALUMNI, the PRESIDENT OF THE THIRD CENTURY FUND, the PRESIDENT OF THE BROWN UNIVERSITY SPORTS FOUNDATION, the COCHAIRMAN OF THE BROWN FUND, the CHAIRMAN OF THE NATIONAL PLANNED GIVING COMMITTEE, the CHAIRMAN OF THE CORPORATIONS AND FOUNDATIONS COMMITTEE, and the CHAIRMAN OF THE MEDICAL FUND-RAISING COMMITTEE, all *ex officio*, 1983-84.

Members 1983-84: Mrs. LEONARD, Messrs. N.M. MARSHALL, and SHARPE (Chairman) (to 1984); Messrs. CARNEY, MACMILLAN, and Mrs. WOLF (to 1985); Messrs. K. H. COHEN and B. R. POLLOCK (to 1986).

*Committee for Facilities and Design*²

The PRESIDENT, *ex officio*.

Members 1982-83: Mrs. COOPER, Messrs. EHRLICH, LIPPITT (Chairman), POLLARD, Mrs. FISCHER, Messrs. ROGERS, WEZNIAK, MATHES, Miss MOSBACHER, and Mr. SAUNDERS (Vice Chairman).

Members 1983-84: Mrs. FISCHER, Messrs. ROGERS and WEZNIAK (to 1984); Mr. MATHES, Miss MOSBACHER, and Mr. SAUNDERS (Vice Chairman) (to 1985); Mrs. COOPER, Messrs. EHRLICH, LAMBERT, and LIPPITT (Chairman) (to 1986).

Committee on Graduate Education and Research

The PRESIDENT, the PROVOST and DEAN OF THE FACULTY, and the DEAN OF THE GRADUATE SCHOOL, all *ex officio*.

Members 1982-83: Mrs. EKSTROM, Messrs. GIBBONS, MASSEY, R. W. MORSE (Chairman), Mrs. HARTLAND-THUNBERG,³ Messrs. HUDSON, LITTLEFIELD, PFAFFMANN, Mrs. JOUKOWSKY, Mrs. NOWLIS, Mrs. PRAGER, and Mr. REDDING.

Members 1983-84: Messrs. BUTCHER, HUDSON, LITTLEFIELD, and PFAFFMANN (to 1984); Mrs. JOUKOWSKY (Chairman), Mrs. NOWLIS, Mrs. PRAGER, and Mr. REDDING (to 1985); Mrs. EKSTROM, Messrs. GIBBONS, MASSEY, MORSE, and WANG (to 1986).

Investment Committee

The PRESIDENT and the TREASURER, *ex officio*.

Members 1982-83: Messrs. CARTON, HOLMAN, R. R. COLE, E. N. MORSE, A. H. PARKER, BALL, and CADWGAN (Chairman).

¹ Statute amended, July 1, 1983.

² Formerly Building and Grounds Committee

³ Resigned August 3, 1982

Members 1983-84: Messrs. COLE, MORSE, and PARKER (to 1984); Messrs. BALL and CADWGAN (to 1985); Messrs. CARTON and HOLMAN (Chairman) (to 1986).

John Carter Brown Library Committee of Management

The PRESIDENT (Chairman), the UNIVERSITY LIBRARIAN, the CHAIRMAN OF THE ASSOCIATES OF THE JOHN CARTER BROWN LIBRARY, and the CHAIRMAN OF THE JOHN CARTER BROWN LIBRARY FACULTY LIAISON COMMITTEE, nonvoting, all *ex officio*.

Members 1982-83: Messrs. J. C. BROWN, A. P. LORING, C. H. WATTS, II, and LIPPITT.

Members 1983-84: Mr. WATTS (to 1984); Mr. LIPPITT (to 1985); Messrs. BROWN and LORING (to 1986).

Committee on Legal and Governmental Affairs

Members 1982-83: Messrs. MAXWELL, TAURO, TROTTER, Ms. BUC (Chairman), Messrs. LICHT, NEWMAN, TERRY, TILLINGHAST, and Mrs. WHITTAKER.

Members 1983-84: Ms. BUC (Chairman), Messrs. LICHT and NEWMAN (to 1984); Messrs. TERRY, TILLINGHAST, and Mrs. WHITTAKER (to 1985); Mrs. COOPER, Mr. CUTLER, Mrs. LEDERBERG, and Mr. MACMILLAN (to 1986).

Committee on Medical Education

The PRESIDENT and the VICE PRESIDENT (Biology and Medicine), *ex officio*.

Members 1982-83: Messrs. A. GELLHORN, R. E. GOSSELIN, W. H. HEISLER, Mrs. E. M. SILVER, Messrs. UDIS, DOWLING, T. H. HUNTER, WHITE, Mrs. P. L. LEVEN, Messrs. LICHT, R. G. PETERSDORF (Chairman), and R. R. S. PICERNE.

Members 1983-84: Messrs. DOWLING, HUNTER, P. T. VON OEYEN, and WHITE (to 1984); Mrs. LEVEN, Messrs. LICHT, PETERSDORF (Chairman), and PICERNE (to 1985); Messrs. A. T. BECK, GELLHORN, HEISLER, Mrs. SILVER, and Mr. UDIS (to 1986).

Committee on Minority Affairs¹

The CHAIRMAN OF THE THIRD WORLD AFFAIRS COMMITTEE OF THE ASSOCIATED ALUMNI, *ex officio*.

Members 1982-83: Mrs. MICHAEL, Messrs. W. J. MOSES, NEWMAN, R. A. NURSE, F. M. STEWART, TERRY, T. J. BROWN, Mrs. FAIRCHILD, Messrs. F. S. LEVIN, LIPPITT, WHITE (Chairman), WILLIAMS, Mrs. BLISTEIN, Mr. C. H. NICHOLS, Mrs. POLLOCK, and Ms. B. I. TANNENBAUM.

Members 1983-84: Mr. BROWN, Mrs. FAIRCHILD, Messrs. LEVIN, LIPPITT, WHITE (Chairman), and WILLIAMS (to 1984); Mrs. BLISTEIN, Mr. NICHOLS, Mrs. POLLOCK, and Ms. TANNENBAUM (to 1985); Mr. E. T. KORNHAUSER, Mrs. MICHAEL, Messrs. NURSE, and TERRY (to 1986).

Nominating Committee

Members 1982-83: Mrs. COOPER (Chairman), Messrs. TAURO, ALDEN, UDIS, DOWLING, and Mrs. JOUKOWSKY.

Members 1983-84: Messrs. ALDEN (Chairman) and UDIS (to 1984); Mr. DOWLING and Mrs. JOUKOWSKY (to 1985); Mr. CARNEY and Ms. GIDWITZ, GLEASON (to 1986).

Committee on Proxy Issues

Members 1982-83: Messrs. HUNT, TAURO (Chairman), Mrs. POLLOCK, Messrs. TILLINGHAST, and BUONANNO.

Members 1983-84: Mrs. POLLOCK and Mr. TILLINGHAST (Chairman) (to 1984); Mr. BUONANNO (to 1985); Messrs. CAROLAN and HUNT (to 1986).

Committee on Relations with Tougaloo College

Members 1982-83: Mr. ALDEN, Mrs. FARNHAM, Messrs. HUDSON, EDWARDS (Chairman), FIDLER, POLLARD, FERNALD, MICHAELSON, and SULZBERGER.

¹ Student members not listed.

Members 1983-84: Messrs. EDWARDS (Chairman), FIDLER, and POLLARD (to 1984); Mr. FERNALD, Mrs. MICHAELSON, and Mr. SULZBERGER (to 1985); Mr. ALDEN, Ms. CHAPMAN, and Mrs. FARNHAM (to 1986).

Committee on Senior Administration

The CHANCELLOR, the VICE CHANCELLOR, the SECRETARY OF THE CORPORATION, and the TREASURER, all *ex officio*.

Student Life Committee

Members 1982-83: Messrs. JOSLIN (Chairman), MAGAZINER, Mrs. MICHAELSON, Messrs. CAROLAN, DOWLING, Mrs. MICHAEL, Ms. GIDWITZ, GLEASON, Messrs. KRESKO and TROTTER.

Members 1983-84: Messrs. CAROLAN, DOWLING, and Mrs. MICHAEL (to 1984); Ms. GIDWITZ GLEASON, Messrs. KRESKO and TROTTER (to 1985); Ms. CHAPMAN, Messrs. JOSLIN (Chairman), MAGAZINER, and Ms. WEBER (to 1986).

Trustee Vacancies Committee

The PRESIDENT (Secretary) and the CHANCELLOR (Chairman), *ex officio*.

Members 1982-83: Messrs. TROTTER, MASSEY, and ITTLESON.

Members 1983-84: Mr. MASSEY (to 1984); Ms. ITTLESON (to 1985); and Miss MOSBACHER (to 1986).

University Library Committee

The PRESIDENT (Chairman), *ex officio*; the LIBRARIAN OF JOHN CARTER BROWN LIBRARY, nonvoting, *ex officio*.

Members 1982-83: Mr. F. H. JACKSON, Mrs. JOUKOWSKY, Mr. J. K. LUCKER, Mrs. S. F. ROBINSON, Messrs. BLOOMINGDALE, GIBBONS, Ms. HOWARD, Miss MOSBACHER, Mrs. BLISTEIN, Messrs. LIPPITT, and TUKEY.

Members 1983-84: Messrs. BLOOMINGDALE, GIBBONS, Ms. HOWARD, and Miss MOSBACHER (to 1984); Mrs. BLISTEIN, Mr. LIPPITT, Ms. M. OTTO, and Mr. TUKEY (to 1985); Mrs. JOUKOWSKY, Ms. LANGLOIS, Mr. LUCKER, and Mr. A. VERSHBOW (to 1986).

*Standing Committees and Officers of the Faculty*¹

NOTE: All terms begin 1 July and end on 30 June unless otherwise noted.

Faculty Policy Group (established May, 1969)

The PRESIDENT, the PROVOST AND DEAN OF THE FACULTY, the VICE-PRESIDENT OF BIOLOGY AND MEDICINE, the DEAN OF THE COLLEGE, the DEAN OF THE GRADUATE SCHOOL and the SECRETARY OF THE FACULTY as non-voting, *ex-officio* members.

Members 1982-83: J. ANDERSON, W. BEEMAN J. BIGGINS, F. BISSHOPP, W. CROSSGROVE, S. DRIVER, J. HALE, B. HARRIS, R. JAY, J. LENZ, J. LUSK, L. MONTEIRO, B. MYERS, A. SCHRIER, B. SHEPP, T. TULLIS, H. WARD, M. WIDGOFF.

Members, 1983-84: W. BEEMAN, J. BEHAR, J. BIGGINS, W. CROSSGROVE, A. GORTON, B. HARRIS, L. LAMPHERE, J. LENZ, J. LUSK, W. MCLOUGHLIN, L. MONTEIRO, C. POORE, J. QUINN, A. SCHRIER, H. WARD, P. WEGNER, M. WIDGOFF, B. WOOTEN.

Advisory Committee on University Planning (established March, 1973)

The PROVOST AND DEAN OF THE FACULTY, the VICE-PRESIDENT OF ADMINISTRATION AND FINANCE, the DEAN OF THE GRADUATE SCHOOL, the DEAN OF THE COLLEGE and the VICE-PRESIDENT OF BIOLOGY AND MEDICINE as *ex-officio* members.

¹ The President of the University is an *ex-officio* member of all Faculty Committees except the Committee on Nominations, the Committee on Drafting, and the Advisory Committee on University Planning.

Members 1982-83: A. BOEGEHOLD, C. DAFERMOS, L. GOLDSTEIN, J. HERMANCE, J. LOFERSKI, A. SABOL.

Members, 1983-84: C. DAFERMOS, P. EVANS, T. GILBERT, G. PETER, G. SHAPIRO.

NOTE: Full membership includes four undergraduates to be elected by the student body to serve staggered two-year terms, one graduate student to be elected by the graduate student body to serve a two-year term, and one student in the Medical Program to be elected by the medical student body to serve a two-year term.

Committee on Academic Standing

The DEAN OF THE COLLEGE, two ASSOCIATE DEANS OF THE COLLEGE, and the REGISTRAR, as *ex-officio* members.

Members, 1982-83: R. MESKILL, S. RABSON, D. SMITH, P. WILLIARD.

Members, 1983-84: R. MESKILL, B. SHEPP, D. SMITH.

Committee on Admission and Financial Aid (reorganized November, 1969)

The PROVOST and the DEAN OF THE COLLEGE, as *ex-officio* members. The DIRECTOR OF ADMISSIONS and the DIRECTOR OF FINANCIAL AID attend meetings as non-voting members.

Members, 1982-83: J. CALO, H. CSERR, A. LEVITSKY, F. LOVE, L. NEWMAN, L. O'BRIEN, J. TUCCI, J. WRENN.

Members, 1983-84: P. KANNELLAKIS, J. LEITH, A. LEVITSKY, L. O'BRIEN, M. POVAR, A. SIROTA, J. TUCCI, J. WRENN.

Committee on Awards & Benefits (established May, 1973)

The PROVOST AND DEAN OF THE FACULTY and the VICE-PRESIDENT FOR ADMINISTRATION AND FINANCE, as *ex-officio* members.

Members, 1982-83: J. BAIRD, R. BEYER, A. FELDMAN, R. PATRICK, A. SCHMITT, R. SORRENTINO.

Members, 1983-84: R. BEYER, R. CLIFTON, A. FELDMAN, H. KOLSKY, A. SCHMITT, R. SORRENTINO.

Committee on Commencement Speakers

The Committee shall consist of a chairperson, who shall be a member of the English Department, and appointed by the President who shall also fix a term of office; the Dean of The College, and an instructor in public speaking; five undergraduates to be elected annually by the senior class.

Members, 1982-83: J. BARNHILL, E. BLISTEIN, R. COBB, T. WINNER.

Members, 1983-84: E. BLISTEIN, R. COBB, N. DUNBAR, L. LIPSITT, B. TANNENBAUM.

Committee on Drafting (established November, 1971)

Members, 1982-83: J. BAIRD, D. ROHR, B. SHEPP.

Members, 1983-84: J. BAIRD, W. CROSSGROVE, D. ROHR.

Committee on Educational Policy (established November, 1969)

The PRESIDENT, the PROVOST AND DEAN OF THE FACULTY, the DEAN OF THE GRADUATE SCHOOL, the DEAN OF THE COLLEGE, and the CHAIRMAN OF THE COMMITTEE ON ACADEMIC STANDING, as *ex-officio* members. The Registrar serves as secretary.

Members, 1982-83: P. ANDERSON, G. CARPENTER, S. FALLIEROS, R. GOULD, T. HARING-SMITH, L. HOCHHEISER, M. HOLLOS, J. SAVAGE, E. SIQUELAND, I. WALDBAUER.

Members, 1983-84: G. CARPENTER, M. DAAMEN, S. FALLIEROS, R. GOULD, D. LATTIMORE, R. LITCHFIELD, E. SIQUELAND, J. WAAGE, I. WALDBAUER.

NOTE: Full membership includes five undergraduate students elected by the undergraduate government, and two graduate students elected by the Graduate Student Council.

Committee on Faculty Reappointment and Tenure (established October, 1977)

THE DEAN OF THE FACULTY, and four other academic administrators to be appointed by the President as a non-voting, *ex-officio* member.

Members, 1982-83: P. BENEDICT, M. HARPER, E. LEDUC, R. MILLWARD, P. SYMONDS.

Members, 1983-84: A. FAUSTO-STERLING, R. MILLWARD, G. MONTEIRO, G. SEIDEL, J. THOMAS.

Financial Aid Awards Review Board (established April, 1976)

The DEAN OF UNDERGRADUATE COUNSELING as Chairman and three members of the administration appointed by the Dean of The College.

Members, 1982-83: S. HARRIS, J. KIDWELL, F. LEHNER, A. TOTH, T. WEBB.

Members, 1983-84: S. HARRIS, J. KIDWELL, L. JOHNSON, F. LEHNER, B. ROTMAN.

Committee on Consultation Concerning Honorary Degrees (established November, 1970)

Members, 1982-83: G. ERIKSON, J. LIU, K. PARKER, H. MOEHRING, N. RICH, D. ROHR.

Members, 1983-84: J. AMOR Y VAZQUEZ, P. LIEBERMAN, J. LIU, K. PARKER, D. ROHR, D. WILMETH, S. ZIMMER.

Committee on the Library (established October, 1974)

The UNIVERSITY LIBRARIAN, as an *ex-officio*, non-voting member.

Members, 1982-83: J. FAIN, R. MATHIESEN, G. MILHAVEN, A. Oldcorn, D. PINGREE, P. RIEGER.

Members, 1983-84: M. BECKMANN, G. MILHAVEN, A. Oldcorn, J. RICHARDS, P. RIEGER, P. SHANK.

*Lectureships Committee*¹

Members, 1982-83: J. CLARKE, A. DAVIDS, S. LEDERBERG, M. MARICQ, P. NELSON, G. TOOMER.

Members, 1983-84: J. CLARKE, A. DAVIDS, M. HOLLOS, M. MARICQ, P. NELSON, M. SCHABERG.

Committee on Nominations

Members, 1982-83: B. CASWELL, R. ELLIS, J. KLING, D. LAURENT, R. LAWLER, P. MAEDER, A. MOST, F. STEWART, L. WILLIAMS.

Members, 1983-84: S. BLUMSTEIN, B. CASWELL, F. HUGOT, D. LAURENT, R. LAWLER, P. LEIS, A. MOST, F. STEWART, A. WIART.

Committee on Prizes and Premiums

Members, 1982-83: S. BEALE, A. LANDMAN, S. LEHMKUHLE.

Members, 1983-84: S. BEALE, L. CURTIS, S. LEHMKUHLE.

Committee on Student Support Programs

Two representatives of the Dean of The College and the DIRECTOR OF THE STUDENT SUPPORT PROGRAM as non-voting, *ex-officio* members.

Members, 1982-83: B. BECKHAM, C. CAREY, A. DZIDZIENYO, S. HOFFMAN, J. SUGGS.

Members, 1983-84: B. BECKHAM, A. BROWN-COLLINGS, S. FOLEY, S. HOFFMAN, R. PAOLINO.

Advisory Committee on the University Press

The DIRECTOR OF THE PRESS and the DEAN OF THE GRADUATE SCHOOL, as *ex-officio* members.

Members, 1982-83: N. BARON, L. COOPER, S. GRAUBARD, J. KESTIN.

Members, 1983-84: N. BARON, J. KESTIN, E. SOSA, L. WILLIAMS.

¹ Discontinued as Standing Committee of the Corporation. June 30, 1981.

Committee on the Status of Women

The DEAN OF THE COLLEGE, *ex-officio*

Members, 1982-83: A. BROWDER, L. GUNZBERG, C. MARTIN, D. McCLURE, M. SCHAFFER.

Members, 1983-84: A. BROWDER, W. EDWARDS, L. GUNZBERG, A. KANE, K. WEIHS.

Officers of the Faculty

Members 1982-83: Secretary: J. BAIRD; Parliamentarian: D. ROHR; Chairman, Faculty Forum: R. ARCHAMBAULT.

Members 1983-84: Secretary: J. BAIRD; Parliamentarian: D. ROHR; Chairman, Faculty Forum: R. ARCHAMBAULT.

Councils

Graduate Council

The PROVOST AND DEAN OF THE FACULTY, the DEAN OF THE GRADUATE SCHOOL (Chairman), the ASSOCIATE DEANS OF THE GRADUATE SCHOOL, the DEAN OF THE COLLEGE and the VICE PRESIDENT (Biology and Medicine) as *ex-officio* members.

Members 1982-83: E. CHARNIAK, T. ENGEN, H. ESCHENBACHER, W. FREIBERGER, M. KIDWELL, J. KLEEMAN, H. RYDER and M. SCHAFFER.

Members 1983-84: T. ENGEN, H. ESCHENBACHER, W. FREIBERGER, M. KIDWELL, J. KLEEMAN, H. RYDER and M. SCHAFFER.

NOTE: Full membership includes four graduate students.

Medical Council

The VICE-PRESIDENT (Biology and Medicine), the DEAN OF BIOLOGICAL SCIENCES, the DEAN OF MEDICINE, the DEAN OF THE FACULTY, the DEAN OF THE GRADUATE SCHOOL, and the DEAN OF THE COLLEGE, *ex officio*.

Members 1982-83: W. BRADEN, J. EVRARD, D. BARNOUW, D. GANN, D. HEATH, A. LANDY, L. LIPSITT and M. STOLTZ.

Modern Language Board

Members 1983-84: MESSRS. AHEARN, LIEBERMAN, MAJEWSKI, MATHIESEN, RIBBANS, and WARNOCK (Chairman); MRS. MUELLER, Academic Department Manager; MR. RYAN, (Director of the Language Laboratory).

Members, 1984-85: MESSRS. AHEARN, MATHIESEN, RIBBANS (Chairman), WARNOCK, and MS. L. DURAND; MRS. MUELLER, Academic Department Manager; MR. RYAN, (Director of the Language Laboratory).

Physical Sciences Council

The PROVOST AND DEAN OF THE FACULTY (Chairman), the DEAN OF THE COLLEGE, and the DEAN OF THE GRADUATE SCHOOL, all *ex-officio*.

Members 1983-84: T. BANCHOFF, D. CANE, R. DOBBINS, C. ELBAUM, W. FLEMING, M. RUTHERFORD, and J. TAUC.

Members 1984-85: T. BANCHOFF, D. CANE, R. DOBBINS, C. ELBAUM, W. FLEMING, M. RUTHERFORD, AND J. TAUC.

University Council on Student Affairs

Two representatives of the Dean of The College, the DEAN OF THE GRADUATE SCHOOL, or a designated representative, the DEAN OF MEDICINE, or a designated representative, all *ex-officio*.

Members 1980-81: W. ERMEY (Chairman), C. BAUER, and A. DAVIDS.

Members 1981-82: L. CLAPP (Chairman), A. DAILEY, and K. GOODMAN.

Members 1982-83: W. ERMEY (Chairman), R. ELLIS and M. LEWIS.

NOTE: Full membership includes five undergraduate students, one graduate student and one medical student.

History

Brown University was founded in 1764 in Warren, Rhode Island, as Rhode Island College. The seventh oldest college in America and the third in New England, it came into existence at a time when conditions in the Colony were ripe for the establishment of an institution of higher learning: commerce on land and sea was a growing source of wealth; the population included people of wide intellectual interests; and the spirit of religious liberty prevailed in the commonwealth founded by Roger Williams.

The Charter

Under these conditions, the Charter of the College, which was granted by the General Assembly of the Governor and Company of the English Colony of Rhode Island and Providence Plantations, was one of the most liberal instruments of its kind written in the eighteenth century. The original incentive in the founding of Rhode Island College, as with other colonial colleges, was a desire to perpetuate an educated ministry, but in addition a broader purpose was defined and declared in the language of this Charter of 1764—*"preserving in the Community a Succession of Men duly qualify'd for Discharging the Offices of Life with usefulness and reputation."*

As Rhode Island gave to the American Colonies an example of freedom of conscience within a civil state, so Rhode Island College gave to the American colleges one of the earliest examples of full freedom in teaching. The Charter declared that there *"shall never be admitted any Religious Tests but on the Contrary all members hereof shall forever enjoy full absolute and uninterrupted Liberty of Conscience"* and *"that the Sectarian differences of opinions shall not make any Part of the Public and Classical Instruction."* With an outlook unusually far sighted for the eighteenth century, the Charter also required *"that the Public teaching shall in general respect the Sciences."*

In the founding of the College the Baptists took the leadership, but in their willingness to share control with members of other faiths they made a most important contribution to the cause of education.

Colonial Beginnings

In September, 1765, the College had its first registration—a single student, William Rogers, with a faculty consisting of James Manning, the first President. The second member of the faculty, David Howell, was added in 1766. In 1767 the student enrollment was 10, and in 1769 the first class could be graduated. Exercises were held at Warren with the degree of Bachelor in the Arts conferred upon seven young men.

During these early years, there was much agitation to have the College permanently located elsewhere in the Colony. Several towns vied with one another in offering inducements. Finally Providence won, and in 1770 the college was moved to "College Hill" high above the town, where it has remained ever since. At that time, work was begun on the first building, The College Edifice, known since 1823 as University Hall.

Shortly after the College was moved to Providence, it was rocked by events which not only threatened the existence of New England's thriving commerce but which were destined to shape the movement for political independence. The infant College, with its slender resources, was to make an important contribution in the struggle which was soon to follow. From 1776 to 1782, during the American Revolution, the College was closed

while faculty and students, "almost to a man," were engaged in the service of their country, and The College Edifice was used as a barracks and hospital for American troops and for the French soldiers of Rochambeau.

In 1790, after peace had been restored, George Washington, then President of the United States, visited the town of Providence with Thomas Jefferson and was awarded the honorary degree, Doctor of Laws. University Hall was illuminated by candles in celebration of the event, and President Washington with his friends visited the building and viewed the illumination from the College Green. It was in response to a greeting from President Manning upon this occasion that President Washington made this declaration: "You may rely on whatever protection I am able to afford in so important an object as the education of our youth." The illumination of University Hall for President Washington is now recalled on Class Night, Christmas Eve, and Rhode Island Independence Day when candles are again placed in every window of the building.

Early Nineteenth Century Growth

In 1804, Nicholas Brown, son of one of the founders of the College, a member of the Class of 1786, and then Treasurer of the College, made a gift of a sum of money, large for those times. In recognition of this generosity, the name of the College was changed to Brown University. The benefactions of Nicholas Brown to the University continued through many years until they aggregated approximately \$160,000. As a result of his generosity, Hope College, Manning Hall, and the Library Fund came into existence. The John Carter Brown Library, founded by and named for the son of Nicholas Brown, contains the finest collection of early Americana in the world and is one of the choicest material possessions of the University.

During this early period many men were graduated who later were to have positions of prominence and responsibility and whom we remember today for service to our country and for the distinction that they have brought to their Alma Mater. Samuel Snow (1782) was United States Consul in Canton, China. Jonathan Maxcy (1786) was the second President of Brown, later President of Union College and the first President of the University of South Carolina. Jonathan Russell (1791), one of the commissioners who negotiated the treaty of Ghent in 1814, later became a Member of Congress and a Minister to Norway and Sweden. Henry Wheaton (1802), the authority of his day on international law, served as Minister to Prussia. Adoniram Judson (1807) is remembered as a brilliant and heroic missionary to Burma. William L. Marcy (1808) served as Governor of the State of New York before becoming Secretary of War for President Polk and Secretary of State for President Pierce. Wilbur Fisk (1815), a Methodist clergyman, was the first President of Wesleyan University. Horace Mann (1819), as Secretary of the Massachusetts Board of Education, profoundly influenced public school education throughout the country. Samuel Gridley Howe (1821) was a hero in the Greek war of independence and later in America became a pioneer in humanitarian work for the blind. George D. Prentice (1823) became the famed editor of the *Louisville (Kentucky) Journal*.

Later Nineteenth Century Growth

Brown called Francis Wayland in 1827 to be its fourth President. He became one of the best known college presidents of his time, and, toward the end of his long administration, he attracted widespread attention in educational circles by introducing his New System at Brown. This was a new curriculum—radical for the era—that emphasized applied science and engineering and gave the students some choice in the election of courses.

During the period of the Civil War, Brown again felt the influence of a national conflict. Of the 278 men who were graduated during the war, 132 enlisted for service. It was only at the end of this civil strife that the University regained its normal stride.

Important innovations were introduced during the next 25 years. Athletics were organized, and Brown was represented in intercollegiate sports, particularly baseball and rowing. Several new buildings were added to the campus, and the financial resources of the University were increased. The Alumni Association was created during this period, enabling former students to take an ever-increasing and vital interest in the growth of the institution. The time of Commencement was changed from September to June in 1870, and in 1888 the first Master of Arts degree was awarded, followed in 1889 by the first degree of Doctor of Philosophy.

In 1889, Elisha Benjamin Andrews of the Class of 1870 became the eighth President of Brown. His administration marks another important era in Brown's history. The modern University, already emerging, developed rapidly under the initiative and contagious enthusiasm of Andrews. Pembroke College, a coordinate undergraduate college for women, was established in 1891. Nine new departments of instruction were created, and graduate study was seriously encouraged. The undergraduate enrollment was more than doubled, and the faculty was increased more than threefold, largely by the appointment of a group of promising young men who had prepared for teaching in the graduate schools of this country and abroad. These men were a remarkable group of teachers and scholars whose influence was felt for many years thereafter.

From the time of President Wayland to the end of the nineteenth century many eminent men were graduated from Brown. Samuel Sullivan Cox (1846) became famous as an author, humorist, statesman, and diplomat. James B. Angell (1849) was President of the University of Vermont, President of the University of Michigan, and later Minister to Turkey and China. Alexander L. Holley (1853) became a pioneer in modern engineering, particularly in the development of the iron and steel industry. Richard Olney (1856) and John Hay (1858) were both Secretaries of State. Hay was also personal secretary to President Lincoln and Ambassador to Great Britain. William W. Keen (1859), the distinguished surgeon, served in the Civil and Spanish-American wars and World War I. Elisha Benjamin Andrews, the President of Brown, was also Chancellor of the University of Nebraska. Benjamin Ide Wheeler (1875) was the President of the University of California. Dr. Charles V. Chapin (1876) was a pioneer in the field of preventive medicine. Charles Evans Hughes (1881) was, in succession, the governor of the State of New York, Secretary of State, Justice of the World Court, and Chief Justice of the United States. Sam Walter Foss (1882), editor and poet, and Dana Carleton Munro (1887), medieval historian, were well-known graduates of Brown. Theodore Francis Green (1887), after two terms as Rhode Island Governor, served twenty-three years in the United States Senate. Alexander Meiklejohn (1893), Dean at Brown and President of Amherst College, was later Chairman at the Experimental College in the University of Wisconsin and Director of the School of Social Studies in San Francisco. John D. Rockefeller, Jr. (1897), philanthropist and financier, spent a lifetime in humanitarian endeavors.

The Turn of the Century

Just before the turn of the century, William Herbert Perry Faunce of the Class of 1880 began his administration, 1899-1929, the longest in the history of the University. Under his direction Brown became in fact, as well as in name, a university-college—an institution primarily concerned with the liberal education of the individual student but also equipped to offer advanced and specialized study in the scholarly environment of a university.

These thirty years saw a remarkable increase in the physical plant and material resources of the University, with the endowment increasing nine-fold and the income increasing correspondingly. In 1929 the libraries of the University contained approximately 400,000 volumes. The undergraduate enrollment had increased to approximately

1300 men in The College and 500 women in Pembroke, and the faculty numbered over 200.

During this period the University achieved a position of larger importance in the field of American education. Entrance requirements were raised, the curriculum was considerably broadened, study for Honors was inaugurated, and graduate study was given formal recognition by the establishment of the Graduate School. More adequate provisions were made for the administration of student life and welfare, closer relationships with the community were encouraged, and all aspects of the educational process were broadened in scope and enriched in content.

Henry Merritt Wriston was inaugurated as Brown's eleventh President in 1937. Dr. Wriston's impact on the University was enormous, and by the time he retired in 1955 Brown was a profoundly changed institution. In spite of its very considerable growth under President Faunce, Brown had remained primarily of regional importance, drawing a high proportion of its students from the southern New England area. Dr. Wriston built Brown to an eminence where it could be ranked among the outstanding universities of the country. He introduced important changes in the curriculum, brought in many outstanding new faculty members, and, for the first time in its modern history, gave Brown the character of a true residential college. This last change was accomplished through an ambitious building program, the chief feature of which is the quadrangle that bears Dr. Wriston's name. Andrews Hall at Pembroke was also built during his administration, and he made a start on the West Quadrangle (renamed Keeney Quadrangle in 1982).

Recent History

Dr. Wriston was succeeded in August, 1955, by Barnaby Conrad Keeney, a member of the history faculty at Brown who had already served as Dean of the Graduate School and Dean of The College. Under Dr. Keeney the University accelerated its progress toward national preeminence. Symbolizing this progress was the decision by the Ford Foundation—announced in June, 1961—to bring Brown into its Special Program in Education with a "challenge grant" of \$7,500,000. To qualify for the full amount of the grant, Brown, by mid-1964, had to obtain \$15,000,000 in matching funds from sources other than the U.S. Government and the Ford Foundation itself. The goal was met five days before the deadline.

The Ford Foundation responded with a second challenge, offering an additional \$5,000,000 if the University could raise \$10,000,000 in matching funds by mid-1967. This time the goal was reached more than a year before the deadline.

In 1956, the second year of Dr. Keeney's presidency, the University announced a Bicentennial Development Program to raise \$30,000,000 from all sources by June of 1964. The goal was far exceeded, for by that date the drive had brought in about \$63,500,000, including about \$19,000,000 in government grants and the \$7,500,000 from the first Ford grant. By June of 1966, the total raised during the Keeney presidency was nearly \$90,000,000. This huge sum was used to support the largest program of educational and physical growth in the University's history.

Two major innovations in curriculum took effect during the 1963-64 academic year. One was the adoption of a flexible approach to the problem of course selection and distribution requirements for Bachelor of Arts candidates, allowing them considerable discretion in the timing and the depth of their work in their areas of concentration. The second was an integrated six-year program of studies leading to the degree of Master of Medical Science and designed to provide superior preparation for careers in medical practice, teaching and research. The program and its philosophy attracted widespread interest within the medical profession and among medical educators. In the spring of 1964 the University entered into a far-ranging program with Tougaloo College of Tougaloo, Mis-

issippi, a predominantly black liberal arts institution of some 520 students. Backed by initial grants of \$363,000 from foundations and individuals, the agreement looked forward to a period of intensive development at Tougaloo, with Brown's academic and administrative resources pledged toward that end.

On Commencement day of 1965, President Keeney announced that he would resign at the end of the 1965-66 academic year, upon completion of his eleventh year in office. In January of 1966, the Corporation named as his successor Dr. Ray L. Heffner, then Vice President and Dean of Faculties at Indiana University. Dr. Heffner was inaugurated as Brown's thirteenth President on July 1, 1966.

Early in his presidency, Brown launched a \$17,100,000 fund-raising campaign to finance the University's Development Fund for Medical Education. A new Bio-Medical Center was dedicated in 1969 and construction of a new Sciences Library was begun. Brown also bolstered its Medical Education Program through a cooperative agreement with six area hospitals that provided for sharing both staff and facilities. The first graduates of Brown's Medical Education Program received their Master of Medical Science degrees in 1969.

In a period of increasing campus turmoil across a nation torn and divided by the growing involvement in Vietnam, Dr. Heffner guided Brown through a number of controversies without any of the violent disruptions that plagued other colleges and universities during the period. Shortly after becoming President, he appointed a nine-member Advisory Committee on Student Conduct; the result of the group's report was the formation, in 1967, of the University Council on Student Affairs, which acts as a judicial body for cases involving student suspension or dismissal and recommends new rules and rule changes pertaining to student conduct to the President. This committee later recommended that the University cease acting *in loco parentis*, and that students be given responsibility for formulating rules regarding their own conduct, such as the maintenance or dissolution of parietals.

The trend toward greater student responsibility was reflected in the major curriculum reform, still widely referred to as the "New Curriculum," adopted in the spring of 1969. Considered among the most flexible and progressive curricula to be found at any major university in America, the New Curriculum eliminated the traditional distribution requirements in favor of a process that encourages individual students to exercise a greater role in the design of study programs that accent their particular interests, needs, and capabilities. Initiated after three years of discussion and debate among students, faculty, and University officials, the New Curriculum has, over the years, continued to inform and guide Brown's innovative efforts to improve undergraduate education.

After three years in the Brown presidency, Dr. Heffner resigned in August, 1969, to become Professor of English and Provost at the University of Iowa. Over the next seven months, a period in which the University undertook major fund-raising efforts in support of physical improvements, new and expanded programs, and increased endowment, Brown was led by Acting President and Provost Dr. Merton P. Stoltz.

Dr. Donald F. Hornig, a renowned chemist and former science advisor to President Lyndon Johnson, was elected by the Brown Corporation in March, 1970, to succeed Dr. Heffner. His appointment as Brown's fourteenth President was a homecoming for Dr. Hornig, who, over seven years, served the University as Professor of Chemistry, Acting Dean of the Graduate School, and Director of Brown's Metcalf Research Laboratory. He was also Vice President and Director of Eastman Kodak and Professor of Chemistry at the University of Rochester, the post he held when he accepted the Brown presidency.

Dr. Hornig, who pledged himself to "continue to strengthen the quality of the educational experience at Brown," assumed the Brown presidency at a time when troubling problems seemed endemic to all institutions of higher education in the country. At

Brown, as elsewhere, financial pressures were foremost. On his arrival, Dr. Hornig faced a \$4,100,000 deficit, and an endowment in decline as a result; ahead was a period of rising costs generally, particularly in the area of energy.

Under Dr. Hornig's leadership, Brown began a three-year retrenchment program designed to reduce the budgetary deficit and eliminate the use of endowment principal for operating expenses. While this often-unpopular course provoked student protests, particularly by minority students who feared a loss of financial aid funds, it laid the foundation for future fiscal stability at Brown.

Two notable accomplishments during the Hornig years were the merger of the Undergraduate College with Pembroke College in 1971 to create a totally consolidated, coeducational undergraduate institution; and the establishment, in 1972, of a full M.D.-granting Program in Medicine. This medical program became one of the first in the country to use an alliance of community hospitals for clinical training rather than constructing or designating a single university teaching hospital. The program was fully accredited early in 1975; M.D. degrees were conferred on the first graduating class that June.

In 1976, citing the need for "fresh energy and a new outlook," Dr. Hornig resigned as Brown's fourteenth president. Once again, Provost Merton P. Stoltz was called to serve as Acting President.

The educator to whom Brown turned for fresh energy and a new outlook was Howard Robert Swearer, a 44-year-old political scientist and President of Carleton College in Northfield, Minnesota. He was inaugurated as Brown's fifteenth president in April, 1977.

Named in 1974 to *Time* magazine's "Portfolio of 200 young American leaders," Dr. Swearer had been for the previous six years a markedly successful president at Carleton. His guidance enabled the Minnesota institution consistently to balance its budget at a time of severe financial crisis for most private colleges. He involved students, faculty, and staff in key areas of decision-making, from preparing the annual budget to the development of new courses for the liberal arts curriculum.

Prior to his tenure at Carleton, Dr. Swearer was responsible for the Ford Foundation's multimillion-dollar international scholar-exchange program, as Program Officer in the International Division (1967), and as Program Officer in charge of European and International Affairs (1968-70). Between 1960 and 1967, he taught in the political science department of the University of California, Los Angeles. In addition to directing UCLA's Peace Corps training programs in Africa and South America, in 1964 he served as Acting Director of the University's Russian and East European Studies Center.

The first six years of the Swearer presidency at Brown have been marked by a dramatic upsurge in applications for admission, making Brown one of the most sought-after institutions in the country; by the balancing of the operating budget, for the first time in a decade, in 1978-79; and by significant gains in fund-raising, an increase in the endowment, and one of the largest construction programs in Brown's history.

In 1979, a major capital development campaign—the Campaign for Brown—was announced. By far the largest fund-raising drive in Brown's history, this campaign set the ambitious goal of raising \$158,000,000 in five years. By comparison, this goal was higher than the University's entire endowment. The Brown Fund, the annual fund-raising effort, was raising only \$700,000 a year. By the conclusion of the campaign in June, 1983, the Brown Fund was raising \$5,000,000 a year and the overall campaign had soared over its goal with total pledges and gifts at \$182,000,000.

Construction projects totaling more than \$40,000,000 were completed during this time, including a major heavy research facility serving the Departments of Chemistry and Geological Sciences, a new indoor athletic center, and renovations on the historic John Hay Library.

Brown's flexible curriculum, still called the "New Curriculum" on its fourteenth anniversary, has continued to receive strong support from faculty, students, and administrators. Major grants from the Commonwealth Fund have been used to develop programs more closely relating pre-medical and liberal arts education. A number of new, interdisciplinary centers have been established, including the Centers for Cognitive Science, Law and Liberal Education, Center for Old World Archaeology and Art, Environmental Studies, and the Pembroke Center for Teaching and Research on Women.

Brown's commitment to integrative education was further emphasized by the establishment, in 1980, of the Francis Wayland Collegium for Liberal Learning, endowed by a gift from Chancellor Richard Salomon. This collegium, named in honor of Brown's fourth president, provides a setting in which faculty are encouraged to develop courses that cross departmental boundaries and to participate in seminars and discussions of an interdisciplinary nature.

Significant grants from the federal government were also received during these years, including a five-year \$2,000,000 award to establish the Southeastern New England Long Term Care Gerontology Center at Brown. The Program in Medicine continued to grow, announcing early in 1980 a cooperative arrangement with Dartmouth College in which twenty students a year take two years of medical training at Dartmouth and then enter Brown's Program in Medicine for the final two years.

In 1981, the University installed a campuswide coaxial cable network to provide computer services throughout all 126 buildings on campus. That network—called BRUNET—soon became the largest and most heavily used university broadband network in the world, with thousands of faculty, students and staff using the University's time-sharing computers.

The University began in 1983 an ambitious campuswide computer experiment with the help of several computer companies. The experiment, which continues into the 1990s, involves the entire University in creating and testing new ways to use computers for teaching and scholarship. At the heart of the experiment is the development of a "scholar's workstation"—a small, simple-to-operate computer that provides easy access to a wide range of communication and information services.

The University plans to have as many as 10,000 such workstations of various makes, models and sizes—one for every member of the faculty, staff, and student body—in use by the 1989 academic year. All the workstations will be connected by a campuswide (and, later, a statewide) communications network.

After six years of Dr. Swearer's leadership at Brown, the faculty voted unanimously to award him its highest honor—the Susan Colver Rosenberger Medal of Honor—during Commencement ceremonies, June 6, 1983. The medal was accompanied by a citation which read, in part:

"To assuage confrontation with dialogue, to advance the function of the faculty in the fabric and the governance of higher education, to encourage those forces which are directing the College into a position of highest national esteem, to stimulate by creative innovation a wealth of new programs, departments, and experiments in conformity with a long tradition, and to demonstrate the concerns of all of us in your role as a national educator, at the same time initiating and completing a financial drive with a success hitherto unimagined in these Providence Plantations—these are unmistakable arts, these are talents of no mere academic executive. They symbolize the quiet and friendly achievement you have brought, with great modesty, to this ancient University.

"You have amply dramatized that 'new beginnings' can originate not only from 'an old-fashioned lecture,' but also from intensity of purpose, sound conviction, and the cooperative venture of Corporation, faculty and students."

General Regulations

Admission—The College

In 1971, the undergraduate College of Brown University merged with Pembroke College, its coordinate institution for women. The College is now fully co-educational, and its Admission Office handles applications from both men and women.

An individual is considered for admission to The College on the basis of personal and academic qualities presented in the completed application. *Students are accepted without regard to race, creed, color, handicap, sex, or national or ethnic origin.*

In the application and admission process, the applicant and the University share responsibility for weighing their respective capabilities, values, and aims. The student, to be considered a realistic applicant to Brown University, must present to the Board of Admission both a strong scholastic background and the intellectual ability to meet the demands of a rigorous academic program. In making its decisions regarding an applicant's potential for success in the University, the Board of Admission considers a variety of information, including teacher and counselor evaluations, secondary school records, and the results of the College Entrance Examination Board Tests.

The admission officers in making their appraisal of the candidate, must reconcile the need to select a Freshman Class, whose size can be only a fraction of the number of generally qualified applicants, with the absolute necessity for recognizing the unique capabilities of each applicant. For this reason a candidate's credentials are reviewed in the light of the individual's own strengths and as they relate to a number of admission criteria.

The Brown curriculum is intended to give students freedom in the selection and creation of academic programs. An undergraduate at Brown must be able not only to cope with, but more importantly, to profit from this flexibility. An applicant should exhibit, therefore, a genuine interest in learning, a readiness for intellectual independence, and a willingness to accept responsibility.

It is important that Brown maintain an academic and extracurricular atmosphere that is as diverse in its perspectives as in its programs. This atmosphere should represent a lively, not just formal, interest in scholarly inquiry and activities. For this reason, the Board of Admission is concerned with the extent to which each applicant might contribute in his or her own way to the total life of the University.

Joint Statement on Common Ivy Group Admission Procedure

The Ivy Group is a loosely-formed organization of colleges and universities. It was established in 1954 primarily for the purpose of fostering amateurism in athletics. Relations between the member institutions have grown over the years to the point where we now meet regularly (along with the Massachusetts Institute of Technology) at a variety of levels to discuss topics which range from the purely academic to the purely athletic and from fundamental educational philosophy to procedures in admissions.

Each member institution has its own identity and character and protects its right to pursue its own educational objectives. Thus, although the Ivy Group institutions are similar in many respects, each member institution will continue to make its own independent admission decisions according to its own particular admission policy.

In recent years, however, it has become clear that the transition between secondary school and institutions of higher education has become increasingly complex and that greater efforts should be made to simplify the admission process through more uniform

procedures. It is our hope that by outlining carefully the procedures under which we are operating, we can help students pursue their college interests free of unnecessary confusion and pressure.

General Procedures

All contacts with students by representatives of Ivy institutions are intended to provide assistance and information and should be free of any activity which could be construed as applying undue pressure on the candidate. No information referring to the admission or financial aid status of an applicant to an Ivy institution may be considered official or reliable unless it is received directly from that institution's admission or financial aid office.

Ivy institutions mail admission decision letters twice annually, in mid-December and mid-April. Those who wish a decision in December must apply by November 1 and complete their applications with supporting materials shortly thereafter. The application deadline for mid-April notification is January 1.

December Notification

Under December Notification an applicant may be notified that he or she has been granted or denied admission or that a final decision has been deferred until the mid-April notification date. Two plans are offered:

- A. The College Board-Approved Early Decision Plan, which is offered by Columbia College, Cornell University (College of Arts and Sciences and some other units of the University), Dartmouth College, and the University of Pennsylvania, requires a prior commitment to matriculate. Financial aid awards for those qualifying for financial assistance will normally be announced in full detail at the same time as the admission decisions. An applicant receiving admission and an adequate financial award under the Early Decision Plan will be required to accept that offer of admission and withdraw all applications to other colleges or universities. All the Ivy institutions will honor the required commitment to matriculate which every Early Decision applicant must make.
- B. An Early Action Plan is offered by Brown University, Harvard University, Princeton University, and Yale University. This plan does not require a commitment to matriculate. Under this plan, a student may file an Early Action application at only one of these institutions. Students may, however, apply to other colleges at any time under their standard admission programs, with Spring notification of final admission decisions. Those admitted candidates applying for financial aid and qualifying for financial assistance will not receive any information concerning financial aid awards until the mid-April Common Notification Date.

Students are urged to consult the admission literature available at each Ivy institution for details concerning their particular December Notification Plan (see page 84).

Early Evaluation Procedure

Beginning in January and continuing until March 15, some participating institutions may, but are not obligated to, advise an applicant of his or her chance of admission (e.g., "Likely," "Unlikely," "Possible," or "Insufficient Information for an Evaluation"). As these are merely tentative assessments, it should be clearly understood that no commitments are involved on the part of either the institution or the applicant. Any Ivy institution may also send out copies of its Early Evaluation notices to guidance counselors and to others involved in admission-related activities, such as faculty, alumni and coaches, but no final information about the admission or financial aid status of an applicant may be released to anyone until the common notification date in mid-April. One major exception

to this rule is that any Ivy institution may announce formal denials of admission to applicants at any time during the admission season.

April Notification

On a common date in mid-April, usually a Saturday, applicants to the Ivy institutions will be notified by mail of admission decisions and financial aid awards.

Financial Aid

All the Ivy institutions follow the common policy that any financial aid will be awarded solely on the basis of demonstrated need. Moreover, in order to insure that financial awards to commonly admitted candidates are reasonably comparable, all of the Ivy institutions will continue to share financial aid information concerning admitted candidates in an annual "Ivy overlap" meeting just prior to the mid-April common notification date.

Common Reply Date

Except for those applicants admitted under the College Board-approved Early Decision Plan, which requires a prior commitment to matriculate, no candidate admitted to any of the Ivy institutions will be required to announce his or her decision to accept or decline an offer of admission until the Common Reply Date of May 1. All such candidates may delay their commitment to attend until May 1 without prejudice.

Participating Institutions

Brown University, Columbia College, Cornell University (College of Arts & Sciences), Dartmouth College, Harvard and Radcliffe Colleges, Princeton University, University of Pennsylvania and Yale University.

General Admission Procedure

Admitted Freshmen may register only in September of each academic year. A prospective student may apply for admission to the University under either the Early Action or Standard Admission plan. Procedures for these plans are described below.

Standard Admission

The Final Application (Form 1) should be completed by the applicant no later than January 1 of the year of desired entrance to Brown. The form must be accompanied by the application fee (which covers a part of the processing expense and is not refundable) or a fee waiver request. No student should hesitate to file the application for lack of this fee. The application will be processed and the fee waiver request will be considered when the financial aid application has been completed.

The processing of this completed form by the Admission Office will immediately designate the student as a final applicant to The College. Subsequently, the following completed forms must also be filed with the Admission Office: Personal Statement, Secondary School Report, and Teacher References. These forms, as completed by the student and secondary school officials and teachers, are most important. No applicant will be considered for admission until he or she has filed all of the required forms.

The evaluation of an applicant's credentials is begun as soon as possible after all of the application materials have been received. Because of the time required for the consideration of over thirteen thousand individual applications, applicants will not be notified of the Board's final decision until mid-April. (The Early Action Plan is an exception to this rule and is described below).

The *only* official and binding notification as to the Board of Admission's decision on an application is by an official letter signed by the Director of Admission. It will be mailed from Providence in mid-April to those candidates not already so notified under the Early Action Plan. Applicants must recognize that there will be many instances in which encouragement, whether it be found, for example, in the warmth of an Admission Officer's interview or a coach's letter, may nevertheless end in disappointment. Brown simply is unable to admit all the young people it would like to, nor is the Board able to make the final decisions until all the evidence is in and the merits of each candidate are weighed against those of all the rest. You should make no assumptions as to your admission from the fact that after completion of your application forms you may receive from time to time various materials or communication whose sole purpose will be to inform you about different aspects of Brown. The same admonition must also be taken regarding the award of financial aid. Here also, the only official notification is by letter from the Director of Financial Aid, which accompanies that of the Director of Admission except in the case of those accepted under Early Action, who will be informed of their financial aid in mid-April. Candidates for Standard Admission who have completed their applications for financial aid will be notified of the financial aid decision at the same time that they are accepted for admission. A candidate who does not complete the financial aid application on time may not be eligible for a financial aid award. In addition, although all efforts are made to meet the demonstrated financial need of applicants, the University cannot guarantee that the applicant will be granted the amount of aid that he or she believes is required in order to attend.

An accepted candidate must notify the Board of Admission by the Candidate's Reply Date (usually May 1) of plans to matriculate in order to reserve a place in that fall's freshman class.

Early Action Plan

Along with three other Ivy Group colleges, Brown has adopted an Early Action Plan in place of its previous Early Decision Program. As in the prior plan, a candidate who wishes to receive December notification should apply as early in the fall of the senior year as possible but in any case before November 1. Most other credentials, i.e., Personal Statement, Secondary School Reports, Teacher References, and College Board tests must be returned and completed no later than November 15.

This Early Action Plan is available at Brown University, Harvard University, Princeton University and Yale University. Under this December notification procedure, a student may file an Early Action application at one, and only one, of these institutions. Students may, however, apply to other colleges at any time under their standard admission programs, with Spring notification of final admission decisions. Early Action is similar to Early Decision with the important exception that a participating applicant is not required to make any commitment of any sort to enroll under Early Action until May 1.

The candidate will be notified, by mid-December, of one of three decisions:

- 1) He or she has been accepted. The candidate is not obliged to notify the Admission Office of an intention to enroll until May 1. Nevertheless, applications for admission to other colleges may be safely withdrawn, as a place in the class is secure pending satisfactory completion of the senior year. (Note: Candidates applying for financial aid will not be notified of their award until the mid-April mailing date).
- 2) A final decision has been deferred, in which case applications to other colleges should be initiated if this has not already been done. Deferred Early Action applicants become a part of the regular application group and are given careful consideration again in the spring.
- 3) He or she has not been accepted, in which case the application will not be reconsidered.

General Admission Information

Campus Visits and Interviews

For a variety of reasons it may be impossible for you to visit Brown University to see and be seen. If so, be assured that your admission to The College is in no way jeopardized. If, however, you can come to Providence, the Board of Admission strongly urges something more than a perfunctory two-hour campus visit. Such a short time will give you an opportunity to do little more than see the facades of buildings and the grounds of the University. We suggest instead that you plan to spend as much time as possible visiting different colleges so that you may talk to a number of students, visit classes, and meet with faculty; it is the people who live and study at the University with whom you should be most interested and from whom you should seek more information.

We suggest that you plan a visit to the campus during the academic year; during the summer months few students are here, and no regular classes are offered. With the exception of vacation periods, guided tours are available through the Admission Office each weekday morning and afternoon; you may, however, prefer to explore the campus yourself. If you have to stay overnight, we shall, with advance notice of your arrival, be glad to make arrangements for you to spend the night with students in a dormitory room during the academic year.

Before your visit to Brown you may wish to make an appointment to meet with a member of the Board of Admission. Although the interview is not required for admission, you may find it helpful to have your questions answered. Interviews are not intended to resemble a contest of wits, nor are they an important factor in the Board's decision on your application. Rather, an interview can provide a chance for a mutual exploration of your needs, interests, and questions. If you live too far from Providence to visit, but desire an interview with a Brown alumnus or alumna in your area, the Admission Office will, on request, provide names of alumni interviewers willing to talk with a prospective applicant at a mutually convenient time and place.

You may request an on-campus interview before you have filed an application. It is advisable to make an appointment three or four weeks in advance. The Admission Office in the Corliss-Brackett House, 45 Prospect Street, is open from 9 a.m. to 5 p.m. on weekdays and during October, November and December from 9 a.m. to 12 noon on Saturdays. Appointments may be made in writing to or by calling the Admission Office:

Admission Office—The College
Brown University
Providence, Rhode Island 02912
(401) 863-2378

Directions to the Admission Office

Providence and the Brown campus are accessible to the visitor arriving by plane, train, bus or automobile. Theodore F. Green Airport, in nearby Warwick, Rhode Island is serviced by most major domestic airlines. In addition, Amtrak and several major bus lines provide service into the downtown Providence area as well. Both stations are located a short, but hilly, 10 minute walk from the campus. For those less energetic, cabs are readily available to aid in the negotiation of College Hill.

The winding streets and hills that lend so much charm to the Providence area also present certain navigational challenges to the out-of-town motorist wishing to find the way to the Brown campus. Hence some directions are in order.

The University is situated on College Hill, overlooking the Benefit Street historical section and the downtown district just beyond. The interstate highways provide the easiest

access to the city and to the starting point for the street-by-street directions below. Fortunately, all the major highways converging in Providence feed into the interstate system.

The best strategy is to be on Interstate 195 and leave it via the "Downtown Providence" ramp, the first exit east of the junction with Interstate 95. There are "Downtown Providence" exits for both the eastbound and westbound lanes, serving the motorist traveling in either direction. The exit ramps converge and deposit you on a northbound street beside the Providence River, with the downtown area to your left and the hill to your right. After about one block you will be obliged to turn right. Directly ahead, and to the east, the golden dome of the Old Stone Bank building provides a conspicuous landmark. Continue toward it until obliged to turn left on South Main Street. Proceed northward for one block to College Street, the first large intersection. Turn right and go up the steep hill for two blocks, where College Street terminates at Prospect Street, before Brown University's Van Wickel Gates. The Admission Office is two blocks to the left, a large, red-brick building at 45 Prospect Street, situated at the corner of Angell Street. Opportunities for parking improve further north on Prospect Street.

Subject Requirements

From the University's commitment to fostering a liberal education it follows that a candidate for admission will profit most from pursuing a comprehensive college preparatory program. The foundations of a liberal education are laid in secondary school. A strong background in English (both literature and writing), foreign languages, mathematics, science, and history will enable students to benefit from the intellectual opportunities offered by Brown University. Brown considers the programs listed below to be a desirable secondary school preparation.

English	—four years, with significant emphasis on writing;
Mathematics	—three years, through trigonometry, though many students complete a sequence ending in pre-calculus;
Foreign Language	—four years of one language is vastly preferable to two years of two, and should be continued through final year in secondary school;
Science	—two years of a lab science. Prospective science or engineering students should take both physics and chemistry and as advanced a level of mathematics as possible;
History	—at least two years, including American;
Elective Subjects	—some study of music or art or both.

Admission to Brown is highly competitive. In the interest of good college guidance the below secondary school courses and duration of study are offered as the minimum that each applicant should have successfully completed before graduation. A student without these minimums should consult with his/her secondary school college counselor before making application to Brown.

English	—four years
Mathematics	—three years
Foreign Language	—two years
Science	—one year
Elective subjects	—preferably in the fields of English, Foreign Language, Mathematics, History, Science and Humanities.

College Entrance Examination Board Tests

Each applicant must take the Scholastic Aptitude Test and at least three Achievement Tests of the College Board no later than January of the senior year. Scores for the examinations administered through the American College Testing Program may be submitted in lieu of those of the CEEB. Test results are considered in relation to the student's school record and interests. They can be important aids to the Board of Admission in judging the individual's readiness for Brown's curriculum and for study in the student's field of special interest, although the Board realizes that such scores are not infallible indicators of a student's academic ability.

It is important, therefore, that the tests be taken at a time when the candidate's highest level of achievement and intellectual growth can be shown. Hence, the Scholastic Aptitude Test and Achievement Tests in continuing subjects should be taken in the senior year, preferably in November or December but not later than January. If a subject is complete in the sophomore or junior year, it is often in the best interest of the student to take the Achievement Test in May or July of that year. (Early Action applicants should note the appropriate dates.)

The Achievement Tests taken should cover as wide a range of subjects as possible, but the actual test selection is left up to the applicant. Some of the factors which might influence an individual's choice are: subjects which relate to expressed degree and concentration interests (as Mathematics Level I or II for science students), terminal courses (as American History or Biology), or areas of particular academic strength. Some of these examinations as well as others taken before entering Brown may later be considered for placement in higher level courses. All accepted applicants are strongly encouraged to submit the results of the English Composition Achievement Test, preferably incorporating the essay component, and one of the foreign language Achievement Tests before matriculation.

It is the responsibility of each candidate to take the appropriate College Board Tests and to see that they are officially reported to the Board of Admission at The College before February 15. A final decision on the application cannot be made until the official scores have been received. Test application blanks may be obtained through the applicant's school or by writing directly to the College Entrance Examination Board: Princeton, New Jersey 08541 or 1947 Center Street, Berkeley, California 94704. Applications must be made at least four weeks in advance of the testing date in order to avoid paying a penalty fee.

Advanced Placement

Brown participates in the Advanced Placement Program of the College Entrance Examination Board. The Program's aims are "to give able students challenging educational experiences in school, and to increase for these able students the opportunity to take advanced work in college." Students enrolled in secondary schools participating in this program may take the appropriate examinations given in May and have the scores sent to the Office of the Dean of Freshmen and Sophomores. Course credit and/or placement is determined by the appropriate academic department of Brown University, which may review the examination booklets and other materials. Policies on credit and/or placement vary from department to department. Students will be notified of such credit upon matriculation at Brown. By the end of the second week of their fifth semester, students must declare to the Registrar's Office whether or not they wish to use their AP credits for acceleration. To use AP credits for acceleration, students may request one semester of Advanced Standing (and tuition credit) for 3-6 AP credits or two semesters of Advanced Standing (and tuition credit) for 7-10 AP credits. Students not requesting Advanced Standing (and tuition credit) from the Registrar by this deadline may not do so subsequently,

except through petitioning the Committee on Academic Standing. Advanced Placement credits may not be applied to the minimum 28 courses needed to earn a Brown degree.

Subjects in which course credit may be granted include American History, Art History, Biology, Chemistry, European History, French, German, Latin, Mathematics, Music, Physics, and Spanish.

Transfer Admission from Other Colleges

Only a limited number of students can be accepted each year from the large pool of candidates who annually apply to transfer. A transfer applicant to The College must meet the following criteria to be considered: the student must furnish an official transcript from his or her former or current institution showing a strong record; the transfer applicant must, like regular applicants, submit SAT tests and any three Achievement Test scores; he or she must submit two letters of recommendation from current or former college instructors and/or deans; the secondary school record must have been conspicuously strong; reasons for transferring should be discussed thoroughly in writing; the applicant must have been in good standing at his or her prior college.

A maximum of two years of study elsewhere is transferable; extension or correspondence courses are not transferable, nor are courses outside the realm of defined academic disciplines (nursing, radio electronics and/or broadcasting, or business administration, to name a few). The assigning of transfer credits for courses taken at another college takes place by the middle of the first semester after an incoming student arrives at Brown.

Students who wish to be considered as transfer candidates should write or call the Admission Office for additional information, application forms, and procedures.

Special and Guest Students

Each year a number of students enrolled at other colleges spend a semester or a year as "visitors" at Brown to pursue course work (toward credit at their own college) not offered at their own institution. Other students are accepted on a non-matriculated basis for a limited number of courses and are classified as special students.

Resumed Education Program

The Resumed Undergraduate Education program at Brown University enables a person who has interrupted his or her formal education for five or more years, or who is twenty-five years or older, to enroll as a fully matriculated student and to study at a full or part-time rate. Some applicants have completed college work already; others have interrupted their education after completing high school. A Board of Admission for Resumed Education goes beyond the traditional bases of secondary school grades and college board scores in making its admission decisions and considers a number of criteria including experience, maturity, commitment, and future potential.

All undergraduate courses of the University are available to Resumed Education students. Since Brown has a flexible curriculum without language or distribution requirements, students shape their own programs in consultation with faculty counselors and deans.

Interested people should call or write Resumed Undergraduate Education Program, College Admission Office, Box 1876, Brown University, Providence, Rhode Island 02912. The telephone is 401-863-2381.

Course Registration and Enrollment

Orientation Program

The Orientation Program at The College, preceding the opening of the University each September, includes aptitude tests, orientation lectures, medical examinations, conferences on course programs, and course registration. All new students are expected to be present. Detailed instructions are mailed.

General Information

Instructions about enrollment will be sent prior to the opening of each semester to all students. To complete enrollment, all requirements of the pertinent administrative offices of the University must be met, including registration for courses, payment of accounts, and arrangements for housing as appropriate. Fees will be charged for failure to meet established deadlines.

All students must complete enrollment in order to be eligible to remain at the University.

Enrollment Without Academic Credit

Auditing. An auditor is a student who is registered in a course without credit under the following conditions: (1) the student must be properly registered for it; (2) the student must pay the usual course fee except as indicated in the next paragraph; (3) the student is entitled to all instruction in the course, including conferences, the criticism of papers, tests, and examinations.

A student who is registered for credit in at least three courses may be permitted to audit additional courses in any semester without charge.

With the concurrence of the instructor, the fact that a course has been audited shall be entered on the permanent record of any student electing this privilege. The status of a course in which a student has been registered as an auditor may not be changed from audit to credit after mid-semester.

Vagabonding. A "vagabond" is a student who, with the permission of the instructor involved, visits a given course occasionally or regularly without payment of fee. It is understood that such a student shall be entitled to participate in classes and activities, including discussions, conferences, and papers, *only* at the pleasure of the instructor.

Attendance, Grading, Examinations

Attendance

It is in the interest of every student to attend all sessions of the classes in which registered, and each student has an obligation to contribute to the academic performance of all by full participation in the work of each class; however, within such limits as are necessary for the general welfare, a student benefits also from exercising discretion and assuming responsibility for his or her educational progress.

Accordingly, unless the instructor imposes attendance requirements, students are not limited with respect to the number of absences from a course. Upon notification from the instructor, the office of the Dean will enforce such limitations.

A student is always fully responsible for any course work missed because of absences and will be assigned failing grades in examinations missed without excuse from the office of the Dean or the University Health Service.

No student organization shall make any appointment for undergraduates which conflicts with college exercises unless permission has been obtained from the Dean.

Grading System—The College¹

At the end of each semester final grades are given in semester courses. A tentative grade is given at the end of the first semester in year courses (indicated by a dash between course numbers); at the end of the second semester examinations in such courses cover the work of the two semesters, and a final grade for both is assigned at that time.

All undergraduates will be graded, subject to the conditions listed below, on one of the two following bases: (1) A, B, C/No Credit, or (2) Satisfactory/No Credit. Although there is no minimum letter grade equivalent for "Satisfactory," such an evaluation should be interpreted as comparable to the A, B, C/No Credit alternate system.

1. All Modes of Thought courses will be graded on a *Satisfactory/No Credit* basis only. Instructors of MT courses will be responsible for providing Course Performance Report forms to all students who request them.
2. Other courses may be designated to be graded on a *Satisfactory/No Credit* basis for all students enrolled on the initiative of the instructor. The designation of a course by an instructor to be graded *Satisfactory/No Credit* only must be announced no later than the first day of classes and entails the responsibility for providing Course Performance Report forms to all students who request them. An asterisk shall accompany the listing on the transcript of any course that has been designated by the instructor to be graded on the basis of *S/NC* only, with an appropriate explanation of the symbol provided.
3. A student enrolled in a course designated by the instructor as an A, B, C/No Credit course may opt to take this course as a *Satisfactory/No Credit* course. The student's option must be exercised before midsemester. No distinction, either with regard to requirements or to the processes of evaluation, may be made on the basis of the grade option which the student has chosen.
4. Courses from which a student withdraws, or which he or she does not complete satisfactorily, will not be entered on the permanent record.
5. In exceptional circumstances, a course may be left incomplete (except for a regularly scheduled final examination—see paragraph 6 below), with the instructor's consent. In such cases, a grade of *I* will be assigned provided that the student has filed a request for extension of time to complete the work of the course and the instructor has consented to such a request (forms for this purpose are available from the Registrar's Office and departmental offices). Unless an earlier date is specified by the instructor, grades of *I* must be made up as follows: for Semester I, by midsemester of Semester II; for Semester II, by the first day of the following semester. Extensions beyond these dates for any period of time up to but no more than one year from the end of the semester in which the course left incomplete was taken may be granted by the instructor who will indicate this in writing to the Registrar.
A course not completed by the designated time will be assigned a grade of *NC* unless the instructor indicates that sufficient work has been completed to justify course credit by submitting, as appropriate, a grade change from *I* to A, B, C, or S. A grade of *NC* assigned in accordance with these procedures may be changed subsequently, but no later than one calendar year after the end of the semester in which the course was taken.
6. If a student is absent from a regularly scheduled final examination for a course, the

¹ See section on the Graduate School, page 140, for grading system for graduate students.

instructor will assign a grade of *ABS*. If the absence from the examination is excused by the Dean, the student will be permitted to take a Special Examination. The Special Examination will be administered by the Registrar in accordance with the provisions in the Faculty Rules for such examinations, unless other arrangements are agreed to by the instructor and the student, and communicated to the Registrar. If the absence from the final examination is not excused by the Dean, the student will receive no credit for the course.

7. A grade of *I*, *ABS* will be assigned if appropriate and will be resolved in accordance with the provisions of No. 5 and No. 6 above.

Course Performance Reports. Students who elect to take a course on a *Satisfactory/No Credit* basis may request the instructor to complete a Course Performance Report form. This request has to be made prior to mid-semester. The instructor may decline to submit such a form if it is believed he or she has inadequate information to do so. Particular consideration should be given to requests from students for whom the course is part of their concentration program. Copies of Course Performance Reports will be made available to: (1) the student, (2) the Dean's Office, and (3) the student's concentration advisor. While not part of the official record, Course Performance Reports may be sent out of the University at the student's request as information on his or her work at Brown University.

Concentration Evaluations. A student may request a written evaluation of performance in concentration, which will consist of the student's own statement and an evaluation prepared by an appropriate faculty member. The following points may be included in such an evaluation: any special characteristics of the concentration program; information on the student's official transcript, such as the interest and motivation of the student, the probable capacity for more advanced work, the ability to conduct research, and so forth; and a comment describing the bases on which the evaluation was prepared.

If the student elects to have a concentration evaluation prepared, a concentration evaluation form, available from the Registrar, should be submitted to the concentration advisor by the end of the first week of the student's final semester. The student will include his or her own statement and the names of three or more faculty members familiar with the performance in concentration. One of the three may be the concentration advisor if appropriate. The concentration advisor will be responsible for the completion of the form by the end of the student's final semester.

An academic department or committee (for standard concentration programs) or concentration advisor (for independent concentration programs) must provide a senior concentration evaluation upon request, provided that the student has enrolled in a senior seminar, completed a thesis, taken a special examination, or enrolled in a suitable independent study unless the department (or committee or advisor) finds that it already has enough information to write a meaningful concentration evaluation without such additional work by the student. If sufficient information will not be available, the department (or committee or advisor) shall so notify the student, upon receipt of his or her initial request.

Copies of the concentration evaluation will be made available to: (1) the student, (2) the Dean's Office, and (3) the student's concentration advisor. While not part of the official record, concentration evaluations may be sent out of the University at the student's request as information on his or her work at Brown University.

Procedure for having course performance reports and other material sent out with an official transcript. An official transcript shall consist of a copy of the permanent record card listing courses passed and grades received. A statement shall be added to all transcripts explaining the grading system and indicating that the student may elect to include other material with the official transcript. In such cases the student should provide copies of all the material to be enclosed at the time he or she requests an official transcript. The student should choose this material in consultation with his or her advisor. The University will mail this material in one envelope along with the official transcript.

Examinations

Final Examinations. A final, written examination (at the end of each semester) shall be given in each course numbered under 200 unless the instructor of a particular course decides to use some other mode of final evaluation. If the written examination is not to be used, the mode of final examination which is to be used shall be made known to the students in the course no later than mid-term and, in addition, the Department and the Educational Policy Committee shall be informed.

Special Examinations. These examinations are given only with the approval of the Dean to students absent from final examinations. A fee of \$5 is charged for each examination; it may be waived, however, for any student submitting a medical excuse satisfactory to the Dean.

Special examinations on the work of the first semester are given during a special examination period, in the fifth week of the second semester. A student eligible for such a special examination must file an application with the Registrar, *not later than the second Wednesday of the second semester.*

Special examinations on the work of the second semester are given in the week preceding the opening of the academic year. A student eligible for such a special examination must file an application with the Registrar, *not later than August 15.*

Placement and Achievement Tests in Foreign Languages. Placement tests in the foreign languages are given during Orientation Program in the fall and during the first week of classes in each semester.

All students, before taking college courses in a foreign language in which they have presented entrance credit, must take either a placement test at Brown University or, preferably, a College Board Language Achievement Test in secondary school. Students with outstanding performance on these tests, or on the Advanced Placement Tests of the College Entrance Examination Board, may be admitted to advanced courses without the usual course prerequisites.

Academic Status—The College

Warning, Serious Warning, Dismissal

A student must maintain the minimum standards set by the Faculty and Corporation for graduation. A student whose grades fall below these standards will be subject to dismissal from college.

Undergraduates who, in the judgment of the Committee on Academic Standing, have an unsatisfactory scholastic record will be placed in one of three categories—Warning, Serious Warning, Dismissal.

Action by the Committee will depend on the extent of the student's deficiency as determined by academic performance in the most recently completed semester or semesters and/or the cumulative record to date. To remain in good academic standing, a student must complete successfully at least seven courses in each consecutive two semesters.

Warning serves to caution students that their record is below the standard for graduation.

Serious Warning notifies a student that, unless the record improves, he or she will be subject to dismissal at the end of the semester.

Dismissal may be ordered when the Committee finds that a student's academic record is unsatisfactory and there is no reasonable expectation of significant improvement.

Students on Warning and Serious Warning may be required to seek special academic advising by the Dean.

Discipline

Academic Discipline

All cases of academic dishonesty among undergraduates, as defined in the Academic Code at Brown University, shall be referred to the Dean of the College or his or her designated representative. A student accused of such an offense shall be notified in writing as soon as possible of the specific charge or charges against him or her before his or her case is considered. The student shall be given the opportunity of a hearing before the designated representative of the Dean of The College at which all relevant facts may be presented. A student shall have the right to appeal to the Dean of The College any decision, within five business days after the decision has been rendered. For definitions of offenses against the Academic Code, procedures, policies, and a list of penalties, see the pamphlet issued by the Office of the Dean of The College, the Academic Code of Brown University.

Non-Academic Discipline

In order to protect personal and academic freedoms, Brown University seeks through appropriate policies and regulations to encourage mature and responsible behavior on the part of students within a social system which they help to create and enforce. Students are expected to conduct themselves in a manner compatible with the University's function as an educational institution and with the right of all members of the University community to attend, make use of and enjoy the facilities and functions of the University without interference or disruption. Failure to do so may result in withdrawal of the student's privilege of attending the University at any time, the suspension of specified privileges (computer, dining, etc.) or the imposition of other penalties prescribed by the University Council on Student Affairs.

Disciplinary cases are dealt with initially by the appropriate dean. If the dean determines that an offense is one warranting possible suspension or dismissal, the case will be heard by the University Council on Student Affairs (UCSA) which is composed of students, faculty members, and deans. Special procedural guarantees assure the student a fair hearing. The decision in any such case may only be appealed to the President of the University.

University Policies and Rules Governing Student Conduct.

The following regulations have been prepared by the University Council on Student Affairs and approved by the President of the University. The policies and rules were approved in May, 1969, by the Advisory and Executive Committee of the Corporation. Subsequent revisions have been made on a regular basis. Significant modifications most recently came as a result of the Judicial Task Force, May, 1980 and actions of the Advisory and Executive Committee of the Corporation in April, 1983.

Policies

- I. All members of the Brown University Community are entitled to the following

basic rights: the rights of peaceful assembly, free exchange of ideas and orderly protest; and the rights to attend, make use of, or enjoy the facilities and functions of the University.

In order to secure the right of all members of the University community to reasonable peace and quiet during normal hours of rest, the creation of undue noise and disturbance in or adjacent to the residential units is prohibited during the weekday hours between 12 midnight and 7 a.m., and between 2 a.m. and 9 a.m. on Saturday and Sunday. Creation of undue noises or disturbances at other times of the day, or other actions that abridge the rights of members of the University community to reasonable peace and quiet, is also prohibited. These prohibitions include the use of tapes, radios, phonographs, televisions or other devices in a manner to disturb any member of the community, and further includes any other noise-making at a disturbing level such as singing, dancing, shouting, running, moving furniture, etc. Violations of this rule reported by any member of the University community will result in disciplinary actions.

Interpretations of the foregoing policy as it applies to a specific future event may be issued by the President or by the Provost, if it becomes necessary or advisable. The reasonableness of such interpretations will be a proper subject of review in any hearing on a charge based on violations of the policy as so interpreted.

Supplementary Explanation

These basic rights may from time to time come into conflict, and it will at times be difficult to draw a clear and precise line between the reasonable exercise of and the abuse of such rights. The circumstances in each case will vary, but the objective must always be to assure a fair and reasonable balance when there is a conflict between the basic rights referred to above.

- II. It is improper and unnecessary for the University to attempt to duplicate the law enforcement functions of the civil state. It is not, however, inappropriate for the University to initiate potential disciplinary sanctions in cases where a student's behavior not only makes him or her liable to prosecution by civil authorities, but which also after thorough study, is found to constitute a serious University offense. The chief concern here is the well-being of others.
- III. Serious or persistent minor violations of University rules or regulations may result in suspension or dismissal.
- IV. All members of the Brown University community are expected to comply with operational rules governing various parts of the University (e.g., Faunce House, the libraries, Food Services). Flagrant or repeated violations of such operational rules may result in disciplinary action by the appropriate Dean or referral to the UCSA.

Offenses

Listed below are offenses which could warrant suspension or dismissal (note that offenses which have a significant impact on the total University community may also be referred to the full UCSA regardless of the level of potential penalty):

- I. Behavior which disrupts or materially interferes with the exercise by others of the basic rights to which they are entitled on University property or at University functions.

Supplementary Explanation

Protests or demonstrations, the effect of which is to infringe upon the rights of others to peaceful assembly, orderly protest, free exchange of ideas, or which interfere with the rights of others to attend, make use of, or enjoy the facilities or functions of the University cannot be tolerated.

Picket lines which permit free passage of those who wish to pass, signs, banners and peaceful assemblies are all normally acceptable. On the other hand, actions such as the following, if they result in infringing the rights of others are normally unacceptable: blocking; obstructing or impeding passage of a person or vehicle; actions which result in bodily harm; erecting or placing of obstructions or barriers which require effort or force to remove or overcome; and noise or other disturbances which result in depriving others of their rights.

- II. Behavior which causes or can be reasonably expected to cause physical harm to persons or damage to property, or is unreasonable disruptive. This includes drug and alcohol-related behavior.
- III. Sexual harassment.
- IV. The selling of drugs, or the possession of drugs with the intent to sell.
- V. Theft or attempted theft of personal or University property.
- VI. Altering, forging or contributing to the fraudulent use of University identification cards.
- VII. Possession or distribution of firearms, ammunition or explosives. The University defines firearm as any projectile firing device, especially those which are capable of causing harm to persons or damage to property. This includes but is not limited to conventional firearms (devices using gunpowder), all types of air rifles; BB pellet and dart guns; wrist rocket slingshots and other slingshot devices.
- VIII. Flagrant or repeated violations of operational rules governing various parts of the University (e.g., Faunce House, the Computer Center, the libraries, Food Service).
- IX. Violation of the terms of probation or limited probation imposed as a penalty in a case where a student has been found guilty of one or more of the above offenses.

The University is also deeply concerned with the development and personal well-being of the individual student. In attending to this concern it is felt that specific rules and regulations are not effective. Rather, a greater degree of effectiveness is attained by offering a wide range of counseling services and making pertinent information readily available.

In further interest of the student's welfare, the attention of students is called to the general laws of Rhode Island in connection with alcohol, marijuana, LSD, and certain other hallucinogens and narcotics. Under the laws of the state of Rhode Island the sale of intoxicating beverages to, or possession of such beverages by persons under the age of twenty is prohibited. Visiting a place where a subject drug is illegally kept or stored; illegal possession; illegal possession with intent to sell; illegal sale or gift to an adult; illegal sale or gift to a minor are prohibited. Procedural Guarantees

MAJOR OFFENSES

The preliminary decision that an alleged offense is serious enough to warrant review by the full Council as having a significant impact on the total University community shall be made by the Dean of Student Life, the Dean of the Graduate School, or the Dean of Medicine, as appropriate. Only the full Council has the authority to impose the penalties of suspension or dismissal. The following procedural guarantees shall be applicable to cases involving such offenses:

- I. A student should be entitled to a fundamentally fair hearing, not to be confused

with a legal trial and not including the right to application of the formal rules of evidence.

- II. A student accused of an offense shall be notified in writing as soon as possible of the specific charge or charges. Such charges should be presented with reasonable particularity. The student shall be notified in writing of the time and place of the hearing of his/her case. Such hearing shall be held within a reasonable time.
- III. All such cases shall be heard by the University Council on Student Affairs. The student has the right to request a public or private hearing and may request that the student members of the Council not participate in the case.
- IV. The Council shall make known the procedures to be followed in hearing a case, and advise the student of these procedures a reasonable period of time before the hearing.
- V. The student shall have reasonable time to prepare his/her defense and the right to be assisted by an advisor of his/her choice from within the University community. The accused student is not, however, entitled to have legal counsel as an advisor.
- VI. The student shall have the right to be present when the case is presented, he/she shall have an opportunity to testify and to present witnesses and evidence in his/her behalf, and shall have an opportunity to hear and question adverse witnesses.
- VII. No student shall be suspended temporarily within a semester or subjected to disciplinary sanctions pending a hearing unless the nature of the case indicates there is a danger to him/her or the immediate well-being of the University community, in which situation appropriate interim measures may be taken by the appropriate Dean, including imposing involuntary absence from University property.
- VIII. In order to separate the determination of guilt from the selection of appropriate penalties, in a case where guilt is contested, the UCSA, having reached a decision of "guilty", must so inform the accused student and must recess for not less than three hours, nor for more than one week, and then must conduct a second deliberation to arrive at an appropriate penalty. At the discretion of the UCSA, the accused student may address the body at this second deliberation, and may present evidence in extenuation or mitigation, as fairness may require.
- IX. Any decision of the full Council in a disciplinary matter may be appealed to the President of the University who may designate a member or members of his senior staff to consider the appeal. The President, acting alone, or on recommendation of such designated senior staff member(s), shall have the power to affirm, reverse, or modify the decision, or to remand the matter to the Council for further consideration, but not to increase the severity of the penalty imposed. Appeals must be submitted in writing setting out the reason(s) for the appeal. Unless the penalty involves separation from the University, appeals will normally be considered only when new evidence becomes available after the hearing or when an allegation of procedural error on the part of the University administration or the Council is made.

MINOR OFFENSES

Minor disciplinary cases shall be considered by the appropriate Dean with a minimum of formality but in accordance with the principles basic to the guarantees of the Council.

Minor offenses may be referred by the Deans to a special subcommittee of the UCSA. The "Lower Board" as it is called, generally consists of at least one faculty/staff person and three students. The Board is convened at intervals, usually every two weeks, and the procedures are informal.

Decisions made by the Deans or by the Lower Board are subject to administrative review by procedures jointly agreed upon by the UCSA as a body and the Deans. Repeated minor offenses may result in a determination that the problem behavior should be treated as a major offense.

GROUP BEHAVIOR

Problem behavior which should be attributed to a club, team, fraternity or some other recognized collective will be dealt with by the Office of Student Life. The basic principles of fairness and the broad intent of UCSA guidelines are applicable in such instances.

RECORDS AND NOTICE

- I. University File Entry: Records of penalties imposed by the appropriate University Office or the UCSA will normally be placed in a student's official University file. Letters of reprimand and notice of probation will be removed upon his/her graduation. The student may place a statement of explanation with such a letter in the University file. Records of suspension or dismissal are permanent and are normally entered also on the transcript.
- II. Parental Notification: Parents will be notified, in accordance with the Buckley Amendment, upon imposition by the appropriate University officer or the UCSA of limited probation, probation, suspension or dismissal.
- III. Public Record: The accused student retains the right to request a private hearing. The outcome of each hearing both as to guilt and as to penalty imposed, and irrespective of whether the hearing was private or public, shall be published through such mechanisms as the UCSA shall find appropriate, and should be recorded for consultation in future cases, in appropriate archives. The name of the student may be published as part of the record of the case only if the hearing was conducted in public. The results of disciplinary action by deans should be similarly published.
- IV. Disciplinary Record Form: The outcome of disciplinary proceedings will be recorded through the use of a disciplinary record form under the following circumstances:
 1. In all cases involving offenses deemed "serious" by the appropriate officer of the University.
 2. In all other disciplinary cases in which the student is found guilty and a sanction more severe than Reprimand is imposed.

NOTE: The Deans and the chairperson of the UCSA will withhold release of the record form until it is ascertained that an appeal will not be filed, or in the case of an appeal, that the appeal process is complete. In cases involving particularly sensitive personal matters, the UCSA may withhold release of the record form.

The Disciplinary Record Form will be made available to the University community by the appropriate Dean.

Penalties of the UCSA, the Deans, or the "Lower Board" may include, but are not limited to, the following:

I. Fines

The UCSA has approved the fine schedule outlined below. IN ADDITION to the fine specified for a particular offense, the penalty of reprimand, limited probation, University sanction, suspension or dismissal may be imposed.

Offense:	Maximum Fines*	
	1st Offense	2nd Offense
Damage to University property	\$100	\$200
Fire safety equipment misuse	100	200
Theft—University Property	100	200
Pet Rule Violations	10	25
I.D. Card Misuse	10	50
False Fire Alarm	800	800

*Plus repair or replacement costs. In addition, the UCSA may, at its discretion, levy fines of no more than \$200 for offenses not listed above.

II. Reprimand

A letter of reprimand will be given for minor offenses. After three reprimands, a student's case will automatically be considered a major offense.

The following will normally, as appropriate, accompany a reprimand:

1. Fines as specified in the fines schedule.
2. University File Entry.

III. Limited Probation

For minor offenses. Written notification from the appropriate Dean stating the duration and terms of the period of limited probation.

Supplementary Explanation

This penalty may be imposed either by the Dean or the UCSA and generally will be stated in terms of a period during which the student must be on good behavior. Violation of limited probation could be either a minor or a major offense. If the student is so charged and found guilty, further action can be taken, including suspension or dismissal, depending on the nature of the violation. *However, violation of limited probation cannot alone be cause for suspension or dismissal as in the case of probation.* When violation of limited probation occurs, the student must be formally charged with an offense and the UCSA will hear his or her case making a decision on the basis of all past disciplinary actions.

The following will normally, as appropriate, accompany limited probation:

1. Fine as specified in the fines scheduled.
2. University File entry.
3. Parental notification.
4. Public Record.

IV. Probation

Written notification from the UCSA stating the duration and terms of probation and the procedures to be followed should the student be found guilty of a further offense or offenses during the probationary period, which procedure may include immediate suspension or dismissal if the student is found guilty of committing even a minor offense during the probationary period.

Supplementary Explanation

The terms of the probation may include any and all steps the UCSA feels are necessary to help insure good behavior, including but not limited to periodic meetings with counselors, denial of privileges, etc. *In addition, violation of probation, because of the seriousness of the original offense, may be a cause of immediate suspension or dismissal if the student is found guilty of the violation no matter how minor.* In such instances, the record of past disciplinary actions need not be considered.

The following will normally, as appropriate, accompany probation;

1. Fine as specified in the fines schedule.
2. University File entry.
3. Parental Notification.
4. Public Record.

V. University Sanction

For repeated minor offenses or major offense found serious enough to warrant full suspension or dismissal, but where the nature of the offense does not warrant separation from the University. Written notification from the UCSA stating the duration and terms of the sanction. Any violation of these terms or further offenses may result in immediate separation from the University. A statement of the offense and the sanction shall be entered on the student's transcript. In addition, an explanation of the offense and the sanctions shall be prepared. At the request of the student, this explanation shall either be attached permanently to the transcript or, filed with the transcript to be sent out on request of the student.

Supplementary Explanation.

As in probation the terms of the University sanction may include any and all steps the UCSA feels are necessary to help insure good behavior.

The following will normally, as appropriate, accompany University Sanction:

1. Fine as specified in the fines schedule.
2. University File entry.
3. Parental Notification.
4. Public Record.

VI. Suspension or Dismissal

For major offenses, repeated minor offenses, or violation of probation or sanction. Written notification from the UCSA stating either the duration of the suspension or the conditions, if any, which must be satisfied for re-admission if the student is dismissed. A statement of the offense and the penalty shall be entered on the student's transcript. In addition an explanation of the offense and the penalty shall be prepared. Upon request by the student, this explanation shall either be attached permanently to the transcript or filed with the transcript to be sent out on request of the student.

The following will normally, as appropriate, accompany suspension or dismissal:

1. Fine as specified in the fines schedule.
2. University File entry, Transcript entry.
3. Parental Notification.
4. Public Record.

Academic Freedom

Consonant with Brown's tradition concerning academic freedom, the Faculty and Corporation, in 1966, adopted the following statement of principles:

Academic freedom is essential to the function of education and to the pursuit of scholarship in universities.

Therefore, Brown University, mindful of its historic commitment to scholarship and to the free exchange of ideas, affirms that faculty and students alike shall enjoy full freedom in their teaching, learning, and research.

Brown University also affirms that faculty and students shall have freedom of religious belief, of speech, of press, of association and assembly, of political activity inside and outside the University, the right to petition the authorities, public and University, to invite speakers of their choice to the campus, and that students and faculty as such should not be required to take any oath not required of other citizens. The time, place, and manner of exercising these rights on campus shall be subject to reasonable regulation only to prevent interference with the normal functions of the University.

The Faculty Policy Group is responsible for assisting in the implementation of these principles. The group shall receive charges and, if necessary, institute formal proceedings in accordance with regulations voted by the Faculty. A charge may be brought by a student, an association of students, a member of the teaching or research staff, faculty member, or the President.

Counseling

Upon entrance, each student is assigned to a counseling unit composed of approximately thirty-five freshmen and three or four upperclass counselors. The counseling units are residentially based, and upperclass counselors live with their unit. In addition, each incoming freshman is also assigned a faculty or staff member who serves as freshman Academic Advisor for Liberal Education. An effort is made to assign the student an Advisor from an academic area in which the student has indicated an interest. Through general discussions and individual meetings with both faculty and upperclass counselors, each freshman should formulate a program of study best suited to his or her intellectual needs, capacities and goals. In 1982, the University introduced the Curricular Advising Program in which during the freshman year students selected for the Program are taught in one course by a faculty member who also serves as the student's advisor. Counselors, Advisors, and Deans are available to students throughout the academic year.

When a student begins a concentration program, he or she thereafter receives educational advice and direction from members of the department in which the concentration has been elected.

Both the Offices of the Dean of the College and the Dean of Student Life provide *ad lib* academic, career, and personal counseling to all students who request this.

Other resources for personal, career, and academic counseling are available through the University Health Service, Chaplains, Deans, Resident Counselors, Minority Peer Counselors, Undergraduate Peer Academic Advisors, Faculty Fellows, Resource Center, Sarah Doyle Women's Center, Third World Center, Randall Counselors and Career Planning Services. The Orientation Program, of course, is a major early resource available to all students.

Student Support Program (SSP)

Students at Brown have available to them a composite student support system, called SSP, intended to improve the transition from secondary school to college and to help students take advantage of academic and cultural resources at Brown. SSP begins with the Third World Transition Program, just prior to the Orientation Program, and includes varied individual tutorial services, reading and study skills programs, a drop-in Writing Center, tutorial sections for certain courses, Minority Peer Counselors, and multi-cultural activities of many kinds at the Third World Center in Churchill House.

The Family Educational Rights and Privacy Act of 1974

The Family Educational Rights and Privacy Act of 1974 (P.L. 93-380) extends to a student the right of access to his or her education records maintained at the University. The Deans of The College, the Graduate School, and Medical Affairs, and the Registrar maintain these records for enrolled students. Information and notification as to the type of record; the accessibility of and policies for maintaining, reviewing and expunging the record; and the procedure for inspecting, reviewing, obtaining copies of, or challenging the record are established and promulgated by the appropriate officers.

A student who is not claimed as a dependent by his or her parents for federal income tax purposes (Section 152 of Title 26 of U.S. Code) may declare at the beginning of each semester by signing a "statement of independence from parents," available at the Registrar's Office. A student who does not submit this notification will be presumed to be dependent and his or her parents may then be kept informed of the student's status, including academic standing, violations of the Academic Code, disciplinary violations, and facts relating to the status of the student.

Equal Employment Opportunity

Brown University does not discriminate against any person because of race, color, religion, age, national or ethnic origin, handicap, status as a veteran, or sex, except where sex is a bona fide occupational qualification. The University has developed and from time to time updates its affirmative action program. The University insists on a good faith effort on the part of its employees in complying with the program. The University will request and expect its agents and those with whom it conducts its affairs to meet the commitments of this important program.

Career Planning Services

Career Planning Services provides many resources to enhance life and career decision-making for Brown's undergraduates, graduate students, and alumni/ae. Specific counselors are available to undergraduates, seniors, graduate students, and alumni for individual consultations regarding choice of concentration, self-assessment, career direction, the employment search, and further educational options.

Many types of workshops and programs are presented throughout the academic year. These include summer and full-time job-hunting and resume-writing workshops, interviewing preparation. Career Forums with alumni panelists co-sponsored with SARC, company informational presentations, and outreach services to freshmen, fraternities, and other organized groups on campus. Audio or video-tapes of many of these programs are also available.

The Career Resource Library houses current occupational information, fellowship and scholarship resources, graduate and professional school catalogs, general job-hunting and career-planning literature, and organizational directories representing social services, the environment, the media, non-profit sector, business, government, law, engineering, to name a few. In addition, there are materials describing over 1,000 companies, and an audio-tape library and listening room. Current job listings for entry-level and experienced personnel are also located in the library.

Employment interviews for seniors and graduate students are arranged by the office with representatives of business, education, non-profit organizations, and the government. Representatives from graduate school programs also visit the campus to provide information and interview students. Applications for the GRE'S, LSAT'S, GMAT'S, and MCAT'S are available in the office and a dossier service for graduate and professional school applications and for educational employment is also available through Career Planning Services.

A bi-monthly newsletter sent to all students announces programs, employment opportunities, and career-related information.

Requirements for Baccalaureate Degrees¹

At Brown University, education for the undergraduate has as purposes the fostering of the intellectual and personal growth of the individual student. The student, ultimately responsible for his or her own development in both of these areas, must be an active participant in framing his or her education. A central aspect of this development is the relationship of the student with professors and fellow students and with the material they approach together. Structures, rules, and regulations of the University should facilitate these relationships and should provide the student with the maximum opportunity to formulate and achieve his or her educational objectives. Accordingly, the following curricular structure reflects these purposes.

Baccalaureate Degrees Offered

Two baccalaureate degrees are awarded—the *Bachelor of Arts* and the *Bachelor of Science*. Which of the two degrees is awarded is determined by the nature of the concentration program (see section on Concentration, page 104). The *Bachelor of Science* degree recognizes a science concentration that demonstrates both breadth and depth in science beyond the minimum required for the *Bachelor of Arts* degree in the same field. A *Bachelor of Science* program normally will follow these guidelines:

1. The concentration program, with the exception of Engineering, shall require no more than ten courses in any one department. The total number of concentration courses required shall not exceed twenty (twenty-one for Engineering).
2. At least one semester course of independent study, research, or design in the concentration discipline must be included.
3. Additional electives must be chosen to meet the quantity requirement for all baccalaureate degrees.

Presently there are standard concentration programs leading to the *Bachelor of Science* degree in Applied Mathematics, Applied Mathematics-Biology, Applied Mathematics-Economics, Applied Mathematics-Psychology, Aquatic Biology, Biochemistry, Biology, Biophysics, Chemistry, Computer Science, Engineering, Geological Sciences, Mathematics, Neural Sciences, Physics, and Psychology.

Quantity and Progress Requirements

Each student is normally expected to enroll in four courses in each of 8 semesters for a total of 32 courses. (Tuition payments, by decision of the Corporation, are based on the norm of 32 courses and 8 semesters of full-time residence at Brown.)

To encourage risk-taking in the planning of educational programs, or to provide a degree of flexibility in individual programs, the minimum number of courses that must be successfully completed for graduation has been set at twenty-eight. The maximum number that may be completed in eight semesters (without extra tuition payments) is forty. A student may choose to take a minimum of three to a maximum of five courses in a particular semester.

¹ See section on the Graduate School, page 141, for degree requirements for advanced degrees.

To remain in good academic standing, a student must complete successfully at least seven courses in each two consecutive semesters. A student may not be enrolled in fewer than three (3) courses in any semester without written permission from the Dean of the College for short-work.

Academic standing is determined only on the basis of courses completed at Brown. Neither transfer credit nor A.P. credit will figure in the determination of academic standing. Transfer credit for courses taken at other institutions, either in this country or abroad, may be granted by the Committee on Academic Standing on the recommendation of a department and, in the case of courses qualifying for concentration credit, on the recommendation of the student's concentration advisor. Summer school courses are not acceptable for transfer credit.

Students who apply transfer credits towards completion of the requirements for their Brown baccalaureate degree, must complete successfully at least 14 courses and 4 full-time semesters of course work at Brown (effective for students entering The College in Semester I, 1983-84, and after). For any semester to count as a full-time semester of residence, a minimum of 3 courses must be taken. Resumed Education students may study either on a part-time or full-time basis.

A.P. credits may only be used as full-time semester equivalents above and beyond the 28 minimum course requirements (effective for students entering The College Semester I, 1983-84, and after); i.e., semester equivalent tuition credits will be awarded for advance placement (A.P.) credits; however, A.P. credits, although carrying academic course credit, may not be applied to the minimum requirement of satisfactory completion of 28 courses.

Residence Requirement

Every candidate for a baccalaureate degree, except those enrolled in the Resumed Education Program, must be enrolled for at least four semesters as a full-time student and must complete satisfactorily a minimum of fourteen courses at Brown (effective for students entering The College, Semester I, 1983-84, and after). Students in the Resumed Education Program must complete satisfactorily a minimum of fourteen courses at Brown and be in residence not less than four semesters. Resumed Education students may study either on a part-time or full-time basis. Every student must spend sufficient time in concentration studies to permit faculty evaluation of his or her concentration.

English Requirement

Since its founding, Brown has stressed the importance of writing. Competence in reading and writing is required for all degrees. Beyond competence, Brown seeks to develop the quality of writing in courses throughout the University.

In general, the entering student is expected to have demonstrated the ability to write by superior performance in secondary school or college courses. Students who, in the opinion of the Dean, have not clearly demonstrated such competence will be directed by the Dean to enroll during their first semester in a designated course that requires significant reading and writing.

As they continue at Brown, all students are expected to pursue a high level of performance in their writing. Students who, in the opinion of their instructors, fail to maintain an appropriate level of competence in reading or writing, should be referred to the Dean for placement in a course offering the opportunity to improve their abilities. If students do not complete such a course satisfactorily and/or are judged by the Dean to be incompetent in writing, they will be refused registration by the Committee on Academic Standing until they meet the responsibilities for the completion of the writing requirement.

Concentration Requirement¹

Concentration is the focal point for a student's undergraduate educational experience. It is an in-depth study centering on the unit provided by a discipline or disciplines, a problem or a theme, or a broad question. Study in depth aids intellectual development by encouraging conceptual and methodological learning on a sophisticated level. Study in depth also allows students to gain a command of an area of knowledge sufficient to enable them to engage in meaningful creative efforts in that area. The unity of the subject area encourages the ability to utilize concepts and methods in a coherent manner.

In concentration students will be undertaking an extensive inquiry into an area which is significant to them. They will be forced to integrate the large amounts of material with their personal experience. The very nature of a long and pains-taking inquiry will aid students in assessing their capabilities and limitations.

Concentration should be undertaken in ways which will maximize students' contact with individual professors who will guide them and work with them, and with their fellow students who are working in related areas.

Concentration may coincide in some ways with specific prerequisite training for professional goals, but professional training is not the central aspect of the concentration process. Concentration is designed to carry out the processes of intellectual and personal development which are at the center of the undergraduate educational experience.

Students are expected to devise, in consultation with an appropriate faculty member, a concentration program centered on a discipline or disciplines, problem or theme, or broad question; they may also select a standard departmental concentration. A written proposal presenting a statement on the major objectives of the concentration program and a list of the specific courses to be taken will be signed jointly by the student and faculty advisor, and submitted to the Educational Policy Committee for approval (forms for this purpose are available in the Office of the Registrar). Standard concentration programs require only the approval of the appropriate department or committee. The number and nature of courses constituting any proposed concentration program submitted to the Educational Policy Committee should be fully consistent with the objectives stated in the proposal. The faculty advisor for an approved concentration program will be responsible for meeting regularly with the student throughout the period of concentration, to provide guidance as well as to assess, with the student, progress made toward attaining the goals embodied in the concentration program. This essential relationship will form a central feature in the terminal evaluation of a student's performance in concentration (see paragraph below regarding evaluation requirement and also page 91 for concentration evaluation).

At the discretion of the Educational Policy Committee, minor changes in concentration programs may be arranged with the approval of the faculty advisor. Major alterations in concentration programs, involving either changes in courses or in faculty advisors, will require the approval of the Committee.

Departments and interdepartmental groups of faculty may establish, subject to the approval and periodic review by the Educational Policy Committee, standard programs of concentration, thereby eliminating the need for individual approval. Faculty advisors designated by the department and interdepartmental groups will serve in the guidance of students undertaking approved standard programs of concentration.

Standard departmental concentration programs for the Bachelor of Arts degree shall require no more than ten semester courses. Concentration programs for the Bachelor of Science degree, with the exception of Engineering and standard interdepartmental Bachelor of Arts programs shall require no more than ten courses in any one department. The total number of concentration courses required for the Bachelor of Science degree and for standard interdepartmental Bachelor of Arts programs shall not exceed twenty (twenty-

¹ See also the section on Interdepartmental Concentration Programs, page 106.

one for Engineering). None of these limits need preclude a reasonable number of pre- or co-requisites, but when passing upon any concentration requirement the Educational Policy Committee shall also review the number of these pre- or co-requisites.

In the case of independent concentrations which overlap with areas of study covered by departmental or interdepartmental programs, the Educational Policy Committee shall inform the appropriate departmental officer(s) of all actions taken on submitted proposals. An active exchange of opinion between these components of the University is desirable from two viewpoints: first, a clear statement of the Committee's reasons for arriving at specific judgments should assist the departments and interdepartmental groups in the continuing evaluation of their standard concentration programs; second, the comments transmitted by the departments and interdepartmental groups to the Educational Policy Committee should be of considerable value to its members in the review of future proposals.

All students must declare a field of concentration by filing an appropriate concentration program form with the Registrar, no later than the end of Semester IV. No student will be permitted to preregister for his or her sixth semester unless a declaration of concentration has been filed. Students failing to complete preregistration on time because of the failure to file a concentration declaration will be subject to the same action taken by the University for all cases of late preregistration. Changes in declaration are permissible in accordance with the above procedure. The form will consist of three parts: (1) a statement by the student of his reasons for selecting his field of concentration and his plans for completing it; (2) a list of the courses the student plans to take in order to fulfill his purpose; (3) a statement from a faculty member approving the student's program.

All courses in the concentration program must be completed satisfactorily.

A student who satisfactorily completes more than one concentration program may have the fact indicated on his or her permanent record card. In order to accomplish this, the student must have filed a concentration program form with the Registrar for each concentration. Sponsorship and authorization of each concentration program shall follow the usual procedures.

Honors Program. The University, at graduation, grants Honors to students whose work in the field of concentration has demonstrated superior quality and culminated in an Honors Thesis of distinction. The designation "Honors" is included on the student's transcript and diploma. No distinctions are made among quality levels of Honors work. Students considering Honors work should consult their departmental or independent concentration advisor. If the advisor accepts the student as an Honors candidate, the advisor will request the Registrar to record that fact.

The Educational Policy Committee administers the Honors Program. It:

- a. assumes overall responsibility for the Program;
- b. arranges to issue timely procedural reminders to students and to departmental and independent concentration advisors;
- c. acts on recommendations for Honors awards.

(It does *not*: file or specify formats for Honors theses; or maintain records of Honors candidates).

Recommendations for Honors awards are submitted to the Educational Policy Committee and include an evaluation of (1) the student's overall performance in concentration, and (2) the quality of the Honors Thesis.

- a. For students pursuing a standard concentration in a department, the Honors recommendation is made by the department.
- b. For students in an interdepartmental program of study, the Honors recommendation originates in the appropriate committee.
- c. For students pursuing an independent concentration, the Honors recommendation is

made by the student's sponsor with the approval of two other faculty members familiar with the work.

STANDARD INTERDEPARTMENTAL CONCENTRATION PROGRAMS

In addition to standard departmental concentration programs, several standard interdepartmental concentration programs are available. These standard interdepartmental concentration programs are subject to approval and periodic review by the Educational Policy Committee in the same manner as standard departmental concentration programs, thereby eliminating the need for approval by that Committee of programs for individual students. The standard interdepartmental programs which have been approved to date are as follows:

1. AMERICAN CIVILIZATION

Concentration requires ten courses. These must normally include: (1) two sections of American Civilization 190; (2) two semesters in American History (e.g. History 51, 52; 121, 122; 151, 152; 160, 161, 162; 169, 170; 173, 174; 175, 176; 185, 186); (3) two semesters in American Literature (e.g. English 41, 42; 141, 142; 143, 144; 122; 140; 171; 172; 187; 192; 193; 194); and (4) four electives chosen in consultation with the undergraduate advisor from more than one hundred relevant courses offered by various university departments. In order to add greater flexibility the Program makes available a number of different seminars in American Civilization 190 for juniors and seniors, any of which satisfy the requirement. The topics for these seminars change frequently and the student should consult the Course Announcement to determine which of the 190 seminars are available from year to year.

A rare exception to this standard pattern may be made in favor of an individually constructed concentration reflecting distinctive interests. A written description of the individually constructed concentration should be submitted to the undergraduate advisor no later than the second semester of the sophomore year. Such a concentration must retain American Civilization 190, but it may substitute a coherent program reflecting alternative disciplinary interests for other required courses.

Honors: In addition to the courses required of all concentrators, candidates for honors must complete the honors seminar (American Civilization 180) and an honors project (American Civilization 192). Candidates must enroll in American Civilization 180 in the first semester of their junior year. Enrollment in American Civilization 180 and admission to the honors program is on the recommendation of the director of the honors seminar, the undergraduate advisor, and another faculty member from whom the student has taken a course for concentration credit.

2. ANCIENT AND MEDIEVAL CULTURE

It is strongly recommended that the student complete two sections of advanced Latin (Latin 103, 104, 105, 106) before electing this pattern of concentration.

Prescribed courses: Eight to ten semester courses including Classics 131, 132, *Roman History to 337 A.D.*; History 101, 102, *Europe in the Middle Ages*; Latin 111, *Medieval Latin*.

Recommended electives: Art 45, *Western Medieval Art*; Art 144; English 105, *Chaucer*; French 101, *Early French Literature*; Italian 101, *Dante's Divina Commedia*; Latin 104, *The Poetics of Vergil's Aeneid*; Philosophy 180, *Ancient and Medieval Philosophy*; Religious Studies 172, *History of Christian Thought: Medieval*.

3. ANCIENT STUDIES

Standard concentration patterns: Ancient History, Ancient Religion, Languages and Literatures of Greece and the Ancient East.

Requirements: Ancient Studies 1, 2 (listed as F13, F14). (Ancient History pattern) 4 courses from: Classics 121, 122, 131, 132, Egyptology 143, 144, History of Mathematics 143. (Ancient Religion pattern) 4 courses from: Religious Studies 15, 16, 51, 63, 71, 72, 81, 82, 161, 164. 4 other related courses. Recommended electives are: Art 42, 43, 143; Classics 54, 55, 57, 58, 113, 114, 116, 118, 121, 122, 129, 131, 132, 135, 151, 157; History of Mathematics 143, 144, 152, 153; Egyptology 131, 132, 143, 144, 143A, 143B; Judaic Studies 111, 112; Philosophy 180; Engineering 94F.

Honors: (Ancient History and Ancient Religion). As above, except that only 3 other related courses are required. In addition, the candidate for honors must have passed one intermediate-level course in an ancient language (Egyptian, Hebrew, Aramaic, Sanskrit, Greek or Latin) and composed an honors thesis (Ancient Studies 191, 192).

Languages and Literatures of Greece and the Ancient East (available only as an honors concentration):

Requirements: Ancient Studies 1, 2.

2 100-level courses requiring knowledge of Greek, plus 2 courses in classical literature or culture.

2 100-level courses requiring knowledge of one of the languages Egyptian, Hebrew, Aramaic or Sanskrit, plus 2 courses in the literature or culture associated with that language.

Honors Thesis (Ancient Studies 191, 192).

Concentration advisor: Mr. Toomer.

4. ANTHROPOLOGY-LINGUISTICS

This interdisciplinary concentration primarily combines courses from the fields of anthropology and linguistics to provide systematic study of language in its social and cultural context. The concentration is built around a core of courses designed to situate this core of knowledge in a cross-disciplinary and cross-cultural context. Students will be able to relate their studies toward a relevant third discipline such as speech communication, philosophy, or social psychology through the inclusion of courses from departments other than anthropology and linguistics by arrangement with their concentration advisor.

The concentration consists of the following: 1) designated courses: a) at least two of the following anthropology courses: 20, 80, 131, 180, b) Linguistics 22, 121, 131; 2) Elective courses : a) Anthropology 132 or 133 or another course dealing with analysis of social structure, Anthropology 111, 112, 113, 114, 115, 116, or another course dealing with the ethnography of a particular world area; one to four additional courses to be drawn from Anthropology and Linguistics, or from relevant courses in other disciplines such as Sociology 40, 42; Psychology 152, 180; English 7, 21, 22; Engineering 93B; Philosophy 55, 155, 163, 177. Students will be encouraged to write honors theses in consultation with members of the anthropology and linguistics departments. Honors theses will be prepared in consultation with two faculty members from two different departments, one of which must be Anthropology or Linguistics.

5. APPLIED MATHEMATICS-BIOLOGY

This standard Sc.B. concentration program is designed as preparation for graduate study in applied mathematics or a biomathematics program in biology or for employment in a research environment where mathematical modeling of health care systems or biosystems is useful.

Requirements:

- a. Applied Mathematics 33, 34, 165 and one of 117, 118 or 120.
- b. Biomed 110, and any 3 other Biomed courses to be agreed upon by the student and his or her advisors.
- c. Mathematics 9, 10, 18 and 52 (or the Applied Algebra course in Applied Mathematics if appropriate).
- d. Chemistry 3, 11 (recommended for certain concentrators in addition: Chemistry 12, 63, and Biomed 123).
- e. Physics 3, 4 or 5, 6.
- f. Two additional courses in Applied Mathematics, Biomedical Sciences, Chemistry, Mathematics, or Physics.
- g. The Sc.B. requirement of one semester of an independent study course (e.g. AM 193, 194, Biomed 195, 196 or an approved equivalent must be fulfilled).

6. APPLIED MATHEMATICS—COMPUTER SCIENCES

The standard program for the Sc.B. degree with concentration in Applied Mathematics and Computer Science is sponsored jointly by the Division of Applied Mathematics and the Department of Computer Science. The concentration is designed to lay a foundation of basic concepts and methodology of mathematical analysis and computing and to build on this foundation with courses that bring together aspects of computer science and mathematics. The emphasis is on applied mathematics courses that use computers or that develop the mathematics of computing and on computer science courses that include a substantial component of mathematical analysis.

Prerequisites: Mathematics 9, 10.

Requirements: Applied Mathematics 33, 34 or Mathematics 25, 26; Computer Science 11 or 4, 12, 21, 152, 153; Applied Mathematics 117 or 118, 116 or 121, 165; Computer Science 191 or Applied Mathematics 193 or 194; seven additional courses, approved by the concentration advisors, from the courses offered by Computer Science and Applied Mathematics. Of the unspecified courses, at least four shall be 100-level or higher level. Concentrators are reminded that many 100-level and higher-level Computer Science courses presume a background in discrete mathematics at the level of Computer Science 52. Students who have not acquired this background elsewhere are encouraged to consider Computer Science 52 when choosing courses to fulfill the quantity requirement of the concentration. Courses from other departments may be substituted for the unspecified Applied Mathematics and Computer Science courses if such courses stress the use of mathematical or computer models and if the advisors approve of the substitution.

Suggested courses: This list of suggested courses is intended to give ideas of courses that may be used to adapt the standard program to meet individual needs. It does not aim to list all courses that are suitable for the concentration program.

Computer Science 141—Introduction to Artificial Intelligence.

Computer Science 159—Introduction to Computational Complexity.

Computer Science 224—Computer Graphics

Computer Science 253—Analysis of Algorithms.

Computer Science 254—Mathematical Analysis of Algorithms.

Computer Science 256—Applied Theory of Computation.

Computer Science 274—Programming Language Theory.

Applied Mathematics 120—Operations Analysis: Probabilistic Models.

Applied Mathematics 151—Applied Modern Algebra.

Applied Mathematics 166—Statistical Inference II: Regression and Analysis of Variance.

Applied Mathematics 167—Statistical Inference III.

Applied Mathematics 170—Introduction to Automatic Language Analysis.

Applied Mathematics 255, 256, 257, 258—Numerical Analysis.
 Engineering 163—Digital Electronics Systems Design.
 Engineering 164—Computing Systems.
 Engineering 252—Pattern Recognition and Computer Vision.
 Engineering 253—Digital Signal and Image Processing.
 Mathematics 153—Abstract Algebra.

7. APPLIED MATHEMATICS-ECONOMICS

Standard program for the Sc.B. degree. The program is designed for students preparing for graduate study in applied mathematics, economics, business or law.

Prerequisites: Mathematics 9, 10.

Course Requirements: Applied Mathematics (8 courses) 33, 34, 1 or 116 or Computer Science 4 or 11; Applied Mathematics 165, 166; Mathematics 52 or Applied Mathematics 151, and two other approved courses. Economics (8 courses) 111 or 113, 121, 122, 162, 164 and three other approved courses. The Sc.B. requirement of one semester of an independent study course must be fulfilled by taking Applied Mathematics 193, 194, Economics 164, 195, or an approved equivalent. Concentrators are urged to complete their introductory programming course before the end of their sophomore year.

Standard program for the A.B. degree. Designed to give a background in economic theory and application plus the mathematical tools needed to thoroughly understand the theory and adapt it to particular economic applications. Emphasis is on applied theories.

Prerequisites: Mathematics 9, 10.

Courses: Applied Mathematics 33, 34, 1 or 116 or Computer Science 4 or 11, Applied Mathematics 165, 166; Economics 111 or 113, 121, 122, two courses from Economics 162, 163, 164, 186, and two other approved courses. Concentrators are urged to complete their introductory programming course before the end of their sophomore year.

8. APPLIED MATHEMATICS-PSYCHOLOGY

Standard program for the Sc.B. degree

This program is designed to cover the fundamental theories, principles, and methods of psychology and to provide background in the basic mathematical models applied to problems in psychology.

Prerequisites: Mathematics 9, 10 and Psychology 1.

Requirements: Applied Mathematics: (1) 33, 34; (2) Two one semester courses in computer science. Recommended: (a) Applied Mathematics 1, 100; (b) Applied Mathematics 1, Psychology 17, 18 or 181; (c) Applied Mathematics 1, Linguistics 170; (3) Two one semester courses in probability and statistics. Recommended: Applied Mathematics 116, 120, 165, 166 or Mathematics 161, 162.

Psychology: Six approved one-semester courses in Psychology. The student is expected to elect as many laboratory courses and advanced courses as possible. For example, if a student were to specialize in physiological psychology he or she might choose among the following courses—Comparative (50), Introduction to the Nervous System (91, 92), Psychological (102), Sensory (119), Human Information Processing (180), and a graduate seminar such as Neural Foundations of Behavior (229) or Vision (237). An interest in Cognition and/or Psycholinguistics would suggest the following courses—Measurement (104), Human Information Processing and Cognition (152), Quantitative Aspects of Cognition (181, 182), Selective Attention (183), Theories of Behavior (187) and a graduate seminar such as Cognition (233) or Perception (212). Stu-

dents interested in Child Development and Learning would probably find the following courses most appropriate—Child (81), Educational (113), Conditioning and Simple Learning (120), Human Information Processing and Cognition (152), Advanced Abnormal Child (136), Selective Attention and Cognitive Development (183), Infant Learning and Development (184), and a graduate seminar such as Developmental (234) or Learning (232).

Other sciences: four approved courses from other fields selected to reflect the student's area of specialization.

Independent research: A one-semester course in Independent Research.

Recommended: Psychology 197 or 199; or Applied Mathematics 193 or 194. This research effort should be considered during the Spring of the Junior Year for implementation during the Senior year and is expected to result in a paper of some substance or an Honors Thesis.

9. AQUATIC BIOLOGY

Standard Program for the Sc.B. degree

Program:

1. Chemistry 3, 11, 12 or 63; Physics 3, 4 (or 5, 6 or 11, 12); Mathematics 9, 10 or 17.
2. Three additional courses in Physics, Chemistry, Mathematics, Applied Mathematics or Geological Sciences.
3. Seven courses in Biomed: i) Four of the following group: Biomed 28 (27), 61, 111, 112, 118, 185; ii) at least three additional Biomed courses; highly recommended are Biomed 11, 12, 42, 46 or 47, 52, 103, 100.
4. Three out of the following group of related science courses (or substitutions as approved by the Concentration Advisor); Geological Sciences 121, Oceanography; Geological Sciences 112, Historical Oceanography; and Geological Sciences 11, Fossil Record; or Geological Sciences 28, Pollution and the Environment.
5. Biomed 195-196 (may be taken for one or two concentration credits). Reading knowledge of one of the following languages is recommended: French, German or Russian.

10. BIOCHEMISTRY

Two concentration programs in biochemistry are offered with the cooperation of the Department of Chemistry and the Division of Biological and Medical Sciences. They are coordinated by a joint Biochemistry Concentration Committee whose members are drawn from both departments.

Standard program for the A.B. degree

The concentration is designed to provide an understanding of basic principles and concepts of modern biochemistry and molecular biology as well as a background for medical school, research or graduate studies in biochemistry or molecular biology. It is administered by a Concentration Advisor in the Division of Biology and Medicine.

Program: Chemistry 3, 11, 12 and 113 (or equivalent), Physics 3 and 4 (or equivalent), Mathematics 9 and 10 (or equivalent), plus eight courses in the area of concentration including: Biomed 126, one course in molecular biology (currently chosen from B105, B124 or B151), one additional advanced course requiring B126 (biochemistry) as a prerequisite (C124, C127, B105, B121, B124, B130, B151, B156, B220, B225, B227, B253, B254, B256), one semester of independent study or research (Chemistry 97 or 98 or Biomed 195 or 196), and 4 additional courses in chemistry or biology approved by the concentration advisor.

Concentration Advisors: J. Fain for the class of 84; K. Bostian for the class of 85; D. Brautigan for the class of 86.

Standard Program for the Sc.B. Degree

- A. Twenty semester courses in Biology, Chemistry, Mathematics, and Physics with a minimum of four semester courses in Biology (generally including Biomed 126 and a course in molecular biology, e.g., Biomed 151, 124 or 105), seven semester courses in Chemistry (generally including Chemistry 3 or 5, 11, 12, 113, 124, and 127), three semester courses in Mathematics or Applied Mathematics, two semester courses in Physics, and one (preferably two) independent study courses (Biomed 195, 196 or Chemistry 97, 98).
 - B. Foreign Language: A reading knowledge of one or more modern languages. German, Russian, or French are recommended. The requirement may be satisfied by: (1) presenting two years of high school credit upon entrance or (2) passing a 3-level course in one of these languages or (3) passing a 1R-2R sequence in one of the languages.
 - C. Students are advised to take at least six courses in the humanities and social studies.
- Concentration Advisors: J. E. Lusk and P. H. Rieger.

11. BIOMEDICAL ETHICS

The concentration in Biomedical Ethics focuses on interdisciplinary exploration of ethical problems associated with recent advances in biology and medicine and their impact on the individual as well as on contemporary social and political life. The concentration is intended not only for students interested in a career in the life sciences, but also for those with a general interest in ethical issues arising from biomedical practice and research.

Each student in consultation with at least one member of the Committee on Biomedical Ethics devises a concentration program. The student presents for approval by the Committee a written statement of the objectives of the program and a list of component courses. The program is expected to have a firm foundation in ethics and in the biomedical sciences. Each concentration program must have a total of 10 courses including: 1) at least two courses in ethics selected from Philosophy 20, 143, 158, 164, and Religious Studies 22, 125, 128; at least one of these must be Philosophy 158, or 164 (preferably by the end of the sophomore year); 2) at least two courses in biomedical science selected from Biomedical Sciences 46, 47, 108, 109, 117, 122, 124, 125, 126, 127, 128, 129, 130, 131, 132, 141, 142, 146, 148, 151, 158; one of these courses may be 11, 12, 81, 91, or 92; 3) at least two advanced courses in Biomedical Ethics. Students are also strongly urged to take at least one related course in the social sciences, such as Sociology 155 or Economics 136. Other recommended courses include Philosophy 159, 160, 165, 178; Religious Studies 123, 138, and Anthropology 281, and University 123. With the approval of the Committee other relevant courses in psychology and the social sciences, independent and group study projects, or graduate seminars may be used as part of the concentration program. A concentration in Biomedical Ethics with Honors requires, in addition, an Honors thesis (Biomedical Ethics 192, during one semester of the senior year) directed by a member of the Committee on Biomedical Ethics. Students interested in this concentration should contact Mr. Ladd in the Department of Philosophy.

12. BIOPHYSICS

Standard program for the Sc.B. degree. An undergraduate concentration in biophysics provides broad interdisciplinary training which will prepare a student for further work in a number of areas. These include medical school, graduate studies in biology, in biophysics, and in many of the basic medical sciences. As an undergraduate field of concentra-

tion, biophysics requires a significant level of competence in mathematics, physics, chemistry and biology. Because of this breadth of subject matter, considerable amounts of individual extracurricular study will probably be necessary for many students. Students interested in an Sc.B. in Biophysics are urged to consult one of the biophysics concentration advisors at an early stage of their concentration planning.

Requirements: (1) Physics 5 (or 7), 8 (or 6), 47, 50, 56; (Physics 141, 142 is strongly recommended); (2) Chemistry 3, 11, 12, and either Chemistry 63 or Physics 152; (3) Mathematics 10 or 17, together with Applied Mathematics 33, 34 or Mathematics 29, 52 or Mathematics 24, 25; (4) Biomed 110, plus any two additional 100-level courses in Biomedical Sciences (in addition, Biomed 11, 12 is strongly recommended); (5) three additional intermediate or advanced level courses in science (including engineering) but all three may not be taken in a single department; (6) at least one semester of Independent Study, Research, or Design (this may be included as one of the three courses required under No. 5).

13. CHEMISTRY-GERMAN

The Departments of Chemistry and German make available to students a program combining a professional training in Chemistry with substantial exposure to German language, cultural history, literature, and everyday life. The program is designed for students who wish to augment their work in either field by taking a significant number of courses in the other. The exercise of learning two distinct methodologies and subject matters will provide the student with a broader perspective without sacrificing the depth requisite to future academic or professional work.

The requirements for the program are:

1. Completion of all requirements for the A.B. degree in Chemistry (see page 226).
2. Completion of German 11 or 12, 19, 51, 170; German 191 (Seminar in German Civilization); and 2 other courses at the 100 or 200 level.

Students in this program will have the opportunity to apply for a 12-week apprenticeship program, typically during the summer after semester 6, working in the laboratories of an international firm in a German speaking area as salaried employees of the firm. The program is directed by a committee of one representative from each department. Interested students should contact Professor Crossgrove (German) or Professor Greene (Chemistry).

14. COGNITIVE SCIENCE

The undergraduate programs in Cognitive Science are designed to provide an interdisciplinary approach to the study of thinking and the nature of intelligent systems by combining course work primarily from Computer Science, Linguistics, and Psychology. Relevant courses in related disciplines such as Anthropology, Applied Mathematics, Engineering, Neuroscience and Philosophy are also acceptable.

The A.B. program is designed primarily for students interested in language and human cognition, and who have only secondary interest in computer science and artificial intelligence. Any Cognitive Science A.B. program which focuses mainly on language and human cognition along the lines of the earlier psycholinguistics program will receive, with the mutual consent of the student and the Center Executive Committee, the concentration designation. "Cognitive Science-Psycholinguistic."

The Sc.B. program is intended for students who have a strong interest in artificial intelligence and the experimental aspects of Cognitive Science.

Standard program for the A.B. degree

Prerequisites: Psychology 1, Linguistics 22, and one of the quantitative methods sequences—a) Psychology 9; b) Cognitive Science 17 or 17 and 18; or c) Applied Mathematics 165. Students are encouraged to take Cognitive Science 17-18, however.

Requirements: A total of nine courses including 1) Linguistics 141, Psychology 152, and Cognitive Science 100; 2) Four courses from among those designed “Cognitive Science” below; and 3) Two courses from among those designed “electives” below.

Standard program for the Sc.B degree

Prerequisites: Computer Science 11, 12, and 52, Psychology 1, Linguistics 22, and Cognitive Science 18 or Applied Mathematics 165.

Requirements: A total of eleven courses including 1) Computer Science 141, Linguistics 141, Psychology 152, and Cognitive Science 100; 2) Four courses from among those designed “Cognitive Science” below; 3) Two courses from among those designed “electives” below; 4) Independent study, Cognitive Science 198.

Cognitive Science courses: Anthropology 20, 80; Computer Science 12, 21, 52, 141, 159, 224, 227, 242; Linguistics 45, 53, 111, 112, 113, 114, 121, 122, 123, 124, 131, 136, 142, 143, 144, 145, 146, 148, 170, 172, 245, 251, 252, 253; Psychology 27, 81, 100, 102, 119, 165, 181, 182, 233.

Electives: Engineering 94A, 122, 163, 164, 252, 253; Neural Sciences 1, 2, 101, 102; Philosophy 2, 10, 55, 159, 163, 175, 185, 210.

Independent Study: Independent study is encouraged for the A.B. degree and required for the Sc.B. degree. Students in either program should sign up for Cognitive Science 198 with an advisor who is a member of the Center for Cognitive Science. Arrangements should be made in the Spring of the student’s junior year so that preliminary reading can be carried out before the Fall of the senior year.

Honors Work: Students interested in Honors should sign up with the Honors Advisor by the Spring Semester of their junior year. An Honors student must write a thesis and is expected to spend his or her entire senior year working on it. Therefore, Cognitive Science 198 may be taken for two terms if a student is doing Honors work. Although no specific grade-point average has been set for acceptance into the Honors program, only students with a good record and an advisor willing to work with them will be allowed into the Honors Program. The Executive Committee of the Center for Cognitive Science will make the final decision. Honors students will defend their thesis work in an oral examination during the final examination period.

15. DEVELOPMENT STUDIES

Development studies is designed to provide a comparative perspective on the long-term social, political, and economic changes which have accompanied industrialization and the growth of the modern state in Asia, Africa, Latin America and in the historical experience of European countries. Courses must be taken in at least three of the five social science disciplines in order to provide an interdisciplinary approach to these processes of change. Ten courses are chosen from among the following: Afro-American Studies 15, 16, 103, 121; Anthropology 13, 104, 105, 115, 117, 135, 137; Economics 111,¹ 121,¹ 125, 151, 158; Engineering 94B; History 90, 118, 121, 122, 127, 143, 144, 145, 147, 148, 149, 155; Political Science 121, 126, 128, 129, 130, 135, 145, 182K;²

¹ These courses may be counted as part of the major only by concentrators who also take at least one of the other listed economics courses.

² Research seminars and special topics courses change in numbering from year to year. Whether or not such a course may be counted toward the concentration depends on its content.

Sociology 15, 20, 120, 130, 160, 170, 187B, 187D, 187J; University Course 124. Qualified student may substitute appropriate graduate seminars or individual reading and research projects for one or more of the above courses with the approval of one of the concentration advisors. Other substitutions must be approved by the Committee as a whole and justified in terms of both course content and relation to the student's overall concentration program.

In an eleventh course, usually an Independent Study or reading and research project during the senior year, concentrators will write a paper which serves to integrate the work done in the concentration. Two faculty members from different departments will give advice for this paper and evaluate it.

Concentrators are encouraged to spend part of their junior year in a developing country if appropriate arrangements can be made. Early acquisition of appropriate foreign language skills is strongly encouraged. Concern with at least two of the three major areas of the developing world (Asia, Africa, Latin America) should be reflected in the selection of courses.

In order to design a coherent program of studies with clearly-stated goals, concentrators should discuss their entire program with one of the concentration advisors as well as individual faculty members teaching the courses listed. For further information see Peter Evans (Chair), Department of Sociology; Lina Fruzzetti, Department of Anthropology; Louis Putterman, Department of Economics; James McClain, Department of History; or Van Whiting, Department of Political Science.

16. ENERGY STUDIES

The energy concentration is an academic program which will provide an understanding of current energy problems and the skills needed to contribute to their resolution. The program balances science, engineering, mathematics and economics with a view to employment opportunities as well as continuing advanced studies.

The energy concentration develops a strong foundation in the scientific and technical aspects of energy as well as providing the empirical and economic skills to understand the market allocation of energy and natural resources. The concentration has five principal components: (1) a foundation in the physical sciences and mathematics, (2) an introduction to the nature of our planet and its resources, (3) a rigorous study of the technology of energy conversion processes, (4) an introduction to economic theory and estimation with applications to energy and natural resource decision making, and (5) a study of policy issues. A senior seminar will bring students, faculty and invited speakers together for an integration of the disciplinary training into a coherent approach.

A student electing a concentration in Energy Studies may choose between programs leading to either a Bachelor of Arts degree or a Bachelor of Science degree. While the two programs have the same prerequisites (Mathematics 9, 10, Calculus; and Physics 3, 4, Fundamental Physics), the Bachelor of Science option requires Computer Science 4, and greater depth in Economics, Engineering and Geology through the addition of four courses: Economics 135, Environmental Economics; Engineering 81, Fluid Mechanics; Engineering 177, Design of Thermal Power Plants; and Geology 3, Chemical Geology.

The Engineering courses in the Bachelor of Science concentration give the student an introduction to Thermodynamics (Engineering 72). Fluid Mechanics 81 and Engineering 171 prepare the student for Engineering 177, Design of Thermal Power Plants. Energy Conversion 167 investigates electromechanical energy conversion as well as the conversion of thermal, nuclear and solar energy into electricity by other means.

The Economics courses in the Bachelor of Science concentration give the student an introduction to market supply and demand and efficient allocation of resources through the price system (Economics 111). Energy Economics 134 discusses the optimal rate of

use and extraction of natural resources, the tradeoffs between alternative energy options, and evaluates public policy in the energy field. Recognizing that alternative energy options involve significant environmental tradeoffs, Environmental Economics 135 is included, so as to give the student a background into the welfare aspects of environmental influences and public policy.

Finally, through Geology 2, Physical Processes in Geology, an introduction is given to the structure of the earth and physical processes in its interior and exterior. Geology 3, Chemical Geology, studies minerals and rocks and the chemical composition of the earth.

The following points concerning the curriculum should be noted:

1. Any required course can be replaced by its equivalent in another department or by an upper level equivalent in the same department.
2. The senior seminar conducted directly by the Center for Energy Studies will be taken jointly by the Bachelor of Arts and Bachelor of Science concentrators. Problems concerning energy policy, as well as health problems of energy production, will be treated within the senior seminar.
3. Members of the Executive Committee of the Center for Energy Studies provide concentration advice for students. Each student is requested to select a concentration advisor who is a member of the Executive Committee of the Center.
4. The courses and prerequisites as presented in the two concentration programs are consistent with the course listings and prerequisites of the 1983-84 University course announcement. Exceptions should be discussed with the advisor.

Standard program for A.B. degree

Prerequisites: Mathematics 9, 10; Physics 3, 4.

Required Courses: Applied Mathematics 33 or Mathematics 29; Chemistry 3; Economics 111, 134; Engineering 72, 167, 171; Geological Sciences 2; Senior Seminar; two courses in the humanities or social studies in the areas of policy and decision-making, to be approved by the Concentration Advisor.

Standard program for the S.B. degree

Prerequisites: Mathematics 9, 10; Physics 3, 4.

Required Courses: Computer Science 4; Applied Mathematics 33 or Mathematics 29; Chemistry 3, Economics 111, 134, 135; Engineering 72, 81, 167, 171, 177; Geological Sciences 2, 3; Senior Seminar; two courses in the humanities or social studies in the areas of policy and decision-making, to be approved by the Concentration Advisor.

17. ENGINEERING AND ECONOMICS

The Engineering portion of this program will include at least eight semester courses, including 3, 4 and at least two 100-level Engineering courses, one a design course. The Economics portion includes at least six semester courses. Economics 111 or 113, 121, and 122 are required and a minimum of three additional courses should be chosen from other 100-level Economics courses.

18. ENVIRONMENTAL STUDIES

The Center for Environmental Studies has developed a standard concentration in environmental studies. The program requires a minimum of fifteen courses for a concentration, including Environmental Studies 11, 191, 192, 195 and/or 196. One course in Biomedical Science (11, 12, 42, 51, 52 or 61), Economics 111 or 113 and one course in value or ethics. The remaining eight courses are selected from the sciences or policy related courses.

Science Focus: Six science courses in addition to one course in Biomedical Science and thesis research; two policy related courses, one of which lies outside the field of economics.

Policy Focus: Six policy courses in addition to Economics 111 or 113 and thesis research; two science courses, one of which should be in the physical sciences.

Thesis Requirement: Each student must register for ES 195/and or 196 and must submit a thesis proposal to the CES concentration committee no later than two weeks prior to the start of the semester in which the thesis preparation is to begin. Students are urged to begin the development of their thesis topic as part of Environmental Studies 191 and to begin the thesis research no later than the seventh semester.

Students with environmental interests should visit the Center or see Mr. Ward in the Urban Environmental Laboratory, 135 Angell Street.

19. GEOLOGY-BIOLOGY

Standard program for the A.B. degree

This program provides more specific emphasis on the evolution and history of life. Recommended for students who wish an understanding of the origin and development of life as interpreted from the geologic record. Fourteen semester courses are required, six from geology, five from biology, one from chemistry, and two from mathematics or physics. Students planning further work in this area should consult the departmental advisor. Required courses: Geological Sciences 2, 3, 11, 24, and two of the following: 41, 45, 102, 109; Biomed 11, 12, and three other courses such as 42, 52, 61, having the approval of the concentration advisor; Chemistry 3 or 5; two of the following: Mathematics 9, 10, Physics 5, 6 (or equivalent).

Standard program for the Sc.B. degree

This program is recommended for those intending graduate work or a career in this field. Program consists of 19 courses:

- A. 6 courses in Geological Sciences: 2, 3, 11, 24, and two of the following: 41, 45, 102, 109.
- B. 5 courses in Biology: 11, 12, and three other courses such as 42, 52, 61, having the approval of the concentration advisor.
- C. 2 courses in Mathematics: 9, 10.
- D. 1 course in Chemistry: 3 or 5.
- E. 4 courses from mathematics and supporting sciences, including upper level Biology and Geological Sciences courses. The selection of these courses must have the approval of the departmental concentration advisor.
- F. 1 Independent Study course, Geological Sciences 191 or 192.

A reading knowledge of Russian, German or French is recommended.

20. GEOLOGY-CHEMISTRY

Standard program for the A.B. degree

This program provides more specific emphasis upon chemical processes and phenomena on and within the earth. Recommended for students who wish an application of physical-chemical principles toward an understanding of earth history and earth processes. Fourteen semester courses are required from geology, chemistry, physics, and mathematics. Students planning further work in this area should consult the departmental advisor. Required courses: Geological Sciences 2, 3, 24, 41, 45, 102; Mathematics 9, 10; Physics

5, 6 (or equivalent); Chemistry 3 or 5, 114, plus two of the following: Chemistry 11, 15, 106, 115.

Standard program for the Sc.B degree

This program is recommended for those intending graduate work or a career in this field. Program consists of 20 courses.

- A. 7 courses in Geological Sciences: 2, 3, 24, 41, 45, 102, 109
- B. 4 courses in Chemistry: 3 or 5, 15, 114, 115
- C. 2 courses in Mathematics: 9, 10
- D. 2 courses in Physics: 5, 6, (or equivalent)
- E. 4 courses from mathematics and supporting sciences and upper level Chemistry and Geological Sciences courses. These courses must have the approval of the departmental concentration advisor.
- F. 1 Independent Study course, Geological Sciences 191 or 192.

A reading knowledge of Russian, German, or French is recommended.

21. GEOLOGY-PHYSICS/MATHEMATICS

Standard program for the A.B. degree

This program provides more specific emphasis upon physical processes and phenomena on and within the earth. Recommended for students who wish an application of physical and mathematical principles toward an understanding of the earth. Fourteen semester courses required from geology, physics, and mathematics. Students planning further work in this area should consult the departmental advisor. Required courses: Geological Sciences 2, 3, 45, 63, and 41 or 161 or 109; Physics 5, 6 or 7, 8 and 47, 50 or Engineering 52, 137; four math courses including either Mathematics 29, 52 or Applied Mathematics 33, 34; Chemistry 3 or 5.

Standard program for the Sc.B. degree

This program is recommended for those intending graduate work or a career in this field. Program consists of 20 courses.

- A. 7 courses in Geological Sciences, either option (1) or (2).
Option (1): 2, 3, 45, 63, 161, 162, plus one from 41, 109, 116.
Option (2): 2, 3, 41, 45, 63, 109, plus one from 116, 161, 162.
- B. 4 courses in Physics: 5, 6 or 7, 8 and 47, 50 or Engineering 52, 137.
- C. 4 courses in Mathematics, including Applied Mathematics 33, 34.
- D. 1 course in Chemistry: 3 or 5.
- E. 3 additional math and science courses having the approval of the departmental concentration advisor.
- F. 1 Independent Study course, Geological Sciences 191 or 192.

A reading knowledge of Russian, German or French is recommended.

22. HEALTH AND SOCIETY

Health and Society is an interdisciplinary concentration program that examines health policy, health care, and the social structure through which health services are delivered and received. The program will enable the student to pursue a systematic course of study that will focus on health-related behavior and the organization of health care from a variety of scholarly and professional perspectives. The range of courses will demonstrate the

relevance of the social and behavioral sciences in examination of the health care system. The program will also present the basic methodological tools necessary for problem solving in the areas of health care research and planning.

Prerequisites: Biology 6 or more advanced course, one introductory course in either sociology or anthropology, and one statistics course, either Sociology 110, Psychology 9, or the equivalent.

Required Courses: Biomed/Community Health 31, 132 and 191; Biomed 195, Sociology 154 and 155, and four additional elective courses. Electives are to be selected from courses relevant to one of the following areas of interest: Evaluation and Methods, Health Care Organization and Policy, Culture and Health, International Health, Health and The Life Cycle.

Concentration Advisor: Lois A. Monteiro.

23. HISTORY AND CHINESE LANGUAGE

A joint concentration in History and Chinese Language. This program includes eight courses in History (only two of which—e.g., 41, 42—may be at the introductory level) and six courses in Chinese (e.g. Chinese 1, 2, 3, 4, 5, 6, or Chinese 1, 2, 5, 6, 7, 8) or their equivalents. It is expected that the majority of the history courses will be related to East Asia. Programs for individual students must be planned in consultation with and be approved by concentration advisors who are historians in the East Asia Language and Area Center.

24. HUMAN BIOLOGY

An interdepartmental program offered by the Division of Biology and Medicine together with the Departments of Psychology, Sociology, and Anthropology. The uniting theme of this program is the study of the evolution of man and of those environmental forces (including social, biological, and physical factors) which affect man's evolutionary development. Students may elect Program A which interrelates areas of biology and psychology, Program B which interrelates areas of biology with sociology and anthropology, or alternate approved student constructed course patterns.

Background Courses: Psychology 1 (Elementary Psychology); Anthropology 50 (Interpreting Our Past: Introduction to Archeology and Prehistory) or an approved substitute; Mathematics 9 (Calculus); Chemistry 3 (Equilibrium, Rate and Structure) and 11 (Organic Chemistry).

Program A (Biology/Psychology): Five courses in the Biomedical Sciences, including one in morphology (Biomed 32, 81, or 185), one in genetics of higher organisms (Biomed 46 or 47), at least one approved 100-level course, and Biomed 190 (Human Biology Seminar) which is usually taken in Semester VIII; Biomed 11, 12 (Current Concepts in Biology) are strongly recommended but are not required for concentration; Psychology 9 (Quantitative Methods) or an approved substitute; one elective course in Psychology approved by the concentration advisor; at least two of the following Psychology courses, at least one of which must have a laboratory: 74 (Physiological Psychology), 103 (Techniques in Physiological Psychology), 119 (Sensory Psychology), 120 (Learning), 152 (Human Information Processing and Cognition), 153 (Laboratory in Cognitive Processes); plus one additional elective selected from approved Biomed or Psychology courses.

Program B (Biology/Sociology/Anthropology): Five courses in the Biomedical Sciences including Biomed 32, 81 or 185, 46 or 47, 190, and at least one approved 100-level course; Biomed 11, 12 (Current Concepts in Biology) are strongly recommended but are not required for concentration; Sociology 110 (Introductory Statistics for Social Research)

or Psychology 9; three electives in Sociology or Anthropology which often include the recommendation of Sociology 120 (Population Growth and the Environment) and Anthropology 2 (Cultural Anthropology); plus one additional elective selected from approved courses in Biomedical Sciences, Sociology, or Anthropology. Only one Sociology course from among those numbered 1-21 may count for Concentration credit.

Student Constructed Course Pattern: Students are permitted to construct their own programs in the concentration but must submit a written statement of their programs and the courses they wish to take for the advice and approval of the Human Biology Concentration Advisor no later than the beginning of the second semester of their junior year. Normally, student constructed programs should interrelate either Biology and Psychology or Biology and Sociology/Anthropology. The program must be a carefully integrated and coherent set of related courses which provide the opportunity for study in depth of a significant area or aspect of Human Biology. In addition to the specified background courses for concentration in Human Biology, the student constructed program should consist of at least nine courses plus the senior seminar (Biomed 190).

NOTE: Changes presently under consideration for the standard Biomed concentration will probably lead to alteration of the program above. Consult the concentration advisor for details.

25. INTERNATIONAL RELATIONS

This interdepartmental concentration introduces the student to perspectives and methods from History, Economics and Political Science which contribute to understanding of international relations. It also provides the student with opportunity to give emphasis to a particular approach, issue, or area.

Prerequisites: History 1, 2, or 41, 42; Economics 111; Political Science 1 or 50. Knowledge of a foreign language is also required, to be attained concurrently with the concentration program if not previously achieved (through the 4 level as a minimum; 19 and 51 strongly recommended).

Program: at least one Economics course from among 151, 152, 154, 155; History 123, 124 or 159, 160; Political Science 40 or 141; Political Science 142 (to be taken in the Senior year); at least three additional courses to be chosen in consultation with one of the concentration advisors. Courses in Anthropology or Sociology may be included.

26. LATIN AMERICAN STUDIES

The purpose of this concentration is to allow a student to pursue an interdisciplinary study of the cultures, history, and present-day problems of Latin America. Through this broad interdisciplinary approach, the student will obtain some knowledge of the various factors which have interacted to produce the Latin American societies and cultures of today and perhaps understand the directions they will take in the future.

Prerequisite: Language proficiency in Spanish and Hispanic Studies 19 or 51.

Program: Hispanic Studies 13 or 137; also one of the following senior courses in directed reading and research leading to the completion of a senior project: Anthropology 193 or 194; Economics 199; Hispanic Studies 198; History 197H or 197I; Political Science 142, 191/2, 193/4; Sociology 190 or 191; plus five additional courses to be chosen from among the following: Afro-American Studies 121, 122; Anthropology 112, 142, 152, 242 (with permission); Economics 151, 152; History 121, 122, 127, 153; Hispanic Studies 133, 137, 150 (if suitable topic); Political Science 121, 125, 145, 182K; Portuguese 11, 12, 19, 150, 160L; Sociology 15 or 60. At the end of the second semester of the sophomore year, the interested student should consult with the concentration advisor

and/or the Chair of Latin American Studies. Two advisors, chosen from the above participating departments, will assist the student in selecting an individual program from the above courses and choosing a complementary program of background courses from the various departments. At that time the student may also make arrangements, subject to the approval of the Committee on Academic Standing, to spend part of his or her junior year abroad in a Latin American institution. Research in the Latin American community in Rhode Island is also encouraged as part of the student's first-hand experience with the people and culture of Latin America.

27. LAW AND SOCIETY

The honors concentration in Law and Society, sponsored by the Center for Law and Liberal Education, permits students to subject legal phenomena to the questions and modes of analysis which are appropriate to a liberal university.

The following courses must be completed not later than the end of the 6th semester: Economics 111; History 51 and 52, or History 109, or History 152; Philosophy 158, or Philosophy 160 or Philosophy 165; Political Science 116; Political Science 117; Sociology 142. Law and Society 185 is taken during the junior year. A senior tutorial (Law and Society 191) and either a senior thesis (Law and Society 193, 194) or a senior project (Law and Society 192) are required. Each concentrator will design a cognate field of at least three courses at the 100 level or above, in one or more departments, to be completed by the end of the 8th semester.

Enrollment in this Concentration is limited to 15 members of the junior class.

28. LITERATURES

Program may be arranged, in consultation with the advisors of the departments concerned combining any two of the following literatures: Chinese, French, German, Greek, Latin, Italian, Portuguese, Russian, Spanish. Prerequisite: same as for concentration in the two literatures concerned. Normal Program: not less than ten courses, reasonably balanced in distribution between the two literatures and centering on some common focus, such as a genre, period, or general topic. When a modern foreign language is involved, such courses in writing and speaking will be included as are needed to assure adequate competence in its use. Students who wish to combine English with one or two foreign literatures are advised to consider patterns I and II in the Department of Comparative Literature.

29. LITERATURE AND SOCIETY

This interdisciplinary program focuses on the relationship of texts—whether prose, poetry, fiction or polemic—to their social, political and intellectual contexts. The program explores the ways in which social history can enhance critical approaches to the works of some of the leading writers of Western, Central and Eastern Europe from the mid-seventeenth century to the present. This program complements the Renaissance Studies program and draws on faculty members from some six departments in the Humanities and Social Sciences.

Prerequisites: History 1 or 2 (or equivalent) recommended and a college level literature course emphasizing critical analysis. The concentration consists of 10 courses, 2 of which must be Literature and Society 149 and 150. Of the remaining 8 courses, 4 will normally be historical and 3 in relevant literatures, or vice versa, depending on the student's preferences. The last requirement is a senior-level research course culminating in an honors thesis written under faculty supervision. Concentrators will also be invited to take part in faculty-led colloquia on the methodological and interpretative aspects of Literature and Society.

Students concentrating in one particular culture or era will be expected to attain a comparative perspective by studying a different culture or era. Individual concentrations will be designed in consultation with faculty advisors, and a faculty advisory committee will review and approve all concentration proposals.

All concentrators should have reading proficiency in one foreign language as determined by the Executive Committee, and they should be fluent in that language if working in a non-English culture. Interested students should discuss the concentration with either Professors Henkle (English), Curtis (History), or Smith (German).

30. MATHEMATICAL ECONOMICS

Designed to give a background in economic theory plus the mathematical tools needed to analyze and develop additional theoretical constructions. Emphasis is on the abstract theory itself.

Program: Economics 111 or 113, 121, 122, 162, 186 and one other 100-level economics course. Mathematics: Calculus with differential equations (i.e. through Mathematics 29 or its equivalent); linear algebra (Mathematics 52 or 54); and probability and statistics (Mathematics 161, 162 or, under exceptional circumstances and with approval of concentration advisor, Applied Mathematics 165 plus a 100-level mathematics course such as Mathematics 111).

31. MATHEMATICS AND PHYSICS

Prerequisites: Mathematics 9, 10 or 17; Physics 3 or 5 or 11.

The required mathematics courses are Mathematics 18 or 29 or 35 and 52 or 54; or 25 and 26; 111; and at least one of the following: 106, 112, 161. The required physics sequence consists of Physics 4 or 6 or 12; 47; 50; 56; and at least two of the following: 141, 142, 151, 152.

Concentrators are required to take at least one upper level course in Mathematics and one in Physics in each of their last two semesters.

32. MEDIEVAL STUDIES

The Committee on Medieval Studies sponsors a concentration aimed at understanding the civilizations which gave rise to the modern world. The concentration combines interdisciplinary perspectives with depth of study in one or two disciplines. There are no strict chronological limits, since the Middle Ages are perceived as beginning and ending at different times in different cultures, but the millenium from 500 to 1500 is a useful general framework. While medieval studies have traditionally focused on Western Europe, students are also encouraged to do work in other areas, for example, Byzantine, Islamic, Judaic, or Slavic cultures.

Requirements: ten courses approved by the Committee on Medieval Studies, including two courses in medieval history and one 100 or 200 level course in which primary texts in a medieval language other than English are used. Interested students should discuss their plans with a member of the Committee. A concentration proposal should be prepared in consultation with the faculty advisor and submitted to the Committee for approval.

Honors requirements are the same as those for the regular concentration with the addition of one course credit of Independent Study for preparation of the Honors thesis in the department of the thesis advisor.

Prospective concentrators are encouraged to take the introductory course, Medieval Perspectives, during their freshman or sophomore year.

The Committee on Medieval Studies includes the following members: Professors Bossy (French Studies), Crossgrove (German), Elliott (Classics), Gillerman (Art), Kirk (English), Lenz (Philosophy), Levitsky (Slavic Languages), Lyon (History), Mathiesen (Slavic Languages), McIlwain (Biology and Medicine), Oldcorn (Italian), Pingree (History of Mathematics), Russom (English), Schaffer (Spanish), Terras (Slavic Languages), Warnock (German, Chairman), Wilmeth (Theatre Arts).

33. NEURAL SCIENCES

This is an interdisciplinary concentration sponsored by the Center for Neural Sciences in conjunction with faculty from several departments. The concentration provides a firm foundation in the sciences important to an understanding of brain function and the mechanisms underlying the control of behavior. The concentration minimizes formal requirements in order to enhance flexibility in the design of individual programs.

The core program includes Neural Science 1, 2 (Biomed 91, 92) and 100 (Biomed 161), Biomed 11, Mathematics 9, 10, Physics 3, 4, one course in computer science or equivalent courses. At least three additional courses will be recommended in areas closely related to the Neural Sciences to develop more depth in one of the many areas represented by the Neural Science faculty. For further information, consult Dr. James Anderson, Advisor.

34. OPERATIONS RESEARCH-ECONOMICS

Designed to cover the decision-making tools of operations research plus the economic problems and analysis that form much of the motivations for the tools and a major area for applications. *Prerequisites:* Mathematics 9, 10. *Courses:* Applied Mathematics 33, 34, 165, 120, 121; Engineering 131; Economics 111 or 113, 121, 163, 186, and a 100-level Economics elective.

35. ORGANIZATIONAL BEHAVIOR

Complex, formal organizations are a dominant feature of modern society in both private and public sectors. This concentration brings together the perspectives of the various social sciences (economics, history, political science, psychology, and sociology), those of engineering and applied mathematics and computer science. Such questions are considered as the effect of organizations on the behavior of their members, the development of organizations to accomplish goals, and the management of business, government agencies, or service organizations. Economics 111, Engineering 9, Sociology 150 and a course in History or Political Science, chosen from the list below are required courses. In addition, six more courses will be chosen, with the approval of the concentration advisor, from the following: American Civilization 190Q; Applied Mathematics 120, 165, 166; Computer Science 4, 11, 12; Economics 71, 132, 145, 146, 147, 148, 161, 165; Engineering 90, 94A, 131; History 197P; Political Science 10, 14, 45, 111, 113, 115, 120, 182G; Psychology 21; Sociology 110, 116, 142, 154, 158, 159; Theatre Arts 22. An 11th course will be included which is an independent research project usually completed during the senior year and normally done with two faculty members from different departments.

For further information on this concentration, see any of the following faculty: Barrett Hazeltine (Engineering), Robert M. Marsh (Sociology), Peter B. Evans (Sociology), Martin Beckman (Economics), Harl Ryder (Economics), Elmer Cornwell (Political Science), Naomi Lamoreaux (History).

36. RENAISSANCE STUDIES

The concentration in Renaissance Studies is designed to encourage a comprehensive view of a period for which the interdisciplinary approach is especially fruitful. Students will be invited to explore several aspects of the period and several disciplinary approaches to it—e.g. history, literature, thought, art, music. The aim is to enhance the student's understanding of the period itself, and also of the uses, limitations, and interrelationships of the methods of particular disciplines. Sponsoring departments are: Art, Music, History, English, French Studies, Hispanic and Italian Studies, Comparative Literature, German, Classics, History of Mathematics.

Requirements

1. History 107 (Renaissance Italy) and History 108 (Europe in the Age of Charles V).
2. Three courses on Renaissance topics in one field in which the student has primary interest and training. (The Renaissance concentration can easily be combined with standard departmental concentrations).
3. Three courses related to the Renaissance chosen from two other fields.
4. A project seminar in the final semester, designed to enable students to gain perspective on their concentration programs through the preparation and presentation of an original paper or project. During the first part of the semester, the student will work closely with one or more members of the cooperating faculty in the definition and preparation of his or her paper. During the final weeks, students will present their papers to the seminar for discussion and criticism, thus contributing to and benefiting from the experience and perspectives of other students and faculty. Credit for the work will be granted through the medium of registration by the concentrator for one course credit of Independent Study (Reading and Research) in the Department in which the topic of research lies.
5. Reading knowledge of a relevant modern or ancient language other than English.

The program is directed by the following committee: Professors Benedict (History), L. Durand (French Studies), Josephson (Music), Molho (History), Newman (Comparative Literature), Oldcorn (Italian Studies), Pingree (History of Mathematics), Putnam (Classics), Sabol (English), Schulz (Art History), and Woods (English). Interested students may discuss the program with any member of the committee.

37. RUSSIAN STUDIES

Prerequisites: A reading knowledge of Russian to be demonstrated by satisfactory completion of Russian 4 or 4I, or by equivalent examination.

Requirements: Russian 19, 29, 30, two 100-level courses in the social sciences (normally History 137, 138), and an appropriate course in Political Science, plus two 100-level courses in Russian or Slavic literatures or languages.

With the approval of the Department, and in consultation with the concentration advisor, one course from the other offerings of the Department, or where appropriate, from other departments, may be substituted for one of the two 100-level courses in Russian or Slavic literatures or languages.

Honors requirements are the same as those for a standard concentration in Russian Studies, plus Russian 198 or Slavic 198 for the preparation of an honors thesis.

38. URBAN STUDIES

The Urban Studies Program attempts to focus on urban phenomena through the approaches of different disciplines, thus providing an interdisciplinary context in which to understand various dimensions of the urbanization process. While the program attempts

to provide sufficient flexibility to allow students to pursue specific interests without being overly bound by requirements, it is nonetheless designed so that there will be a core content to the program of study. The primary aim of the program is to provide a broad liberal arts education. Its purpose is to satisfy the needs of those students who are interested in urban problems, but who do not feel well served by the existing departmental programs in a single discipline.

The program requires ten courses for a concentration. Urban studies 21 or 22 (Political Science 22) is required.

The remaining courses are selected from three other course groups:

1. *Research Skills* (one course): either Sociology 102 or an approved statistics course, e.g., Applied Mathematics 165, Mathematics 162, Political Science 60, or Sociology 110.
2. *Core Curriculum*:
 - A) The disciplines (one course from each of the three disciplines) selected from among Art 56 and Art 59; Economics 141; History 175 and History 176; Political Science 22 and Political Science 118; Sociology 130, 133, 154 and 164.
 - B) Urban Studies Core Courses (two courses) selected from among Urban Studies 23, 101, 102, 116, 132, 135, and 142.
 - C) An Urban Studies Seminar, Urban Studies 18X.
3. *Complementary Curriculum* (two courses): selected from among American Civilization 152, Art 47, Classics 54, Economics 148, Engineering 90, Engineering 194D, Political Science 147, University 111, and University 163. In addition, any course listed in the above two groups, including any research seminar in an urban studies-related discipline (art, economics, history, political science, sociology, e.g., History 197C or Art 159) not used to satisfy any of the above group requirements may be used to fulfill this requirement.

Honors. Candidates for honors concentration should apply by midterm of the second semester, junior year. Twelve courses are required of an honors concentrator, including one thesis preparation course in the senior year and the second *research skills* course. To receive an honors degree, the candidate's thesis and course record must be of outstanding quality.

Concentration Advisors: Professors Zimmer, Feldman, Henderson, Meyer and Silver.

Tuition Requirements

Prior to the awarding of a baccalaureate degree, each candidate must have accumulated credit for the payment of eight semesters of tuition or the equivalent. The eight-semester tuition requirement is separate from and in addition to any other degree requirements. See Student Charges page 147 for details concerning required tuition payments.

Requirements for Combined Degree Programs

COMBINED FIVE-YEAR PROGRAM LEADING TO A BACHELOR OF ARTS DEGREE AND A BACHELOR OF SCIENCE DEGREE

Students who wish to earn both a Bachelor of Arts degree and a Bachelor of Science degree may do so in a five-year program in which the work for both degrees proceeds concurrently. Programs of students who elect this five-year plan will usually be arranged so that those who wish may change to either degree candidacy alone prior to the fourth year.

The specific requirements for this degree program are as follows:

1. Satisfactory completion of:
 - (a) The Sc.B. requirement for a standard concentration program in life sciences or physical science and mathematics, or an approved independent Sc.B. program spanning one or more of these areas.
 - (b) The A.B. requirement for a standard or independent concentration in the humanities or social studies.
2. A minimum of 36 courses passed. Transfer credits to conform to general University regulations governing other undergraduate programs.
3. At least three years in residence.
4. Declaration of intent either by indicating degree candidacy on admission, or by change of degree status no later than the fifth semester.

Tuition Requirement

Prior to the awarding of these combined degrees, each candidate must have accumulated credit for the payment of ten semesters of tuition or the equivalent. The ten-semester tuition requirement is separate from and in addition to any other degree requirements. See Student Charges, page 147, for details concerning required tuition payments.

COMBINED PROGRAM LEADING TO A BACCALAUREATE DEGREE AND A MASTERS DEGREE

Subject to the prior approval of the department involved, and the Graduate Council, and the Committee on Academic Standing, exceptionally capable students may be permitted, in their junior year, to enter a graduate program of study leading to the earning of both a baccalaureate and master's degree at the end of eight or nine semesters. Students who are granted this permission will be expected to complete the specific requirements for both degrees, although some courses may be used for credit toward both degrees. The candidate will complete a *minimum* of thirty-two courses within eight or nine semesters. Normally, no more than two courses counted toward the undergraduate concentration may be used to fulfill the requirements of the graduate degree. The program will include at least two 200-level courses, not including any 200-level courses counted for the independent project or thesis.

In cases where the requirements for an advanced degree are partially completed by students in meeting the requirements for a baccalaureate degree, graduate credit for such work may be allowed under the following conditions: (1) formal admission to the Graduate School, be applied for and granted, (2) the Graduate Council shall, in consultation with the department involved, determine the remaining requirements to be satisfied for the advanced degree.

The Committee on Academic Standing has adopted certain guidelines which it will follow in considering for approval requests for admission to this combined degree program. Interested students should obtain a copy of these guidelines at the Office of the Registrar prior to filing an application.

INTEGRATED FIVE-YEAR BACCALAUREATE MASTER'S DEGREE PROGRAM

Departments may submit to the Graduate Council for its approval proposals to establish integrated programs leading to the successive awards of the Bachelor's degree and the Master's degree. Such programs shall, as the name suggests, articulate the work of the undergraduate years with that of the graduate. In these programs, all the academic requirements for each degree must be separately met.

A student to whom no Integrated Program is available may draw up plans for such a Program and submit them to the Graduate Council through the Graduate Representative of the Department in which the student proposes to do advanced study.

A student must make application to study in an Integrated Program not later than the end of the third week of his or her penultimate semester of undergraduate study. Admission to the Graduate School for the fifth year will ordinarily be a matter of course; however, such admission must be applied for at the proper time and decided on in the regular way.

As many as two graduate-level courses taken by a student during undergraduate study at this University in an Integrated Bachelor-Master's Degree Program may be offered in partial fulfillment of the requirements for the Master's degree if not already used to meet specific requirements for the Bachelor's degree. However, the equivalent of at least six semester courses must be taken in-residence as a graduate student at Brown University.

THE MEDICAL EDUCATION PROGRAM LEADING TO THE DOCTOR OF MEDICINE DEGREE

Freshmen who have been accepted into the Medical Education Program (MEP) follow a continuum of courses which leads to an A.B. or Sc.B. degree in any field at the end of four years, and an M.D. degree 3 or 4 years later. In the seven-year continuum, the senior undergraduate year is also the first year of the Program in Medicine (PIM), but MEP students may elect to complete their baccalaureate degree first and enter the PIM in their fifth year at Brown (the eight-year continuum). On his or her own initiative, a student may elect to take an additional year of undergraduate studies to enhance a liberal arts background, to complete a research project (on a subject related to biology or medicine, but not necessarily within the Division of Biology and Medicine) toward the Master of Medical Science degree (see page 128). or to enroll, at the end of four years, in a joint M.D.-Ph.D. program.

Following completion of the first five (or seven) semesters, the MEP student may apply for promotion into the Program in Medicine, which is Brown's accredited medical school. Promotion is based on scholastic ability, personal characteristics, and motivation as determined by academic performance, MCAT scores, and interviews. The MCAT is typically taken after two years of college courses (including physics, organic chemistry and biology).

Years 1 through 3 (or 4)

Before entering the second half of the Medical Education Program, undergraduates in the MEP are expected to have accumulated 24 tuition credits (and at least 22 course credits) in either of the following options, depending on which baccalaureate degree they choose to obtain at the end of their fourth year. In the 7-year continuum, with either option A or B, the senior year is the first year of the Program in Medicine (see below), and courses numbered in the 100 series (but not 300-level ones) may count towards the baccalaureate degree requirements. Minimum requirements for the two options are:

A. THE MEDICINE/SCIENCE OPTION

Mathematic 9, 10 or equivalent (2 courses in calculus)

Physics 3, 4 or equivalent

Chemistry 3, 11, 12 or equivalent

BioMed: 4 courses, including biochemistry (BioMed 126 or equivalent), approved by concentration advisor

Social/Behavioral Sciences: (2 courses in departments of Anthropology, Psychology or Sociology)

Concentration in Biological Science, Chemistry, Engineering, Mathematics or Physics.

B. THE MEDICINE/HUMANITIES-OR-SOCIAL SCIENCE OPTION

Mathematics 9, 10 or equivalent

Physics 3, 4 or equivalent

Chemistry 3, 11, 12 or equivalent

BioMed: 3 courses, including biochemistry (BioMed 126 or equivalent), approved by concentration advisor

Social/Behavioral Sciences: 1 course

Concentration in Humanities or Social Science, or Independent Concentration in these areas.

MEP students, upon admission to the Program in Medicine, will be registered with the Association of American Medical Colleges as first year medical students. They will number 30, typically, in a class of 60 men and women. The remaining places are filled by a Medical Admissions Committee which reviews the applications of students seeking admission through the conventional portal of entry to medical school. Such applicants may apply from any school (including Brown) and from any geographic site. Students enrolled in the Program in Medicine are required to successfully complete Part I of the National Board of Medical Examiners at the end of their second year of medical education, and Part II of that examination prior to graduation.

Program in Medicine

YEAR I:

1. Human Morphology (Biomed 181)
2. Medical Histology (Biomed 180/380)
3. Physiological Control Systems (Biomed 117)
4. Biochemical Pharmacology (Biomed 128)
5. Medical Microbiology (Biomed 158)
6. General Pathology (Biomed 184)
7. Medical Biochemistry (Biomed 130)
8. Social and Behavioral Science (Biomed 390)

YEAR II: (Note: At the time of publication major revisions in Year II were being contemplated. Interested readers should contact the Division of Biology and Medicine for further information).

1. Neurosciences (Biomed 361, 362)
2. Integrated Medical Science (Biomed 363-382)
 - 363: Clinical Pharmacology and Therapeutics
 - 364: Nutrition
 - 369: Clinical Psychiatry
 - 370: Introduction to Clinical Medicine
 - 371: Cardiology
 - 372: Endocrinology
 - 373: Nephrology
 - 374: Human Reproduction, Growth & Development
 - 375: Respiratory
 - 376: Gastroenterology
 - 377: Hematology
 - 378: Infectious Diseases, Parasitology and Supporting Structures
3. Electives

YEARS III, IV

1. Clerkship in Medicine (Biomed 301, 12 weeks)
2. Clerkship in Surgery (Biomed 316, 12 weeks)
3. Clerkship in Human Growth and Development (Biomed 331, 12 weeks)
4. Clerkship in Psychiatry (Biomed 346, 6 weeks)
5. Clerkship in Community Health (Biomed 381, 6 weeks)
6. Elective time (about 6 months)
7. Clerkship in a clinical field selected by the student (8 weeks)

MASTER OF MEDICAL SCIENCE

This program is oriented toward medical students who wish to obtain experience in medical research problems through the preparation of a research thesis. Students already admitted to the first year of the Program in Medicine may apply for admission to the Graduate School after completion of the first year as registered medical students. Required courses: the six basic science courses normally required in the first year of the Program in Medicine (currently Biomed 117, 128, 130, 158, 180, 181 double credit and 184), at least one thesis-research course, and one 200-level course in a field relevant to the area of thesis research. It is strongly recommended that courses be planned early. Interested students should prepare a written description of the proposed thesis work approved by a faculty sponsor as part of the application to a Graduate Program within the Division (if applicable) and to the Graduate School.

M.D.-PH.D. PROGRAM

The combined M.D.-Ph.D. program is intended to prepare professionals interested in combining a background in Medicine with graduate training in an area of investigation related to Medicine. Entry is limited to students formally admitted to the Program in Medicine and to a Ph.D. program of the University.

Students are generally expected to apply simultaneously to the Program in Medicine and to the graduate program of their choice and admission to the M.D.-Ph.D. program is contingent upon admission to both. Students already enrolled in the Program in Medicine may also apply for admission to the M.D.-Ph.D. program during either the first or the second year of their medical studies.

The Ph.D. component of the M.D.-Ph.D. program generally takes place after either the first or second year of the Program in Medicine, and must be completed prior to beginning the clinical clerkships. Special attention is given in the clinical training component of the M.D. program to the needs of, and opportunities for, students enrolled in the joint M.D.-Ph.D. program.

Students in the M.D.-Ph.D. program are given graduate credit for the equivalent of eight courses (one year of full-time study) for satisfactory completion of the first two years (basic medical sciences) of the Program in Medicine at Brown University.

Students in the M.D.-Ph.D. program are expected to complete all the requirements of the Ph.D. program in which they enroll.

While engaged in graduate study, students in the M.D.-Ph.D. program are eligible for financial aid as teaching or research assistants.

The MCAT (Medical College Admission Test) scores may be substituted for GRE (Graduate Record Examination) scores in the review of admission credentials of candidates for the M.D.-Ph.D. program.

Full-time Enrollment

Each full-time undergraduate degree candidate is required to take from three to five courses each semester. Four courses per semester is considered the normal course load.

Permission of the Dean is required to take fewer than three courses in any semester. Students who at the beginning of their senior year lack less than six semester courses of completing their course requirement may obtain permission to distribute their work over the last two semesters.

Degrees with Distinction

Baccalaureate degrees may be awarded *magna cum laude* to the upper 20% (approximately) of the graduating class. The Registrar will provide an opportunity for students to indicate that they do not wish to be considered for a degree with distinction, and will convey this information to the Committee on Academic Standing. The Committee on Academic Standing will draw up a list of those graduating seniors who are eligible to receive the bachelor's degree *magna cum laude*, taking into account for this purpose the student's cumulative academic record, faculty recommendations and any other information pertaining to a student's scholastic record that it deems relevant and useful.

Guidelines for Study Elsewhere

Study at other U.S. Institutions

Students who wish to study at other U.S. institutions for transfer credit toward their Brown degree may do so with *prior* approval of the appropriate departments and the Committee on Academic Standing. The CAS delegates to a specific Dean of the College the authority to approve petitions for such programs.

Students planning study elsewhere in this country should obtain an instruction sheet and a preliminary transfer credit approval form from the Dean responsible for off-campus study. The student should then work out a program and present it to his or her concentration advisor and other appropriate faculty members for approval. When the preliminary transfer credit form is returned to the Dean, that Dean will approve it on a tentative basis for the CAS or advise the student to petition the CAS, in which case instructions for that petition will be made available.

Students returning from study elsewhere may receive up to eight course credits for work undertaken during one academic year, but normally no more than four concentration credits may be awarded. Credit cannot be granted until the student has successfully completed the work and has had an official transcript sent to the Registrar.

Validation of credit will be carried out on a course-by-course basis. If the nature and the quality of a student's work in a specific course cannot be sufficiently determined on the basis of the available documentation, the department may give the student an oral or written validating examination. Validation should be completed as soon as possible after the student's return to Brown, normally no later than mid-semester.

Students who take a semester or year for off-campus study are granted a Leave of Absence and are asked to write the Dean responsible for off-campus studies about returning to Brown. Such notification should be received no later than December 15 for return for the spring semester and no later than June 15 for return for the fall semester.

In exceptional cases, credit may be awarded for summer study elsewhere, particularly for language study. Students considering specific programs should confer with the appropriate Dean.

Foreign Study

The Office of Foreign Study at Brown University will coordinate all foreign study undertaken by Brown students either on Brown sponsored programs or on Brown approved programs. At present Brown sponsors programs in the Peoples Republic of China, France, Federal Republic of Germany, German Democratic Republic, Italy, Japan, and the United Kingdom with programs pending in Tanzania and Brazil. Additional Brown sponsored programs are being developed. The Foreign Study Office is directed by Professor Duncan Smith, Associate Dean for Foreign Study. Students interested in study abroad should check with this office as far in advance of any intended study as possible.

Information about foreign study opportunities is available at the foreign study office. Counselling about foreign study is done by departmental advisors and by the Foreign Study Office.

Students planning to study abroad must be in good academic standing. They must be able to demonstrate competency in a foreign language if one is involved in the foreign study opportunity. Prior approval of the Committee on Academic Standing is required for all students intending to study abroad for transfer credit toward their Brown degrees. In some instances prior approval of departments must also be secured.

Students planning to study abroad should obtain an instruction sheet and a preliminary transfer credit approval form from the Office of Foreign Study. The student should work out her or his program and present it to her or his concentration advisor and other appropriate university officers for approval. When the preliminary transfer credit form is returned to the Foreign Study Office it will be approved for CAS or the student will be advised to petition the CAS in which case instructions for that petition will be made available.

Students returning from study abroad may receive up to eight course credits for work undertaken during one academic year. Normally no more than four concentration credits will be allowed. Credit cannot be obtained until the student has successfully completed the work and obtained documentation of what has been accomplished.

For Brown sponsored programs transfer credit will be granted after consultation with the Office of Foreign Study. Transfer credit for Brown programs abroad can be granted when the appropriate documentation has been submitted and approved by the CAS. This documentation includes: (1) proof of enrollment, (2) course certificates, evaluations, letters of reference from individual instructors indicating nature and quality of the work done, and (3) any written work done for specific courses as well as syllabi and reading lists.

Official transcripts should be sent to the Registrar. Where evaluations and/or other documentation are to be used, these should be brought by the student to the Foreign Study Office. Students on Brown approved but not Brown sponsored programs may be asked to take such materials to faculty advisors for review and final approval.

For students on Brown approved but not Brown sponsored programs validation of credit may be carried out on a course by course basis. If the nature and quality of a student's work in a specific course cannot be sufficiently determined on the basis of the available documentation, the department in question may give the student an oral or written validating examination. Validation should be completed as soon as possible after the student returns to Brown, normally no later than mid-semester.

Students on Brown sponsored programs are considered to be students in residence. Those studying through Brown approved programs are registered on leave of absence and asked to write to the Foreign Study Office about returning to Brown. Such notification should be received no later than December 15 for return in the spring semester and no later than June 15 for return for the fall semester.

In exceptional cases credit may be awarded for summer study abroad particularly for language study. Student considering this option should consult with the Foreign Study Office.

The Graduate School

Graduate education is the responsibility of the University Faculty, which delegates certain of its powers to the Graduate Council and charges it to maintain the quality, coherence, and continuity of graduate study at Brown University. The duties of the Graduate Council are to set policy for the Graduate School, subject to the approval of the Faculty and the Board of Fellows, such policy to include the conditions for admission to the Graduate School and the procedures for the award of graduate fellowships and scholarships; to supervise degree requirements; to approve new courses and other modifications of existing degree programs, and to approve and recommend to the Faculty new degree programs; to review graduate programs periodically, but at least once every five years, in consultation with the departments; and to make annual report to the Faculty of its activities during the preceding year.

Admission

Brown University admits students of any race, color, sex, national or ethnic origin, to all the rights, privileges, programs and activities generally accorded or made available at the University. Further, Brown University does not discriminate on the basis of color, handicap, sex, national or ethnic origin, in the administration of its educational policies, admission policies, scholarship and loan programs, and athletic and other school administered programs. Applicants for admission must either already hold or else be in the process of completing the requirements for an appropriate baccalaureate degree. It is impossible to accept all applicants; and only those whose previous records, test scores, and recommendations give clear evidence of their ability to do advanced work of the highest quality, are admissible. The suitability of the applicant's training and interests to our programs is also influential in determining which applicants can be admitted and which can not.

Students who wish to complete essentially undergraduate preparation cannot be admitted to the Graduate School.

A student who wishes to enter the Graduate School should, in the fall preceding the academic year in which he or she intends to enroll, obtain an official application form from the Office of the Graduate School. All applications must be supported by official transcripts from each college or university attended, and a letter from the student stating plans for graduate study. Also required are three letters of recommendation sent directly to the Dean of the Graduate School from persons well acquainted with the applicant and qualified to comment on his or her potential for graduate study. At least two of these letters must be from professors at the institution at which the applicant is presently studying or, if the applicant is not at any school at the time of applying, at which the applicant most recently studied. For submission of test scores, etc., see under Graduate Record Examinations, below. Completed applications are due in the Office of the Dean by January 15. Applications received after this date will be considered insofar as possible, but no application for admission beginning in the Fall Semester can be considered after May 1. Applications for admission beginning in the Spring Semester must be filed by November 1. However, it is not always possible to admit additional students at mid-year in all departments. No student is allowed to register unless he or she has been notified of admission by the Dean's Office. Admission to the Graduate School does not imply acceptance as a candidate for a degree.

A fee of \$30.00 is charged for each application (\$35.00 for applicants not in the United States at the time of applying). This fee must be sent with the application form. No application will be processed until the fee is paid; it is not refundable. Checks and money orders must be made payable to *Brown University*.

All correspondence concerning admission should be addressed to the Dean of the Graduate School.

Graduate Record Examinations

The complete Graduate Record Examination, including both Aptitude and Advanced tests, is required of applicants in Biochemistry, Biology and Medical Science, Comparative Literature, Computer Science (the Advanced test may be taken in Computer Science, Engineering, or Mathematics), English, French Studies, Hispanic and Italian Studies, Mathematics, Psychology.

The Graduate Record Examination (Aptitude) tests only are required of applicants in Applied Mathematics, Art History, Classics, Economics, Egyptology, German, Linguistics, Philosophy, Religious Studies, Sociology.

The Graduate Record Examination is strongly recommended for applicants in American Civilization, Biomedical Engineering, Education (MAT), Engineering, Geological Sciences, History, Physics, Slavic.

Information about the Graduate Record Examination may be obtained from the Educational Testing Service, Box 592, Princeton, N. J. 08540.

Foreign Students

Graduates of foreign colleges and universities who believe that they have completed the equivalent of at least an American bachelor's degree are invited to apply for admission and for financial assistance. Foreign applicants should enclose with the official application form original documents, or official certified copies, indicating the nature and scope of their educational program.

The importance of ability in the English language cannot be overemphasized. A student should not come to the United States to study unless he or she is competent in reading, writing, and speaking the English language; listening comprehension (for lectures) is most important.

A student whose native language is not English must submit a report of the Test of English as a Foreign Language (TOEFL) administered by the Educational Testing Service. Information about testing dates and an application form may be obtained by writing to TOEFL, Educational Testing Service, Princeton, New Jersey 08540. Since the test scores are an important part of the application, the report should reach the Graduate School by January 15. To meet this deadline, the applicant should take the test early the preceding fall.

It is suggested that foreign students who are not in the United States at the time of application make application, a year in advance of the time they wish to enter the Graduate School, through the scholarship committee of the Institute of International Education in their home country. The Institute acts as a clearing house for foreign students wishing to study in the United States and helps to place them at suitable universities. Students may obtain information about the local committee from the U. S. Embassy or the United States Information Service.

Students from the British Isles may apply through the English-Speaking Union. Foreign students wishing to specialize in Population Studies in the Department of Sociology are urged to apply for financial assistance to the Population Council, 245 Park Avenue, New York, New York 10017.

All foreign students who receive offers of fellowships or assistantships for study at Brown University should keep in mind that the stipend is sufficient only for the living costs of a single person. A married student who plans to bring his or her family to Providence will be required to show evidence of additional financial resources, specified in the annually revised brochure. A foreign student who is *not* successful in the competition for financial assistance will not be granted admission until he or she can prove ability financially to support himself or herself while here and pay travel expenses to the United States and back.

Classification of Students

Regular Students: All students who are admitted with full graduate standing. From this classification students are admitted to candidacy for advanced degrees.

Special Students: Students whose academic record shows promise of development or potential for graduate study but whose undergraduate training is deficient in some respect. Students in this category are admitted provisionally.

With the purpose of serving the community in which the University is situated, a limited number of qualified students who are not candidates for degrees are admitted to courses suited to their needs and are classified as special students. Whether regular or special, students may be classified as either full-time or part-time, so long as there is no legal or contractual barrier to the classification.

Financial Aid

Fellowships and Scholarships

BROWN UNIVERSITY makes provisions for fellowships and scholarships from both endowed and specially appropriated funds.

THE CHARLES EDWIN WILBOUR FELLOWSHIP IN GREEK. A fund established in 1948 by the will of Theodora Wilbour in memory of her father.

THE CHARLES EDWIN WILBOUR FELLOWSHIP IN LATIN. A fund established in 1948 by the will of Theodora Wilbour in memory of her father.

THE CHARLOTTE BEEBE WILBOUR FELLOWSHIP IN CLASSICAL ENGLISH. A fund established in 1948 by the will of Theodora Wilbour in memory of her mother.

THE CORINNA BORDEN KEEN RESEARCH FELLOWSHIP. A fund established in 1934 by the will of Dr. W. W. Keen, to be used for pre-doctoral and post-doctoral fellowships for original research in the sciences. Fellowships are open to men who are holders of Brown University degrees for work to be carried on in any part of the world.

THE EDGAR LEWIS MARSTON FELLOWSHIP. A fund given by Edgar L. Marston in 1920. Open only to graduates of the University of Texas nominated by the President and the Dean of the Graduate School.

THE EDGAR LEWIS MARSTON SCHOLARSHIP (BAYLOR UNIVERSITY). Two funds established by Edgar L. Marston in 1904. Open only to graduates of Baylor University.

THE EDGAR LEWIS MARSTON SCHOLARSHIP (HARDIN-SIMMONS UNIVERSITY). A fund established by Edgar L. Marston in 1902. Open only to graduates of Hardin-Simmons University.

THE EDWIN P. ANTHONY FELLOWSHIP. A fund established in 1931 by the will of Emily J. Anthony in honor of her brother, Edwin P. Anthony. Open only to graduate students in the Department of Chemistry, preference being given to women graduates from The College.

THE EMMA JOSEPHINE (AYER) ARNOLD ARCHAEOLOGICAL FELLOWSHIP. A fund given by Dr. Oliver Henry Arnold in memory of his wife. The Fellowship will be awarded, first, to a female member of the graduate class of Brown University, or, second, to a graduate of not more than ten years' standing for a one, two, or three year course in archaeology (classical or oriental) either in the United States or in a foreign country. In case there is no applicant of sufficient merit, the fellowship is to be awarded for one year to a male graduate of the University. If there are no applicants for use of this fellowship in archaeology, it is to be given for one year of graduate work in mathematics to a female graduate who intends to teach mathematics. Applications should be sent to the Dean of Academic Affairs.

THE GEOLOGICAL FELLOWSHIP. A fund given by Mr. and Mrs. D. Albert Peirce in 1920.

THE GRAND ARMY OF THE REPUBLIC FELLOWSHIP. A fund given by the Grand Army of the Republic, Department of Rhode Island, in 1891. Open only to a male graduate of Brown University of acknowledged excellence. Descendents of Union veterans of the Civil War are always to be preferred.

THE JESSE METCALF FELLOWSHIPS. A fund given by Jesse H. Metcalf in 1923 in memory of his father. Open only to graduate students in chemistry.

THE JOHN G. PETERSON SCHOLARSHIP. A fund given by John G. Peterson in 1945. Open only to a male graduate student in biology.

THE MISS ABBOTT'S SCHOOL ALUMNAE FELLOWSHIP. A fund given by the Miss Abbott's School Alumnae Fellowship of Pembroke College in Brown University, founded in 1930 by The Miss Abbott's School Alumnae Association.

The fellowship will, by preference, be awarded either to a woman graduate from The College or to a woman who has spent one or more years in the Graduate School of Brown University; but other American women are eligible. The holder must have had at least one full year of graduate work. In general, preference will be given to candidates who present plans for the investigation of problems on which they have already begun work. The fellowship may be used for study abroad, study at any American university, or independent research.

THE MORGAN EDWARDS FELLOWSHIP. A fund established by the Philadelphia alumni of Brown University in 1914. Open only to a holder of a Brown University degree of not more than ten years' standing, for the pursuit of original research in any department of knowledge in any part of the world.

THE OLIVER CROMWELL GORTON ARNOLD BIOLOGICAL FELLOWSHIP. A fund given by Dr. Henry Arnold in memory of his father. Open only to a graduate student in biology.

THE R. G. D. RICHARDSON FELLOWSHIP. A fund contributed by former students of the Graduate School of Brown University and by other friends of Dean Richardson. Open to any graduate student of exceptional merit.

THE ROGER WILLIAMS FELLOWSHIP. A fund established in 1906 by the National Society of Colonial Dames in the State of Rhode Island. Open to graduate students working in the field of Rhode Island Colonial History.

THE S. W. MARSTON SCHOLARSHIP. Given by Edgar L. Marston in 1900-02, in memory of his father. Open only to a graduate of William Jewell College.

THE ZOE WILBOUR FELLOWSHIP IN CLASSICAL FRENCH. A fund established in 1948 by the will of Theodora Wilbour in memory of her sister.

THE HELEN HUMPHREY WOOD HURLIN SCHOLARSHIP. A fund established by Dr. Ralph Hurlin in memory of Helen Wood Hurlin, to provide a Scholarship to a woman enrolled in The Graduate School and whose undergraduate work was done, preferably, at Brown University. First preference is given to a woman pursuing the program in medical science. Second preference is given to a woman pursuing work in the life sciences. Third preference is given to a woman pursuing work in the physical sciences.

THE WILLIAM MARLAR MEMORIAL GRADUATE FELLOWSHIP IN GEOLOGICAL SCIENCES. A Fellowship established by the William F. Marlar Memorial Foundation, Inc., a foundation created in 1964 by Mrs. Frieda M. Marlar to perpetuate the memory of William F. Marlar, her late husband.

THE JEAN STARR UNTERMAYER FELLOWSHIPS. A fund established by the late Jean Starr Untermeyer to be used for the advancement of poetry, either through Lectureships or Fellowships.

THE HARVEY A. BAKER FELLOWSHIPS. A fund given by Marion Brown Baker in memory of her husband. For a graduate of Brown University of high scholastic standing who has shown qualities of leadership. For graduate work in a University of the student's choice.

THE KENNETH RALPH AND PAMELA LENDLER GALNER FELLOWSHIP. A fund given by Mr. and Mrs. Louis J. Galner in memory of Kenneth and Pamela Galner. To be awarded, preferably, to a student in Linguistics.

THE FREDERICK POOLE GORHAM BIOLOGICAL FELLOWSHIP. A fund raised by the Gorham Memorial Committee in honor of Professor Gorham. For graduate students doing research in Biology.

THE GEORGE IRVING HOPKINS FELLOWSHIP. A fund given by Daisy Flanders Hopkins in memory of George Irving Hopkins. For a graduate of Brown University of acknowledged excellence of scholarship and character, registered for an advanced degree in Mathematics at Brown.

THE BURGESS FELLOWSHIP. A fund established by W. Randolph Burgess to support research in the area of international economic relations, preferably involving an overlap of the disciplines of Political Science and Economics.

THE MARY LOIS SEAGRAVE DOWNES FELLOWSHIP. A fund established in 1978 by the will of Mary L. S. Downes to assist a woman student or postgraduate or former student of The College in advanced studies.

THE JOHN LAX MEMORIAL FELLOWSHIP. A fund established in 1979 by Anneli and Peter Lax for the support of graduate study in History.

THE WILLIAM MICHAELIDES GRADUATE FELLOWSHIP IN GREEK STUDIES. A fund established in 1979 by Michael W. Mitchell, '59, and Mrs. Brooke Hunt Mitchell, Pembroke '59, in honor of Mr. Mitchell's father. Awarded annually to a graduate student of exceptional achievement and promise whose major field is Greek.

THE R. BRUCE LINDSAY FELLOWSHIP. A fund established in 1981 by an anonymous donor in honor of Robert Bruce Lindsay '20, Hazard Professor of Physics Emeritus. Fellowship is open to students in any discipline, but preference is given to residents of the United States, Canada, and Mexico.

UNIVERSITY FELLOWSHIPS AND SCHOLARSHIPS. Awarded to students in all fields who show great promise of ability in advanced studies.

GRANTS AND FELLOWSHIPS AWARDED BY FIRMS, FOUNDATIONS, AND GOVERNMENTS. For the academic year 1982-83.

African-American Institute
Algerian Government Fellowship
Argentine Government
Bell Laboratories
Beneficial Foundation
Canadian Council
Coordenacao do Aperfeicramento de Pessoal de Nivel Superior (CAPES)
Danforth Foundation
Exxon Education Foundation
General Electric Foundation
Ghana Scholarship
HEA, Title IX-B
HEW, Title VII Traineeship Grant
Hewlett Foundation
IBM
Institute of International Education
Iraqi Government
Ishizaka Foundation Scholarship
Japanese Government
Kress Foundation
Malaysian Government
Mellon Fellowship in the Humanities
National Science Foundation
NDEA Title VI
NIH
Population Council
Raytheon Company
Rockefeller Foundation
Rotary Foundation
Royal Tai Embassy
Sun-Yat Sen Fellowship
Union Oil Foundation Company of California
U.S. Air Force
U.S. Coast Guard
U.S. Navy
United States Information Agency
United States Public Health Service
Venezuela Government

Financial Support

Brown University recognizes merit and financial need as appropriate criteria for the awarding of financial aid to graduate students. Accordingly, all applicants, except foreign, for Fellowships, Teaching Fellowships, Teaching Assistantships, Assistantships, Scholarships, Proctorships, and loan assistance from the University are required to submit the GAPS FAS (Graduate and Professional School Financial Aid Service) application.

The financial support administered by the University takes, in most cases, one of the following forms: University Fellowships, Fellowships, Scholarships, Teaching Fellowships, Teaching Assistantships, Research Assistantships, Assistantships, Proctorships, Traineeships.

University Fellowships are awarded to new students only, on a competitive basis and in light of past academic performance and the promise of future excellence. They pay a stipend, full tuition, and the required Health Fee.

Fellowships are awarded to both new and continuing students, usually on the recommendations of the academic departments and in recognition of academic merit and personal need. They pay a stipend, tuition, and the Health Fee.

Scholarships are like Fellowships in all respects save that they pay only tuition and the Health Fee, with no stipend.

Teaching Fellowships and *Teaching Assistantships* are given only to advanced graduate students who are capable of conducting, or directly assisting in the conduct of, undergraduate courses. Rarely will an incoming student be offered one of these. They pay a stipend, tuition, and the Health Fee.

Research Assistantships are given to new as well as to continuing students. They are a major form of support in the Sciences, occasionally found in the Social Sciences, infrequent in the Humanities. Research Assistants work with investigators on academic projects supported by the investigators' grants or contracts. They pay a stipend, tuition, and the Health Fee.

Assistantships are offered to incoming as well as to continuing students. They involve instructional duties within the capacity of most graduate students and they pay a stipend, tuition, and the Health Fee.

Proctorships involve non-instructional academic employment. They pay a stipend but tuition and Health Fee do not automatically accompany Proctorships.

Traineeships carry with them stipulations as to the field of academic study. They depend for their existence on grants to Faculty members and are available in only a few departments. Where they do exist, all applicants with the necessary qualifications are eligible. They pay a stipend, tuition, and the Health Fee.

Guaranteed Student Loans in amounts not exceeding \$5,000 per year are available to eligible applicants through the University. Foreign students are not eligible for these loans.

Enrollment

Every student, whether continuing in courses of study or engaged in research or in writing a thesis, is required to enroll at the beginning of each academic year. To complete enrollment, all requirements of the pertinent administrative offices of the University must be met, including registration for courses, payment of accounts, and arrangements for housing as appropriate. Fees will be charged for failure to meet established deadlines. No student may take examinations, use any of the facilities of the University, submit a thesis or dissertation, or be a candidate for a degree unless properly enrolled.

Summer Study. Brown University does not have a regular summer session, but graduate students who wish to secure credit for summer work may make arrangements with their departments for reading or research courses. They must enroll formally with the Registrar before the end of the academic year.

Changes in Schedule. Changes in schedule, including the dropping of courses, may be made only with the approval of the department of major study and of the Registrar.

Separation: A general term, covering any absence or severance of a student from the Graduate School. Separated students must be in one of the following categories:

LEAVE OF ABSENCE: Granted by the Dean of the Graduate School upon the written request of the individual student and with the written approval of the department or program concerned. Requests for leaves may be based upon plans to interrupt resident graduate study for field work, study abroad, professionally related employment, or for personal reasons. Leaves are granted for a specified period of time, normally not more than one calendar year. Upon termination of this time period, the student must resume active graduate study or apply for and be granted an extension of the leave; otherwise the student's leave will be changed to "withdrawn" status.

No readmission decision is required for a student returning from Leave of Absence to active graduate study. However, students must write to the Graduate School to request registration material no later than one month prior to the expiration of a leave, and pay a reenrollment fee of \$30. If a student whose Leave of Absence status has been changed to Withdrawn wishes to resume graduate education at Brown, the student must make a formal request for readmission and receive the recommendation of the department and the approval of the Dean of the Graduate School. In addition, there is a readmission fee of \$30.

WITHDRAWAL:

Voluntary: Separation from the Graduate School effected by the Dean upon the written request of the graduate student. The student's reasons for wishing to withdraw need not be specified in the statement of request, but those reasons may include personal, academic, medical, financial, or other factors. Departmental approval is not required, but the Graduate School routinely informs the concerned department before effecting a student's withdrawal. To resume graduate education at Brown, the student must make a formal request for readmission, and receive the recommendation of the department and the approval of the Dean of the Graduate School. In addition, there is a readmission fee of \$30.

Involuntary: The Dean of the Graduate School may effect involuntary withdrawal for good and sufficient reasons, including: academic reasons; failure to meet University charges; disciplinary reasons; medical reasons (see below). The Dean may consult with the student's department, the University Health Services, or other concerned parties. In the case of academic withdrawal, the action will be effected upon the recommendation of the department. Readmission is possible for some students who are involuntarily withdrawn from the Graduate School. Where this possibility exists, the conditions and procedures for readmission are described in the letter of withdrawal from the Graduate School to the student.

Note: Involuntary Withdrawal for Medical Reasons implies that the length of the period of withdrawal is contingent upon the student's attaining full recovery. If such a withdrawal is occasioned by psychological factors, the minimum withdrawal period set by the Dean will normally be either (1) no less than the remainder of the semester in which the withdrawal takes place, or (2) a period of no less than three months, whichever is, in the judgment of the Dean in consultation with Brown University Health Services, appropriate to the individual student both personally and academically. The minimum length of withdrawal will be specified to the student by the Graduate School in its letter of notification. Students seeking readmission after withdrawal for medical reasons must be examined at the Brown University Health Services to determine if their recovery is sufficient to permit recommendation for readmission. The actual decision to readmit is made by the Office of the Dean of the Graduate School.

Grading System

In all courses carrying graduate credit a student may, in consultation with the advisor, elect to be graded on a basis of either *Satisfactory/No Credit* or *A, B, C/No Credit*. A student must for every course taken indicate by mid-semester which basis for grading is elected. On the initiative of the Instructor, any course carrying graduate credit may be designated to be graded on a *Satisfactory/No Credit* basis for all students enrolled in the course.

No Credit is given when courses are not satisfactorially completed or are dropped. The notation *No Credit*, and the description of the course in which it is given, are not entered on the transcript. The notations *I* (Incomplete), *ABS* (Absent), and *I, ABS* are also used when appropriate. For the definition of these marks, and for the modes of their resolution, see the *Catalogue* statement on grading in the College, page 90.

Any student regularly enrolled in a course, no matter whether for *A, B, C/No Credit* or for *Satisfactory/No Credit*, may request from the Instructor a more detailed written evaluation of his or her work. Such supplemental evaluations are intended primarily for the information of the student and do not replace departmental evaluations.

Grade Requirements for Graduate Degrees. Ordinarily, a minimum grade of either *Satisfactory* or *C* in a 100 or 200 level course carries credit toward all advanced degrees. Individual departments may, subject to the approval of the Graduate Council, set higher grade requirements.

Graduate students may be required to register in courses primarily for undergraduates (numbered 1-99); these courses do not carry graduate credit. On occasion, however, and with approval of the student's department and the Dean, a student may register for such a course with extra work for graduate credit. This course then has the same standing as a 100 level course and is so noted on the transcript. This provision for extra work does not apply to courses of the level of 1-99 taken for graduate credit by students in the Master of Medical Science program.

General Information Regarding Degrees

The Graduate School offers courses leading to the degrees of Master of Arts, Master of Science, Master of Arts in Teaching, Master of Medical Science and Doctor of Philosophy. Candidates for the degree of Master of Arts or Master of Science are accepted in almost all departments of the University and in the Programs in Biomedical Engineering, Creative Writing, Museum Studies, Political Science, Portuguese and Brazilian Studies, Portuguese Studies and Bilingual Education and Theatre Arts. The Master of Arts in Teaching is available in the fields of English and Social Studies. The Master of Medical Science is restricted to students enrolled in the Program in Medicine. Candidates for the Ph.D. are accepted in American Civilization, Anthropology, Applied Mathematics, Art History, Biology, Chemistry, Classics, Comparative Literature, Computer Science, Economics, Egyptology, Engineering, English, French Studies, Geological Sciences, German, Hispanic and Italian Studies, History, History of Mathematics, Judaic Studies, Linguistics, Mathematics, Medical Science, Music, Philosophy, Physics, Psychology, Religious Studies, Slavic Languages and Literatures, Sociology, and Special Graduate Studies. Applicants in Political Science are not at the date of this writing accepted for programs beyond the A. M.

An officer of instruction of professorial rank at Brown University may not be a candidate for an advanced degree.

Full-Time Students. A full-time student is one who devotes his or her entire time to a program of graduate work. Such a program may include teaching and research assistance, preparation for foreign language examinations, preparation for the Preliminary Examination, and supervised work on theses, as well as regular course work.

Part-Time Study. Students who can give only a portion of their time to their studies may be admitted in almost all departments.

Credit. Academic credit is stated in terms of semester courses. A regular semester course, or the equivalent research, carries one semester course credit and for purposes of evaluation may be considered the approximate equivalent of four semester hours. The normal course load for a student who is studying full time is four courses per semester.

Conferring of Degrees. Degrees are conferred at the University Commencement at the end of the academic year. However, at any time during the year, if a student has completed all the requirements for a degree, he or she will be issued, upon request to the Registrar, a certification that the degree will be conferred at the next Commencement.

Degree Requirements

NOTE: in the Spring of 1971 the Faculty and the Board of Fellows approved proposals reflecting changes in the philosophy of graduate study at Brown University. Many of the traditional requirements for degrees have been removed from the *General Regulations* of the Graduate School, thereby bestowing on the departments an unusual freedom in defining their own degree structures. Also, provisions have been made for individually designed programs leading to the degree of Doctor of Philosophy.

The statements in this Section describe the minimal quantitative requirements for advanced degrees. Each of the graduate programs has its own standards of quality and achievement, and these too must be met. The mere mechanical fulfillment of the stated basic requirements will not by itself earn any advanced degree; the Faculty of the program concerned must also be satisfied as to the intellectual merit and scholarly potential of the candidate.

Masters' Degrees¹

While the accumulation of credits is by no means sufficient for the attainment of a degree, it is necessary in first-year graduate work to use some unit as a basis in describing the proficiency expected of a candidate. The following paragraphs are to be interpreted from this point of view.

The program of study leading to a master's degree must represent some definite aim; such work may be pursued by attending courses or by individual study under the direction of a professor. The program must be approved by the Graduate Council.

The student's work will be under the direction of a representative of the department, who shall approve the schedule of courses and recommend in writing the granting of the degree.

The minimum requirement for a master's degree for a graduate of an approved college, who is well prepared in a special subject, consists of eight semester credits in advanced work. Additional requirements for specific degrees may be set by the departments, subject to the approval of the Graduate Council (see below, "Departmental Requirements").

Students whose undergraduate degrees have been rated as deficient and those who are not fully prepared to begin graduate work in the department of their choice will ordinarily be required to complete more than the normal requirement, the amount and character of the extra work to be determined by the department and the Graduate School.

Graduate Work Done at Other Institutions. Graduate work done in graduate residence at other institutions and not used in fulfillment of the requirements for a degree may be offered in partial fulfillment of the requirements for a master's degree provided it is approved by the department or program and by the Registrar. However, the equivalent of at least seven semester courses must be done in residence at Brown University. Students

¹ Degree requirements for the Master of Arts in Teaching will be found on page 364.

who wish to transfer credit for work done elsewhere should file an application with the Registrar of the University well in advance of Commencement.

Time Limit. Normally, all work to be used in fulfillment of the requirements for a Master's degree must be completed within a period of five years. See also under Master of Arts in Teaching, page 363.

Departmental Requirements. The minimum General Requirements for Masters' degrees are stated in the foregoing paragraphs. Individual Departments ordinarily have additional requirements as to the number of courses to be taken, proficiency in foreign languages, special examinations and theses. Where detailed information about a specific program is wanted, the department should be directly consulted. The following paragraphs describe typical departmental requirements.

Foreign Language. In many departments, a candidate must demonstrate a reading knowledge of one or more foreign languages sufficient for the purpose of his or her special studies. While there is considerable variation in departmental usages, competence in a foreign language is most often demonstrated in one of these ways:

- 1) By completing with a grade of B or better a 2R course (see below) or an approved substitute.
- 2) By passing an Educational Testing Service Language Test. Passing levels are designated by departments and are approved in advance by the Graduate Council.
- 3) By passing a written examination administered by the department and approved in advance by the Graduate Council.

The Departments of Modern Languages offer beginning courses in French, German and Russian designed to assist graduate students who have had little or no previous course work in these languages. These courses give a brief survey of the elements of the language and practice in reading.

The Educational Testing Service Language Tests (for French, German, Russian, and Spanish) are administered thrice a year at Brown. Registration may be made at the Graduate School administrative offices in the Graduate Center. Educational Testing Service tests taken at other institutions will be accepted in fulfillment of departmental requirements if the scores meet the passing levels.

A foreign student may not offer his native tongue in fulfillment of the foreign language requirement. With the approval of the department, however, English may be substituted for the language desired. In this case, the student must pass the test of English as a Foreign Language with a minimum score of 500.

Comprehensive Examination. Oral or written examinations may be required by departments.

Thesis. A written thesis may be required by a department. If the thesis is required, two copies must be deposited in the Office of the Graduate School by the date specified in the Calendar (page 6). Both copies of the thesis must bear the written approval of the professor under whose direction the thesis is written. Detailed rules concerning the preparation and presentation of theses, available in the offices of the Graduate School, must be followed by students completing their degree. Theses which are not properly prepared cannot be accepted by the Graduate School.

Doctor of Philosophy

Residence Requirement. The normal residence requirement for the degree of Doctor of Philosophy is the equivalent of three years of full-time study beyond the bachelor's degree. At least two semesters beyond the master's degree, or the equivalent, must be spent exclusively at Brown University. During this year of residence, a student may not be employed by the University or hold a position elsewhere. For the purpose of fulfilling this requirement, however, four consecutive semesters served as Assistant, Teaching Assistant, or Research Assistant are considered the equivalent of a year of full-time study.

Graduate work done in graduate residence at other institutions and not used in fulfillment of the requirements for the degree of Doctor of Philosophy elsewhere may, on the recommendation of the department of study and with the approval of the Registrar, be counted in fulfillment of the residence requirement. However, no more than the equivalent of one full year of study may be so counted. A student who desires credit for work done elsewhere should file an application after completing at least one semester in the Brown University Graduate School; forms are obtainable in the Office of the Registrar.

Plan of Work. The program of study must be planned in consultation with the department of study and must be approved by the Graduate Council. The student must plan his or her course of study with the department so as to meet both departmental and general Graduate School requirements.

Admission to Candidacy. A student becomes a Candidate for the degree of Doctor of Philosophy when he or she has satisfactorily completed all the requirements, departmental and general, requisite formally to beginning work on the dissertation. Candidacy is determined by the department or program of the degree and certified by it to the Graduate Council. Each department must set a terminal date, approved by the Graduate Council, for certifying the Candidacy of its students.

Dissertation. The Candidate must present a dissertation on a topic related to his or her major subject which shall embody the results of original research and give evidence of high scholarship. The dissertation will be accepted only when approved by the professor under whose direction it is written and by the Graduate Council. See the Calendar, page 6 for the date when the dissertation, bearing the written approval of the Director, must be deposited in the Office of the Graduate School; dissertations received after this date cannot be processed for the current Commencement.

The dissertation must be prepared for submission to the Graduate School in strict accordance with the "Instructions for Preparation and Presentation of Theses and Dissertations" that are issued annually by the Graduate School. Dissertations not prepared according to those instructions will not be accepted. Information on preparation of the Dissertation Abstract (recently changed), on microfilm publication and copyright, and other essential matters is given in the "Instructions."

The Candidate must sign a contract authorizing the Graduate School to publish the dissertation in microfilm (the proper form may be obtained in the Office of the Graduate School). Since publishing of an abstract of a dissertation in *Dissertation Abstracts* and the offering for sale of film copies of the dissertation constitute publication, the author is governed by existing laws concerning quotation of copyrighted material. Each Candidate will be required to certify that extensive use of copyrighted material in the manuscript is with the written permission of the copyright owner. There is a dissertation fee¹ to cover the costs of collation, binding, and microfilm publication. The fee is not returned to the student in case of subsequent publication of the dissertation, or portions thereof, in other forms.

After its final acceptance by the Graduate Council, the dissertation is microfilmed by University Microfilms International, Ann Arbor, Michigan, from which positive microfilm copies may be ordered. The abstract is published in *Dissertation Abstracts* by University Microfilms International. The student may copyright the dissertation by paying an additional charge.

If the dissertation is presented in published form, two copies are required. If it appears under joint authorship, it should be accompanied by a statement indicating exactly the contribution by the student. The dissertation fee is reduced when the dissertation is submitted in published form.

¹ Fees connected with the dissertation are specified in the "Instructions" referred to above.

Departmental Certification. After the dissertation is accepted by the Graduate School and the Candidate has satisfied whatever departmental requirements still remain, the Candidate's department shall in writing advise the Graduate Council that all requirements have been satisfactorily completed and shall recommend awarding the degree.

Period of Candidacy. A Candidate for the degree of Doctor of Philosophy must complete all the requirements for that degree within five years after admission to Candidacy. Exceptions to this rule may be made only with the consent of the department concerned and the Graduate Council.

Departmental Requirements. The minimum General Requirements for the degree of Doctor of Philosophy are stated in the foregoing paragraphs. Individual departments and programs often have additional requirements as to course-work, foreign languages, computer training, Preliminary and Final Examinations. For detailed information about a specific departmental program, the department should be directly consulted. The following paragraphs describe departmental requirements.

Foreign Languages. In some departments, a student must demonstrate a reading knowledge of one or more foreign languages sufficient for the purpose of his or her special studies. For the modes by which competence in a foreign language is commonly shown, see the statement on Foreign Languages under Masters' Degrees (page 142).

Preliminary Examination. At present, most departments require a Preliminary Examination before advancing any student to Candidacy. The Preliminary Examination is designed to test the student's mastery of his or her field of study; it is not necessarily confined to courses taken by the student at Brown University or elsewhere.

Final Examination. Most departments also require a Final Examination. The Examination is conducted by the officers of professorial rank in the department or departments concerned and by such other members of the Faculty as may be appointed.

Special Graduate Study

The Faculty and the Board of Fellows of Brown University have approved a program of Special Graduate Study. The regulations provide that any student who, after at least one year of graduate study at Brown University, wishes to undertake toward the Ph.D. further scholarly work which cannot be accommodated within an existing department or interdepartmental program, may draw up his or her own plans and on this basis petition the Graduate Council for approval and for permission to enroll as a doctoral student in Special Study.

Financial Information

Tuition

The tuition paid by students covers only a portion of the total annual operating expenses of the University. Income from endowment; contributions from the alumni, alumnae, and other public spirited men and women; and payments from government units, private foundations, and corporations meet the balance of the expenses.

Tuition Regulations — The College

1. Tuition rates are set by the Corporation of the University for each semester. Normally, the tuition rates for the two semesters of a given academic year will be the same.
2. Tuition payments for the baccalaureate degree are based on the norm of thirty-two courses, four courses in each of eight semesters. The minimum tuition requirement is eight semesters, or the equivalent. This eight-semester tuition requirement is separate from and in addition to any other degree requirements. The minimum tuition requirement for the program leading to the combined degrees of A.B.-Sc.B. is ten semesters of tuition credit.
3. Payment of full-time tuition for a semester entitles the student to enroll in three, four, or five courses for that semester. For full-time degree candidates, tuition charges are set for the semester, *not* per course.
4. (a) Students who are granted Brown course credits for Advanced Placement and/or transfer credit for work completed at another college or university prior to enrollment at Brown may apply for and may be granted advanced standing and tuition credit according to the following schedule.

<i>Brown Semester Course Credits</i>	<i>Advanced Standing and Tuition Credit</i>
3-6	1 semester
7-10	2 semesters
11-14	3 semesters
15 or more	4 semesters

(b) Students who are granted Brown course credits by the Committee on Academic Standing for equivalent work completed at and transferred from another college or university after enrollment at Brown may apply for and may be granted advanced standing and tuition credit according to the same schedule as in 4(a) above. All transfer credits earned after enrollment at Brown, except as provided for in Section 4(d), are cumulative. Advanced standing and tuition credit for this cumulative total of transfer credits must be applied for by the student and will be awarded *only* in semester-equivalent blocks.

In exceptional cases the Committee on Academic Standing may allow a student to transfer the equivalent of one or two Brown semester course credits for work completed during the regular academic year (for summer school courses, see (d) below). Tuition credit will be granted for each such course at the rate of one quarter of a full-semester credit subject to the following conditions:

- (1) Such courses completed while the student is not currently enrolled at

Brown will become part of the cumulative total of all transfer credits earned by the student and the Table in (a) above will apply.

- (2) If the courses are completed as part of a dual registration arrangement (e.g., a student who is permitted to carry a less-than-normal load of courses at Brown and to pay an appropriate reduced amount of tuition in order to pursue concurrently certain specialized courses at another institution), tuition credit for such courses will be independent of any other cumulative total of transfer credits earned by the student.

(c) Once advanced standing has been granted, a student wishing to extend his or her total period of enrollment beyond eight full-time semesters, or the equivalent, must apply to do so and must declare the number of courses for which he or she will register by December 15 for the spring semester and by June 15 for the fall semester. In such cases tuition for each course (for the extended period) will be charged at the rate of one quarter of the full-time semester rate.

(d) Summer school courses are normally not acceptable for transfer and tuition credit. On an exceptional basis, after enrollment at Brown, a student may be permitted by the Committee on Academic Standing on one or more occasions to transfer one or two semester course credits for summer study completed at another college or university. With the exception of courses being taken to complete remaining degree requirements away from Brown, for tuition purposes the summer session will be considered as part of the succeeding academic year at Brown, for which the normal full-time tuition will be charged. However, the student will be reimbursed the tuition cost of the work accepted for summer transfer credit upon presentation of proof of cost; and the maximum number of courses that he or she would normally be entitled to take that year will be reduced by the number of transfer credits awarded. Transfer credits awarded under the terms of this Section may not be combined in any cumulative total of transfer credits for the purpose of determining advanced standing and semester tuition credits.

5. An eighth-semester student who owes less than a full-semester tuition credit at the beginning of the eighth semester will be charged the fraction of the full-time tuition charge for that semester which will complete the eight-semester obligation and may take an equivalent number of courses. Additional courses will be charged at the rate of one quarter of the semester's full tuition charge.
6. Regular degree candidate students who must or choose to take courses in semesters beyond the eighth semester in order to complete requirements for the baccalaureate degree will be charged tuition at the rate of one quarter of the semester's full tuition charge for each course enrollment.
7. Degree candidate students who are given permission by the Dean to register for "short work" (one or two courses) will be charged one quarter of the semester's full-tuition charge for each course enrollment.
8. Students in the seven-year continuum leading to a baccalaureate degree and the M.D. degree (Medical Education Program) shall make three annual tuition payments at the rate fixed for The College (for years one through three) and four annual tuition payments at the rate fixed for the Program in Medicine (for years four through seven). Students who request and receive permission to delay entrance to the Program in Medicine until the fifth year and/or candidates for the five-year combined A.B.-Sc.B. degrees, each requiring an extension of the continuum to a total of eight years, shall make four annual tuition payments at the rate fixed for The College (for years one through four) and four annual tuition payments at the rate fixed for the Program in Medicine (for years five through eight).

Except as noted in the next paragraph, the tuition regulations for The College apply until such time as actual enrollment has begun for the Program in Medicine, at which time the tuition regulations for the Program in Medicine take effect.

For students in the seven-year continuum, if at the beginning of the sixth semester a student lacks less than a full-semester tuition payment to accumulate credit for six semesters of tuition, only the balance of tuition required to bring the total credit to six semesters will be charged. In such cases, i.e., when less than a full-semester tuition is charged, the student shall be eligible to register for one course for each one quarter of the full-time rate being charged.

9. The above regulations cover students who are candidates for a baccalaureate degree. For special students who are not candidates for a degree, a tuition charge of one quarter of the semester tuition rate will be made for each course taken.

Estimated Date of Completion (EDOC)

One goal of the present tuition regulations is to enable the University to manage enrollment in The College more effectively. It is essential that this be done to the maximum extent possible. Accordingly, all currently enrolled students are assigned an expected date of completion (EDOC). This information is sent annually to all students with instructions to confirm the assignments or to work out any necessary adjustment with the Registrar. Any extension of enrollment beyond the student's official EDOC will have to be applied for by December 15 for the spring semester and June 15, for the fall semester. In such cases, tuition for the extended period will be charged at the rate of one tuition unit per course.

Student Charges - The College

The University reserves the right to change the charges whenever it is deemed advisable, the new rates to apply to all students. Published notice of any change will normally be given in advance.

Tuition—The annual tuition charge for the year 1983-84 is \$9,150 or eight tuition units. The tuition charge for part-time and special students is \$1,143.75, or one tuition unit, per course. Fourth year students in the seven year Program in Medicine pay \$12,275 for the 1983-84 year.

Room—The dormitory charge for the academic year 1983-84 in the undergraduate residence halls is \$1,755 for regular accommodations, \$1,800 for the Graduate Center, \$1,900 for Dormitory Apartments, and \$2,100 for Appleby Hall or Young Orchard Apartments.

A \$100 room reservation deposit is required of students who file applications for a room in on-campus housing.

Board—Resident freshmen elect either a twenty, fourteen, thirteen (no dinners), ten or seven meal contract at an annual charge of \$1,590; \$1,455; \$1,250; \$1,290; or \$1,145 respectively. Resident sophomores, juniors, and seniors as well as all nonresident, commuting and graduate students, although not required to participate, may elect any of the aforementioned contracts. Any board plan may be reduced or cancelled once during the first four weeks of each semester with a refund credited to the students' university account on a pro-rated basis. A student may increase his or her contract participation at any time during the academic year. As services offered are often modified to reflect changes in student life, a current brochure is available from the Food Services Office.

Nonresident Fee/Commuter Fee—A \$160 fee is charged to all nonresident students in co-ops; off campus; or commuting from home. This fee covers services provided by the University to students such as Faunce House; security services; off campus information and listing services.

Health Services Fee—A \$200 fee is charged all degree candidates in residence, both full and part time. This fee is designed to cover the costs of the health services facilities (Andrews House), but it does not include health insurance coverage, pharmacy, x-rays, laboratory fees.

Student Health Insurance charge for the academic year 1983-84 is \$124. Mandatory participation is required in the University group health and accident insurance program for students unless a waiver of participation is granted upon submission of proof of comparable coverage. Waiver deadline is October 15.

Student Activity Fee—A \$55 fee is charged to all students for the support of registered student organizations and the activities of the Undergraduate Council of Students. The fee also finances the activities of the Student Union.

Readmission Fee—A \$35 fee is charged to all students who re-enroll at the University after having been officially separated for any reason, including leave of absence.

Late Registration Fee—A \$15 fee is charged for late course registration.

Student Deposit—Each student, prior to registration for the first semester after admission or readmission, is required to pay a deposit of \$50. This deposit serves for the duration of the student's enrollment in the University as a guarantee of payment of his or her account. It is not an account against which the student may make charges. It will be refundable in full several months following the student's graduation or withdrawal from the University, unless the University is forced to draw from it to clear the account, in which case any unused balance will be refunded.

Transcripts—Students, former students and graduates who request transcripts are subject to the advance payment of a \$2 fee for the first transcript in each order and \$1 for additional copies ordered at the same time. As noted below, transcripts will be issued only if all financial obligations to the University have been met.

Property Insurance—See page 506.

Payment of Charges - The College

University bills for students' annual charges are mailed to parents in early July.

Annual charges are payable in full, on or before August 1 or in two payments: one-half on or before August 1, and one-half on or before January 1.

Late Payment Charges—If Semester I payment due on or before August 1, is received after August 1, a late payment charge of \$30 is assessed; if received after September 1, an additional late payment charge of \$60 is assessed. If Semester II payment due on or before January 1, is received after January 1, a late payment charge of \$30 is assessed; if received after February 1, an additional late payment charge of \$60 is assessed. Upon application, payment of annual charges may also be made in twelve monthly installments beginning June 1 and ending May 1. Simple interest is charged at the annual percentage rate of 11% on the actual amount borrowed. A late charge of 2% of the monthly payment, or \$5, whichever is less, will be charged on any monthly payment in default for a period of 10 days or more.

Checks in payment of student accounts should be made payable to Brown University and sent to the Bursar's Office, Box 1839, Providence, Rhode Island, 02912. Care should be taken to include the name, ID number, and home address of the student for whom the credit is intended.

Students who fail to meet their financial obligations to the University in accordance with established University regulations will have the status of their accounts reported to the University Student Account Committee for appropriate action which may include cancellation of eligibility for enrollment.

No student may withdraw in good standing from The College unless all current financial obligations to the University have been met.

Students expecting to graduate in May are required to settle their accounts before they receive their diplomas. All accounts with balances of \$250 or more *paid after May 1* must be paid by *certified check or money order*.

No diploma, certificate, transcript, letter of honorable dismissal, or recommendation will be issued to any student or former student, unless all accounts are satisfactorily settled.

Refund of Annual Charges - The College

1. TUITION

- A. A student who leaves the University during or at the end of the first semester shall not be charged tuition for the second semester.
- B. A student who leaves the University (except under conditions noted in (c) below) or changes his/her enrollment status during a semester shall be eligible for tuition payment refund during the first five weeks according to the following schedule:

<i>Week of Withdrawal</i>	<i>Percentage Amount of Refund</i>
1 and 2	80 percent
3	60 percent
4	40 percent
5	20 percent

If a partial refund is made, no portion of the tuition paid and unrefunded will be credited to the total tuition required for the degree. When *no* refund is made, the four tuition units paid will be credited toward the total tuition requirement for the degree, and the number of semesters to which a student is entitled for full-time enrollment will be reduced by one.

- C. A student who is suspended, dismissed, or withdraws when under investigation for misconduct shall not have tuition refunded for the semester in which the action is taken.

2. ROOM

While residence hall rooms are rented on an academic year basis, students who leave the University or change their status to commuting or married students during or at the end of the first semester are not charged room rental for the second semester.

Students who leave the residence halls during the semester are charged room rental for the balance of that semester unless the Residential Life Office can provide a satisfactory replacement for the vacant space. A satisfactory replacement is deemed to be a student who is not currently living on campus or a student who is living in a "roomsharing" room if the total occupancy of the residence halls is in excess of normal capacity.

Prorated room refunds when applicable will be made from a schedule prepared by the Director of Residential Life and will be on file in the Office of Residential Life. A student suspended or dismissed from the University or withdrawing when under investiga-

tion for misconduct is not entitled to any refund of room rental charges for the balance of the current semester. Students seeking any further information regarding room charges and/or refunds should contact the Office of Residential Life.

3. BOARD

Resident freshman, as a requirement of their first year in residence, must elect one of the following meal contracts: the twenty; any fourteen; any thirteen (no dinner); any ten; or any seven meals. Resident upperclassmen, as well as nonresident, commuting, and graduate students may take advantage of the aforementioned contracts or may make other dining arrangements.

All board contracts are for the Academic Year. Contracts are in force on all days the University is in official session as stated in the University Academic Calendar including holidays that do not fall in the recess periods.

All students, except freshmen, may exercise the option of changing or cancelling their board contract once during the first four weeks of each semester. Freshmen are limited to a change of meal plan only (see restriction above).

A credit or debit will be applied to the student's University account based on a weekly proration of annual contract values modified by the following conditions:

A \$10 charge will be applied for changing from one contract to another after the start of the term of any contract.

In the event of cancellation after the start of the term of any contract \$50 of the cost is nonrefundable and retained by the University to cover nonreducible overhead obligations (students who leave the University between semesters, having completed their degree requirements or on an approved leave of absence for Semester II, may apply for a waiver of this provision).

A pro rate refund schedule is available in the Food Service Office. Transactions completed by Wednesday noon become effective the following Friday.

Any modification to an annual board contract must be made in the Food Service Office and signed by the contract holder.

4. HEALTH FEE

A student who leaves the University at any time after the start of the semester is not eligible for a Health Fee refund.

A student who leaves the University during or at the end of the first semester shall be charged a health fee for the second semester.

Student account records are maintained in the Office of the Bursar. Questions concerning the exact amount of debit or credit balance on a student account should be directed to the Bursar.

Tuition Regulations - The Graduate School (effective June 15, 1980)

DEFINITIONS:

Annual tuition—such amount as is fixed by the Corporation of the University for a given academic year.

Tuition Unit—one-eighth of the annual tuition

Full-time enrollment—registration for 3, 4, or 5 courses, or as defined by the Dean of the Graduate School.

Part-time enrollment—registration for fewer than three courses, or as defined by the Dean of the Graduate School.

1. Annual tuition payment entitles a student to full-time enrollment for the normal academic-year and is payable in advance. Teaching Fellows, Teaching and Research Assistants, Assistants, and any others holding equivalent appointments, shall pay at a maximum rate of three-quarters of the annual tuition. They will be considered to be full-time students and will be credited with a maximum of $\frac{1}{4}$ of an annual tuition payment (or $\frac{1}{8}$ of an annual tuition payment in the case of one-semester appointees) toward the requirement for the degree, and $\frac{1}{4}$ of a year of full-time enrollment (or $\frac{1}{8}$ of a year in the case of one-semester appointees) will be deducted from the total enrollment for which they are eligible; they may register for no more than six courses in the academic-year (three courses per semester of appointment in the case of one-semester appointees).
2. When fewer than eight tuition units (six in the case of Teaching Fellows, Teaching and Research Assistants, Assistants, etc.) are in a given year needed to satisfy the minimum remaining tuition requirements for a degree, charges and credits will be prorated accordingly. The determination of enrollment status (full- or part-time) of students obligated to pay less than the full annual tuition, shall be made by the Dean of the Graduate School.

If, at the beginning of any academic-year, only one tuition unit is required to meet the minimum total tuition requirement, the one tuition unit will be charged in Semester I and Enrollment Fee (see below) will be charged in succeeding semesters.

In all cases where because of the previous satisfaction of a part of the tuition requirement less than the full annual charge is made, candidates for the Master's degree will be eligible to register for one course for each tuition unit charged; candidates for the Ph.D. will not be limited with respect to the number of courses for which they may register provided such courses are part of the normal program for the degree.

3. Except as noted in the next paragraph, the minimum total tuition which must be paid for a Master's degree is an amount equal to one annual tuition payment (eight tuition units), for which a student is entitled to two semesters of full-time enrollment or the equivalent. The minimum total tuition which must be paid for a doctorate is an amount equal to three annual tuition payments (twenty-four units), for which a student is entitled to six semesters of full-time enrollment or the equivalent.

If the Graduate Council approves a standard program leading to a Master's degree which requires less than three courses per semester but more than one year of the equivalent of full-time enrollment, or wherein the normal enrollment pattern is not consistent with the normal academic year (e.g., the MAT program), students officially enrolled in such a program will be charged tuition at the rate of one tuition unit per course for the length of the program.

The tuition requirement must be satisfied prior to the awarding of a degree and no portion thereof will be waived. However, Ph.D. candidates who have completed all academic requirements for the degree but have spent without interruption less than the equivalent of three full years in residence, may appeal to the Graduate Council for a reduction in tuition requirements.

4. The total tuition required for a degree will be reduced by one tuition unit for each semester course of transfer credit (to a maximum of one tuition unit for a Master's degree—two in Integrated Programs or in 16-course programs—and eight tuition units for a doctorate).
5. If a Ph.D. candidate applies to be awarded a degree prior to the normal accumula-

tion of credit for the required minimum number of annual tuition payments, the unpaid balance of the minimum tuition requirement for the degree will be charged at the rate in effect during the year in which the requirements for the degree are completed.

6. In addition to those Master's candidates in approved programs provided for in 3, above, the following students will be charged tuition at the rate of one tuition unit per course:
 - (a) Part-time degree candidates enrolled for courses.
 - (b) Master's degree candidates who choose or are required to enroll for courses beyond the period covered by the minimum tuition requirement for the degree.
 - (c) Special students.
7. Until the tuition requirement for a degree has been satisfied, candidates for the doctorate who are not in residence but who are writing dissertations or preparing for examinations in fulfillment of degree requirements must pay a minimum of one tuition unit per semester.
8. For students enrolled in combined-degree programs which include the M.D. degree, the tuition requirement for the M.D. degree covers the minimum total tuition requirement for the other advanced degree as follows:
 - for the Master of Medical Science—all
 - for the Master of Science—all
 - for the Doctor of Philosophy— $\frac{1}{2}$
9. No student may take examinations, use any of the facilities of the University, including the services of a dissertation or thesis advisor, submit a thesis or dissertation, or be a candidate for an advanced degree unless properly enrolled.

Students, both in residence and not in residence, who have fulfilled the total tuition requirement as stated in these Regulations, are required to pay a fee equal to 12% of half the annual tuition for every semester in which they are enrolled to complete degree requirements.

The status—full-time or part-time—of a student paying the enrollment fee only, will be determined by procedures established by the Dean of the Graduate School and the Registrar. In general, full-time enrollment will be understood to mean that at least 30 hours per week are being actively devoted to completion of degree requirements, half-time enrollment being understood to mean that fewer than 30 but more than 15 hours per week are being so spent.
10. In general, enrollment privileges, other than registration for courses, will be extended beyond the end of one academic year to the beginning of the next academic year (that is, over the summer months) without additional tuition charge. Official certification of a specific enrollment status (full-time or part-time) during all or part of this period, however, will be subject to conditions established by the Dean of the Graduate School and the Registrar in cooperation with the appropriate academic departments.
11. Students who reenroll after an approved Leave of Absence or a withdrawal with the advance permission of the Dean of the Graduate School, will be charged a Readmission Fee to be set by the Corporation. Students who are withdrawn on the University's initiative for failure to register or some other cause will, if subsequently readmitted, be charged both the Readmission Fee and a Reenrollment Fee to be set by the Corporation.

Student Charges - The Graduate School

Tuition—Tuition fees for 1983-84 are charged at the rate of \$9,150 per year. Teaching Associates, Teaching and Research Assistants may pay at the rate of three quarters of this amount. Students registered in the Masters of Arts in Teaching Program and those special students who are not following a regular program of study leading to an advanced degree will pay \$1,143.75 per semester course. Candidates for the doctorate who are not in residence but who are writing a thesis or preparing for examination in fulfillment of degree requirements must pay a minimum of \$1,143.75 per semester, unless they have already fulfilled total tuition requirements, in which case they must pay a registration fee.

Every candidate for a master's degree must pay tuition fees for the equivalent of one year of full-time study, unless credit has been received for work done elsewhere. A student who fulfills all other degree requirements before completing total tuition payments may petition the Graduate Council for reduction in total tuition requirements.

Registration Fee—Students, both in residence and not in residence, who have fulfilled the total tuition requirements, as stated above, are required to pay a fee equal to 12% of full tuition for that semester and each additional semester as long as they are registered to complete degree requirements. No students may use the University facilities (including the services of a thesis advisor) unless properly registered.

Thesis Fee—If the thesis for the doctorate is presented in typewritten form, a fee of \$50 is required at the time of final acceptance.

Late Registration Fee—A fee of \$15 is charged for late course registration.

Student Deposit—Each student, prior to registration for the first semester after admission or readmission, is required to deposit \$50. This deposit serves for the duration of the student's enrollment in the University as a guarantee of payment of his or her account; it is not an account against which the student may make charges. It will be refunded in full several months following the student's graduation or withdrawal from the University, unless the University is forced to draw from it to clear his or her account, in which case any unused balance will be refunded.

Room—The 1983-84 academic year charge for a room in the Graduate Center is 1,800. A room reservation deposit of \$100 is required with each room application. Students who cancel their contract after the effective date of occupancy, are charged room rental for the balance of the contract period unless the University can provide a satisfactory replacement.

Health Services Fee—A mandatory fee of \$200 is charged all degree candidates, both full and part-time. This fee is designed to cover the costs of health services facilities (Andrews House) and it does not include health insurance coverage, pharmacy, x-rays, or laboratory fees.

Student Health Insurance charge for the academic year 1983-84 is \$124. Mandatory participation is required for each foreign student in the University group health and accident insurance program for students unless a waiver of participation is granted upon submission of proof of comparable coverage. Waiver deadline is October 15. A graduate student or medical student not required to participate in the program may do so on a voluntary basis.

Student Activity Fee—A \$10 fee is charged to all Graduate students for the support of registered student organizations and the activities of the Graduate Student Council.

Readmission Fee—A \$30 fee is charged to all Graduate Students who re-enroll at the University after having been officially separated for any reason, including leave of absence.

Transcripts—Students, former students and graduates who request transcripts of their academic records are entitled to one copy without charge. Subsequent transcript requests are subject to the advance payment of \$2 for the first transcript in each order and \$1 for additional copies ordered at the same time. As noted below, transcripts will be issued only if all financial obligations to the University have been met.

Refund of Annual Charges - The Graduate School

Provisions for the refund of annual charges in the Graduate School are the same as for refunds for The College—see page 149.

Student Charges - Program in Medicine

Tuition—The 1983-84 annual tuition fee for the Program in Medicine is \$12,275. This charge covers all courses taken during the twelve month period including the summer preceding the academic year. Students in the first year of the Program in Medicine who have not yet received a Bachelor's degree from Brown shall be subject to the above charge.

Late Registration Fee—A fee of \$15 is charged for late course registration.

Student Deposit—Each student, prior to registration for the first semester after admission or readmission is required to deposit \$50. This deposit serves for the duration of the student's enrollment in the University as a guarantee of payment of his or her account; it is not an account against which the student himself or herself may make charges. It will be refunded in full several months following the student's graduation or withdrawal from the University, unless the University is forced to draw from it to clear his or her account, in which case any unused balance will be refunded.

Health Services Fee—A mandatory fee of \$200 is charged all degree candidates. This fee is designed to cover the costs of health services facilities (Andrews House) and it does not include health insurance coverage, pharmacy, x-rays, or laboratory fees.

Student Health Insurance charge for the academic year 1983-84 is \$124. Mandatory participation is required in the University group health and accident insurance program for all medical students (including students in the fourth year of the seven year continuum of Medical Education Program) unless a waiver of participation is granted upon submission of proof of comparable coverage. Waiver deadline is October 15.

Student Activity Fee—A \$20 fee is charged all medical students for the support of registered student organizations and the activities of the Medical Student Council.

Commitment Deposit—A \$100 commitment deposit is required of all students admitted in regular or special standing at any level of the Program in Medicine, with the exception of students promoted from the Continuum of Medical Education at Brown University.

Readmission Fee—A \$60 fee is charged to all Medical students who re-enroll at the University after having been officially separated for any reason, including leave of absence.

Transcripts—Students, former students, and graduates who request transcripts of their academic records are entitled to one copy without charge. Subsequent requests are subject to the advance payment of a fee of \$2 for the first transcript in each order and \$1 for additional copies ordered at the same time. As noted below, transcripts will be issued only if all financial obligations to the University have been met.

Refund of Annual Charges - Program in Medicine

Adjustment of annual tuition charges will be made for any student in the Program in Medicine who withdraws officially or who is dismissed for academic reasons, subject to the following provisions:

A. Year I

1. A student who leaves the Program in Medicine prior to the beginning of the second semester shall not be charged tuition for the second semester.
2. A student who leaves the Program in Medicine during either Semester I or II shall be eligible for a refund of the normal charge for that semester (50% of the annual charge for the Program in Medicine) during the first five weeks only as follows:

First two weeks	80% refund
Third week	60% refund
Fourth week.....	40% refund
Fifth week	20% refund

B. Year II

1. A student who leaves the Program in Medicine during or at the end of the enrollment period preceding the beginning of the normal academic year for the University shall be refunded 90% of the total annual charge for the Program in Medicine.
2. A student who leaves the Program in Medicine prior to the beginning of the second semester of the normal academic year for the University shall not be charged tuition for the second semester.
3. A student who leaves the Program in Medicine during Semester I or II shall be eligible for a refund of the normal charge for that semester (50% of the annual charge for the Program in Medicine) during the first five weeks of the regular semester as follows:

First two weeks	80% refund
Third week	60% refund
Fourth week.....	40% refund
Fifth week	20% refund

C. Year III

1. The academic program for the third year of the Program in Medicine is divided into four clerkship periods of approximately thirteen weeks each.
2. A student who leaves the Program in Medicine during or at the end of the first clerkship period shall be refunded 75% of the total annual charge.
3. A student who leaves the Program in Medicine during or at the end of the second clerkship shall be refunded 50% of the total annual charge.
4. A student who leaves the Program in Medicine during or at the end of the third clerkship shall be refunded 25% of the annual charge.
5. No refund shall be made to a student who leaves the Program in Medicine during or at the end of the fourth clerkship period.

D. Year IV

1. The academic program for the fourth year of the Program in Medicine is divided into three clerkship periods of approximately thirteen weeks each.
2. A student who leaves the Program in Medicine during or at the end of the first clerkship period shall be refunded 66% of the total annual charge.
3. A student who leaves the Program in Medicine during or at the end of the second clerkship shall be refunded 33% of the total annual charge.
4. No refund shall be made to a student who leaves the Program in Medicine during or at the end of the third clerkship period.

Student Account records are maintained in the Office of the Bursar. Questions concerning the exact amount of debit or credit balance on a student account should be directed to the Bursar.

Payment of Charges

The Graduate School and Program in Medicine

University bills for annual charges are mailed to students in early July.

Annual charges are payable in full, on or before August 1, or in two payments: one-half on or before August 1, and one-half on or before January 1.

Late Payment Charges—If Semester I payment due on or before August 1, is received after August 1, a late payment charge of \$30 is assessed; if received after September 1, an additional late payment charge of \$60 is assessed. If Semester II payment due on or before January 1, is received after January 1, a late payment charge of \$30 is assessed; if received after February 1, an additional late payment charge of \$60 is assessed.

Upon application, payment of annual charges may also be made in eight monthly installments beginning October 1 and ending May 1. This plan carries a \$60 service charge. The maximum amount which may be remitted under this plan shall be total University charges minus bank loans, scholarships, fellowships and student loans. If any monthly installment is not received on the due date, the full balance of the installments will be due and payable immediately.

Late Payment Charges—A late charge of \$5 shall be incurred if a monthly installment is not paid on time, except in the months of October and January when the late charge is \$30.

Checks in payment of student accounts should be made payable to Brown University and sent to the Bursar's Office, Box 1839, Providence, RI 02912. Care should be taken to include the name, ID number and home address of the student for whom the credit is intended.

Students who fail to meet their financial obligations to the University in accordance with established University regulations will have the status of their accounts reported to the University Student Account Committee for appropriate action which may include cancellation of eligibility for enrollment.

Students expecting to receive a degree in May are required to settle their accounts before they receive their diplomas. All accounts with balances of \$250 or more paid after May 1, must be paid by certified check or money order.

No student may withdraw in good standing unless all current financial obligations to the University have been met.

No diploma, certificate, transcript, letter of honorable dismissal, or recommendation will be issued to any student or former student, unless all accounts are satisfactorily settled.

Financial Aid - The College

Through a comprehensive program of scholarships, loans, and student employment the University helps many students with limited funds meet their college expenses. Financial aid is based on the principle that as many well qualified students as possible should be helped to gain a university education through awards based on a careful assessment of financial need. This program is administered through the Office of Financial Aid, and all inquiries concerning scholarships, loans, and student employment should be addressed to the Financial Aid Awards Committee, Brown University, Providence, Rhode Island 02912.

Scholarships

Each year the University grants to approximately one-third of the entering class annual scholarships ranging from \$100 to 10,500. These awards are made solely on the basis of financial need.

Any student who knows that he or she will need financial aid to complete four years at The College must apply for aid before admission because almost all of the funds are committed to those who win awards as freshmen and it is often not possible to grant aid to new upperclass applicants.

Applicants for admission who have indicated an interest in scholarship aid on the admission application will be sent the necessary financial aid forms and information by return mail, but it is necessary to file the admission application first. Brown is a member of the College Scholarship Service, a cooperative activity of over one thousand colleges which believe that scholarships should be awarded to properly qualified students only after careful consideration of the financial need of the students and their families.

To apply for financial aid, two different forms must be filed for each student. The applicant, after January 5, should return directly to Brown University the Freshman Financial Aid application. By the same date his or her parents should file with the College Scholarship Service the Financial Aid Form (FAF) and should arrange to have a copy of this sent to Brown. Copies of the FAF should be available at all secondary schools; if not, write to the College Scholarship Service, Box 176, Princeton, New Jersey 08540; Box 1025, Berkeley, California 94701.

Financial Aid awards consisting of jobs, loans, and scholarships will be announced at the same time as admission decisions. These awards are continued during subsequent years provided they are justified by continuing financial need as determined by the Financial Aid Awards Committee in accord with national needs analysis standards. It is necessary, however, that renewal applications be filed each year in the spring. Awards are subject to review at any time by the Committee.

Some of the funds are restricted to students with special qualifications, as, for example, those limited to students from particular areas, schools, or cities. No deserving student with limited funds should hesitate to apply, however, since a majority of the awards come from unrestricted funds and are awarded only on the basis of financial need.

Scholarships and other forms of financial aid have been made possible by gifts to the University for the establishment of scholarship funds. They represent the thoughtful interest of individuals, alumni, alumnae, and friends of the University, and groups such as Brown Clubs and corporations who have manifested in this way their interest in education, their faith in the University, and their desire to be of service to the young men and women for whom it carries on its work.

There are now approximately 320 scholarship funds established by gift or bequest. From time to time a list of the donors is published by the Development Office and copies are available on request.

Supplementary Education Opportunity Grants

This Federal program provides grant aid to all citizens and permanent residents who are at least half-time undergraduate students. Students who are eligible for such grants are given them as part of their total financial aid package. Normally, an SEOG may be received for up to four years. However, it may be received for five years when the course of study requires the extra time.

Pell Grants

For most students, Federal student aid begins with a Pell Grant, which provides a foundation of financial assistance to which other forms of aid may be added. A distinguishing feature of this program is its central concept of "entitlement", which guarantees that students who demonstrate need will receive a grant based on that need and on the cost of education.

Basic Grants for the 1983-84 award period (July 1, 1983 to June 30, 1984) will range up to \$1,800, depending on the student's eligibility as determined by a standard formula.

To be eligible for a Pell Grant, a student must: (a) be found to have financial need based on the Pell Grant eligibility formula and the cost of his or her education; (b) be an undergraduate who is enrolled at least half-time; (c) meet citizenship requirements; and (d) not have used his or her full eligibility for a Pell Grant.

In general, students may receive Pell Grants for four full years. However, they can receive a Pell Grant for up to one additional year if they are enrolled in a course of study designed to require five years for a first degree.

Although most students are paid their awards through the University, the United States Department of Education determines their eligibility. The financial aid officer at the University uses a standard procedure established by the Department of Education to calculate the amount of the award. Financial aid officers cannot make any adjustments in the amount of a Pell Grant beyond those required by the calculation procedure.

A student's need is determined on the basis of a formula developed annually by the Department of Education and reviewed by Congress. This formula is applied consistently to all applicants and takes into account indicators of financial strength such as income, assets, family size, etc. The formula uses the information provided on the application to produce an eligibility index number. The number is not a dollar figure, but is used, along with the cost of the student's education, to determine the actual amount of the grant.

Students applying for financial aid are required to apply for a Pell Grant by completing the College Scholarship Financial Aid Form. Grants received will be included by Brown University in a final award determination.

Loan Funds

Long-term loan funds administered by Brown University have four sources: a) gifts from alumni and alumnae, friends, and corporations; b) University appropriations; c) the National Direct Student Loan Program, and d) the Guaranteed Student Loan Program. These funds vary slightly as to maximum amounts loaned, interest rates, and terms of repayment. As long as a student remains enrolled in the University or maintains half-time student status elsewhere, no repayment of principal is required and no interest is charged. Loans normally become due when the student withdraws or completes college or graduate school. At that time the final repayment schedule is arranged in accord with University and federal specifications.

University Loans

It is normally expected that following graduation or withdrawal the borrower will repay a loan granted from University Funds as quickly as possible. Individual repayment schedules on a monthly basis which are equitable may be arranged. Monthly payments on principal together with accrued interest must begin not later than nine months after graduation or withdrawal. On all loans borrowers are permitted to accelerate payments, thereby reducing interest charges. In the event that financial hardship makes it impossible to meet payments, a new repayment schedule may be arranged at the discretion of the Associate Director of Financial Aid for Loans.

In most cases the interest rate is 9 percent computed on the unpaid principal balance and beginning nine months following the date of graduation or withdrawal. This must be paid concurrently with principal repayments. If a borrower is registered as a full-time graduate student at Brown or other accredited graduate schools, he or she may annually request a deferral of payments until the completion of studies. If the request is approved, no interest will accrue as long as his or her status remains unchanged. A borrower who is in the Armed Forces is also eligible for certain benefits and may annually for three years request exemption from interest and deferral of payment.

National Direct Student Loans

Any citizen or permanent resident of the United States who is enrolled in an institution of higher education on at least a half-time basis, and is in need of a loan, is eligible to receive a National Direct Student Loan. National Direct Loans are given first to those students with the greatest need. Up to \$3,000 may be loaned to an undergraduate student over a two year period, with an additional \$3,000 permissible for the next two year period of undergraduate education making for a maximum of \$6,000.

Repayment provisions include: (a) a six month grace period following graduation or withdrawal during which principal payments need not be made nor does interest accrue; (b) a monthly repayment plan requiring a minimum payment of \$30 principal and interest, or if the size of the loan dictates, larger monthly payments so that the loan is discharged within a ten year repayment period; (c) 5 percent annual interest rate computed on the unpaid balance.

If a student defaults on an NDSL and the University is unable to collect, the Federal Government will take action to recover the loans. If he or she is discharged in bankruptcy, becomes totally or permanently disabled, or dies, the loan obligation will be cancelled.

DEFERMENT PROVISIONS FOR NATIONAL DIRECT AND GUARANTEED STUDENT LOAN PROGRAMS

1. Student Status—Payment is deferred for one year for every academic year and the repayment period is extended when a borrower is at least a one-half time student (NDSL), full-time (GLP), provided that student status is substantiated.
2. Military, Peace Corps, or Vista—Payment is deferred for one year for every year of service and the repayment period is extended when a borrower can verify such status up to a maximum of three years.

THE GUARANTEED LOAN PROGRAM

The Higher Education Act of 1965 established in each state a Guaranteed Loan Program (GLP). These loans are arranged by the student with his or her local bank. The Federal Government may subsidize the 8% simple interest charge while the student is at Brown. The maximum annual loan is \$2,500. In all cases the maximum for undergraduate study is \$12,500. Students interested in applying for GLP loans should consult loan officers in their local banks at least two months before the loan is needed.

Beginning in 1977, federal regulations require that first-time borrowers eligible for a loan from the Guaranteed Loan Program (GLP) first apply to their local bank for a guaranteed loan in the amount assured them by the University in its award letter. If the bank refuses to make the requested loan and gives the student a written statement to this effect, the University is then free to make the loan.

Parent Loans

Educational loans to parents are available through the Parent Loans for Undergraduate Students (PLUS) program, sometimes called the Auxiliary Loans for Assisting Students (ALAS) program. This loan does not affect the student's eligibility to participate in the Guaranteed Student Loan Program.

Under PLUS, a parent may borrow up to \$3,000 each academic year and up to \$12,000 over four years of college, per student. PLUS loans are administered like a traditional bank loan, but charging an interest rate of 12 percent and requiring the borrower to begin paying them off within 60 days after disbursement. Because the Federal government guarantees the loan, no collateral is needed. Since the length of repayment is five to 10 years, monthly payments for a \$3,000 loan are relatively low.

If a Parent is unable to get any of these educational loans from his/her local bank, Brown may be able to help. The University is authorized to act as a lender-of-last-resort to eligible borrowers and Brown will make a PLUS loan at the same terms a bank would charge. Contact the Financial Aid Loan Office to arrange for these loans.

Student Employment

Brown has always been proud of the many students who have earned a part of their college expenses through student employment. To help such students find jobs the Financial Aid Student Employment Office makes every effort to refer properly qualified men and women to potential employers. Through part-time employment over one-third of the students earn from \$50 to \$1300 during the academic year. Employment of this type need not seriously affect a student's time for academic and personal activities if intelligently planned. Many of the most active student leaders work several hours a day, and work schedules up to fifteen hours a week should cause no trouble. Many freshmen have successfully taken such employment, but, of course, in some cases it is preferable not to seek employment in the first year or at least in the first semester. Freshmen who do plan to work should file a preliminary application with the Student Employment Office during the summer. In the fall, after a student's schedule has been arranged, an interview is desirable to determine the type of employment best suited to the individual's previous experience, academic program, and financial need. Whenever possible the University employs students for suitable work in the various departments and agencies, and in the city there are many opportunities for ambitious and deserving students. In addition, many undergraduates are successfully placed in a variety of summer jobs.

College Work—Study Program

Citizens and permanent residents with calculated need qualify for College Work-Study Funds. Because the federal grant must be matched with institutional or non-profit institutional funds, summer as well as term-time jobs may be offered to half-to full-time students. In most cases, jobs received through the Financial Aid Student Employment Office will be subsidized by such funds.

In general, the salary will be based on the current minimum wage, but it may also be related to the type of work and the proficiency required. As with other campus-based aid, the work-study award is set by the aid office at a limit that cannot be exceeded. Thus, if a student has a \$1,000 CW-S award, regardless of the hourly wage, once he or she receives the \$1,000, he or she cannot continue to be employed under Work-Study for that academic year.

Departments, Divisions, Centers, Programs

General Information

TYPES OF COURSES OFFERED

There are several types of courses available at the University as follows:

Departmental Courses (including those offered by Divisions, Centers, and Programs), page 162.

Extra-departmental Courses, page 463.

Special Themes and Topics Courses, page 463.

University Courses, page 471.

Seminar Courses for Freshmen and Sophomores, page 480.

Modes of Thought Courses, page 480.

Special Themes and Topics/Seminar Courses, page 481.

Foundations Courses (Special Themes and Topics/Foundations), page 483.

Independent Study Plans, page 487.

Independent Study Projects, including Internships, page 487.

Group Study Projects, page 487.

Details concerning these courses will be found on the pages indicated, including course descriptions as appropriate; however, specific time schedules are not available in this catalogue. The University publishes a Course Announcement each spring for the following academic year. Reference should be made to this booklet for the courses offered each semester and for the times at which they are given. In general, courses are assigned to recitation groups, each group consisting of three fifty-minute periods a week. A schedule of these groups arranged according to days and hours appears on the inside back cover of this catalogue. The courses described in this catalogue and also those listed in the Course Announcement are subject to change. The University reserves the right to add or delete courses of instruction at any time without notice.

UNIT OF CREDIT

The semester course is the unit of credit. This is defined as one fourth of a student's normal program of academic work for one semester and for purposes of evaluation may be considered the approximate equivalent of four semester hours.

COURSE NUMBERING SYSTEM

Courses numbered 1 to 99 are open only to undergraduates. Courses numbered 100 to 199 are open to undergraduate and graduate students. Courses numbered 200 to 299 are open to graduate students and, by special arrangement, to undergraduates. Courses numbered 300-399 are open only to students enrolled in the Program in Medicine.

YEAR COURSES AND TWO-SEMESTER SEQUENCES

A dash between course numbers (for example, French 1-2) indicates a year course in which the grade at the end of the first semester is normally a temporary one; the final

grade submitted at the end of the course covers the work of the entire year and is recorded as the final grade for both semesters.

A comma between course numbers (for example, History 1, 2) indicates a two-semester course, the first semester of which is normally prerequisite to the second semester; two independent grades are submitted, one at the end of each semester.

Afro-American Studies

Associate Professors BASS, BELANCE (Emeritus), FRUZZETTI, JONES (Director), MOSES; Assistant Professors BROWN-COLLINS, DZIDZIENYO; Visiting Lecturers GLASCOE, OAKES.

The Afro-American Studies Program sees undergraduate education as important to its work. The Afro-American Studies faculty and a number of faculty in other departments offer a variety of courses in the arts, humanities, and social sciences, dealing with Africa, The Caribbean, South America, and the United States. The Program encourages systematic analysis and rational discussion of racial and cultural contacts in the modern world. The Program also aims at promoting healthy interaction between the races on the Brown campus and in the community of greater Providence.

Artists in Afro-American Studies through the powerful media of music, dance, and drama attempt to communicate the research of the Program's scholars to the public. The performing arts component of the Program, Rites and Reason, is the vehicle by which information is presented to citizens, and the means by which the public is afforded an opportunity through dialogue, to respond to the black studies faculty.

The Program aims at involving students in this process, not simply in the classes they take, but by training them in cooperative research and production activities. Concentration requirements for undergraduates are loose enough to permit students to explore the different conceptual worlds of the artist and the social scientist, yet rigid enough to force them to develop a perspective on what they have learned.

The Brown University Library system has collections of especial interest to those with an interest in Africana and Afro-Americana. The John Hay Library has the Harris Collection on American Poetry, Popular Entertainment and Plays, the McClellan Lincoln Collection, and the Metcalf Collection of pamphlets on issues between the Revolution and the Civil War. The John Carter Brown Library has probably the best collection in this hemisphere of works published in and about the New World before the 19th century. Included in its collection is much information on the slave trade, West Africa, abolition, black-Indian relations, the West Indies, slavery, the colonial Americas, the expansion of Europe, and Maroon societies. The John D. Rockefeller, Jr. Library has a goodly selection of anti-slavery tracts, some essential works by ethnologists and anthropologists concerned with Africa, the papers of the American Negro Academy, and the Negro Year Book. The University Library regularly issues reference guides for use by persons interested in Afro-American Studies.

UNDERGRADUATE PROGRAMS

At least eight courses in Afro-American Studies or closely related disciplines are required of concentrators; these must include Afro-American Studies 9, 10 and should

include Afro-American Studies 105 or 106. Because of the interdisciplinary nature of the Program, there is the danger that concentrators may disperse their energies and find themselves at the end of four years with a hodge-podge of facts and no systematic way of relating them. For this reason it is recommended that concentrators consult early and regularly with members of the faculty, and a meeting with a staff member is mandatory for concentrators during or before the first semester of their junior year.

Concentrators are required to take at least six courses in a single traditional discipline so as to develop a unified perspective on Afro-American Studies. No more than two of these courses may be Independent Study. Students are also required to demonstrate proficiency in a foreign language, either by completing two years of work at the college level, or by an examination given by a member of the faculty. Arabic, Spanish, French, Portuguese, and all African languages are useful, but other modern European languages (Dutch, Danish, German) will also be accepted. In extraordinary cases, and by special petition to the chairman of the Program, the language requirement may be waived. Concentrators with an interest in one of the social sciences are urged to make themselves familiar with various research methodologies by taking the appropriate courses.

Honors: Students with outstanding academic records may be admitted to the Honors Program in Afro-American Studies upon recommendation of a member of the faculty. Normally, such recommendations are made by the end of the first semester of the junior year. Honors students must take 105 or 106, and will be expected to prepare a research paper of distinguished quality in one of the latter two courses. Completion of these requirements does not automatically assure a student of receiving his or her degree with Honors, as the faculty must review and evaluate the work.

I. PRIMARILY FOR UNDERGRADUATES

9, 10. *An Introduction to Afro-American Studies* Ms. BROWN-COLLINS and Mr. MOSES. Introduction to modern history and culture of black populations in Africa, the United States and the Caribbean with current events an ever present concern. The role of political and economic forces in shaping literary ideological and artistic expression. Historical topics covered include the abolition of slavery in the Americas, the challenge to colonialism in Africa, and the development of a Pan-African tradition in journalism. The various approaches of art, psychology, folklore, history, semantics, literature, sociology, anthropology, musicology, and economics will be explored. An introduction to the bibliographies of each of these fields will be presented and discussed in its relation to the interdisciplinary field of Black Studies.

15. *African History and Society I* (Pre-Colonial and Colonial Africa 1450-1957)

Mr. DZIDZIENYO and Ms. FRUZZETTI.

A multi-disciplinary course provides students with an understanding of the African past so that they may intelligently confront contemporary Africa and the present black experience in America. The thrust is thematic rather than chronological and emphasis will be placed on discussion and the exchange of ideas. Readings drawn from history, anthropology, and literature.

16. *African History and Society II* (Independent Africa 1957-1980)

Mr. DZIDZIENYO and Ms. FRUZZETTI.

Focus is on post-colonial African development and its problems. Approach is multi-disciplinary and themes include: internal and external conflict, continental and regional integration, the African writer and his society, and politics of the armed forces and civil society. Not a chronological course—emphasis is on themes and their relationship.

17. *Afro-American History and Society*

Mr. JONES.

The course precedes Afro-American History and Society (AA 18) and ought ordinarily be taken before it. It is concerned with the history, culture and development of Afro-American Society in what is now the United States. Unlike most American history courses it is not Anglo-centric, but rather examines the evolving Afro-American culture in settlements undertaken by the French, Dutch, Spaniards, and Germans as well as the English. Among the topics explored are black Indian relations, role of blacks in the colonial American economics, emergence of Afro-American religion, music, and folklore, and the position of free blacks. Also examined is *maroonage*, black participation in the Revolution, the creation of Afro-American institutions, and the emergence of Afro-American ideologies in the wake of American independence. No prerequisites. Offered every other academic year.

18. *Afro-American History and Society*

Mr. MOSES.

Sequel to Afro-American History and Society (AA 17). Begins in 1789 and traces the development of social forces and the ways in which they have been shaped by ideas originating among the black population of the United States. Will examine, from a multi-disciplinary perspective, the development of mechanisms for self determination by black Americans. Will focus on the development of the black press, the black church and other institutions by means of which black Americans began to shape their own destinies. Will cover abolitionism, reconstruction, migration, urbanization, and the political struggles of the 1950's and 1960's. Discussion periods will be arranged so as to encourage students to draw parallels between past and current events.

19, 20. *Caribbean History and Society*

Mr. JONES.

This year long course aims at familiarizing undergraduates with the history, peoples, cultures, and societies of the Caribbean. It adopts a multi-disciplinary perspective on the region examining the music, dance, folklore, family structure, and religion of the Caribbean as well as exploring its economic and political evolution. The first semester examines the Carib and Arawak background, the first Spanish colonies, the challenge to Spanish hegemony by other European powers, Maroon societies, and the transit of European and African civilizations to the New World. It also explores emergent Caribbean cultures and multi-racial societies. The first semester ends with the Revolutionary Era and the second begins by exploring the consequence of the failure of most of the Caribbean to win independence from Europe. The second semester also reviews the impact of imperialism and racism on the Caribbean, the migration of Asians and East Indians to the region, the end of slavery, the Caribbean family, the consequences of the Spanish American War, the Marine occupations, the movement for independence in the British West Indies, the Cuban revolution, and recent events in such areas as Puerto Rico, Cuba, Jamaica, Haiti, Martinique, Trinidad, and Grenada. No Prerequisites. Offered every other academic year.

21, 22. *Blacks in Latin American History and Society*

Mr. DZIDZIENYO.

The role of blacks in the national histories of Latin American countries and their role in contemporary society. Focus on Hispanic America. Issues include comparative slavery and race relations and their bearing on national and international politics of these countries, black socio-cultural and political movements and the issue of race and class in Afro-Latin America. In the second semester, particular attention to the role of black Latin Americans in the recent politics of the African Diaspora, the implications of the assertion of Africanity within Latin American politics and the theory and practice of race relations and politics in Latin America and the United States of America. Readings are multi-disciplinary. While a reading knowledge of Spanish is not a prerequisite, students with such knowledge should inform the instructor by the end of the first week.

II. FOR UNDERGRADUATES AND GRADUATES

101A. *Special Topics in Afro-American Studies: Voices from Beneath the Veil*

Mr. BASS.

Thirty plays written by Afro-American playwrights and presented on the American stage between 1858 and 1970 will be examined as cultural and historical documents of Afro-American realities. Supplementary readings from the humanities and social sciences will provide critical frameworks for in-class discussions and student papers.

101B. *Special Topics in Afro-American Studies: Black Psychology*

(Special Themes and Topics 104)

Ms. BROWN-COLLINS.

Introduction to the issues and perspectives in the study of the psychological development of black people in America, past and present. Special consideration to such issues as: The Afro-American and Euro-American ethos, the nature of Black personality as impacted upon by slavery and racism, psychological assessment of blacks, treatment and counseling techniques, and the relationships between psychological research and social policy in American research. Prerequisite: Psychology 1 or written permission.

101C. *Special Topics in Afro-American Studies: Introduction to the Afro-American Literary Tradition*

The STAFF.

Explores the published works of black writers and seeks to introduce students who have little knowledge of Afro-American literature to the genre. Students are encouraged to read widely, but not superficially in the many varieties of black thought. Emphasis on understanding the complex web of relationships among black literature, black life, and black political thought.

101D. *Special Topics in Afro-American Studies: The Making of a Contemporary Myth*

Mr. BASS.

Faculty in Afro-American Studies at Brown and members of Rites and Reason (the arts component of the Program) are building a myth set in Providence that interprets the making of America and New World societies from an Afro-American perspective. A community collaboration that includes school children, senior citizens adult groups, university students, artists, scholars, professional and business persons, church groups and community centers is being used to approximate the collective process of myth making in the oral tradition. Two community rituals, Providence Festival I; Jamm in the Key Z (1976) and The Blacker the Berry (1980) have resulted from the method and focus of the collaborative myth-making. Apocalypso: The Diary of a Dreamer will be the third part of the projected five-part mythic cycle. This course will examine the collaborative effort to build a contemporary myth located in the shared perceptions and realities of the people of Providence as well as document and evaluate the making of Apocalypso. Selected readings of myths and literature on myth-making from humanities and social science disciplines will be used to provide a critical focus for the semester-long inquiry.

102A. *Special Topics in Afro-American Studies: The Afro-Luso-Brazilian Triangle: Socioracial and Political Perspectives,*

Mr. DZIDZIENYO.

Focuses on recent political developments in the historical triangular relations among continental Africa, Brazil, and Portugal. Topics to be included: Luso-Brazilian relations and independence movements in Luso-phone Africa, Afro-Brazilians and Brazil's African relations, and post-colonial bilateral or multi-lateral relations within the Portuguese-speaking world. Conducted in English. Written permission required.

102B. *Special Topics in Afro-American Studies: Afro-American Folk Traditions and the Aesthetics of Change*

Mr. BASS.

This seminar systematically explores the link between black folkthought and the interpretation of Afro-American realities in folk and academic art from a multi-disciplinary perspective. Readings not only from the arts but from the humanities and social sciences as

well. Particular attention to the relationship between the evolving Afro-American aesthetic and the role of folk art in the struggle for black liberation.

102C. *Special Topics in Afro-American Studies: The Black Family* Ms. OAKES.

An overview of the African-American family in sociological, psychological, economic, anthropological, and historical perspective. Seeks to unravel the complex interplay of self-definition and definition of the other among black women, men, and children within the context of the African-American family. Changing sex roles among black women and men are also explored.

102D. *Special Topics in Afro-American Studies: This is the Time: Protest and War in Central and Southern Africa* The STAFF.

Students will read a great deal of southern and central African Poetry not ordinarily available in the United States, but more importantly will have the chance to put this poetry in the context of the continuing struggle by African peoples for liberation. Examines the direct link between the political and economic struggle for freedom and poets who seek to be a voice in the struggle.

102E. *Special Topics in Afro-American Studies: Black Women in the Americas* Ms. OAKES.

This seminar explores, from a multi-disciplinary perspective, the characteristics, lifestyles, and reflective thought of black women in the western hemisphere. It not only draws upon essays, novels, sociological studies, historical works, poetry, and fiction, but makes students in the course aware of an on-going project concerned with black women in greater Providence.

103. *Politics and Religion: Contemporary North African Societies* Ms. FRUZZETTI.

Politics and the changing political structure in North Africa. Post colonial history will serve as a tool for an understanding of present social and political conditions. The study of Islam as part of a cultural and political system provides an understanding of the intricate relationship which exists between politics and religion in North Africa. Will cover Morocco, Africa, Tunisia, Algeria, Libya, Egypt, and the Sudan.

105. *Seminar in Afro-American Studies: Black Leadership in the Twentieth Century: Focus on W. E. B. DuBois* Ms. GLASCOE.

A survey of the life and writings of W. E. Burghardt DuBois (1868-1963) founder of the NAACP and first editor of its official journal, the *Crisis*. DuBois was the author of over thirty books, including five novels, and some of the classics of 20th century sociology and social history. DuBois was one of the first scholars to insist on the importance of central Africa to the development of the world's civilization. He was first to advocate that slavery must be understood as an economic force and not as a badge of shame.

106. *Seminar in Afro-American Studies: The Slave Community* Mr. JONES.

Knowledge of life within the slave quarters has expanded tremendously over the past decade and a half. The course will draw on recent works in the exploration of such issues as slave diet, religion, family life, social structure, relations between the sexes, economic activities, and political aspirations.

121. *Afro-Brazilians and the Brazilian Polity* Mr. DZIDZIENYO.

The participation of Afro-Brazilians in Brazilian Society and politics in the 20th century is explored. Not a chronologically oriented course but rather a thematic examination of political movements and organizations with specific reference to Brazilian blacks. Topics include: the uses and exploitation of the "African Heritage," a comparison of race and politics in Brazil and the USA, and the Afro-Brazilian role in Brazil's contemporary relations with Africa. While reading knowledge of Portuguese is not required, students with such background should immediately apprise the instructor of the fact.

140. *Origins of Black American Literature*

Mr. MOSES.

Survey of writings in the English language of Africans and Afro-Americans from 1770-1920, with primary focus on the United States. Fiction, drama, and poetry will not be excluded, but greater attention will be given to letters, autobiographies, formal sermons, political tracts, diaries, journalism, and oratory. Constant consideration of the influences of English, African and Afro-American writing on the early development of an Afro-American literary tradition will be encouraged. The following writers, among others, will be considered: Phillis Wheatley, David Walker, Frederick Douglass, Alexander Crummell, Edward Wilmot Blyden, Booker T. Washington, W. E. B. DuBois, Sutton Griggs, Marcus Garvey, and Mary Church Terrell. Selected Anglo American authors including Harriet Beecher Stowe and Joel Chandler Harris will receive some attention.

141. *Africans and the West: Studies in the History of Ideas*

Mr. MOSES.

Based on a series of lectures delivered by the instructor at several African universities, this course offers an introduction to primary and secondary sources in the history of political philosophy and social change among the African peoples from the age of the slave trade to the present. The political and ideological interaction between continental Africans and Africans of the diaspora (people dispersed by the slave trade) will be a major concern of this course. Considerable attention will be focused on African adaptation of Marxism, Freudianism, and existentialism.

154. *Multi-racial Societies in the Americas before 1800* (History 154)

Mr. JONES.

Social scientific conceptual schema are utilized in this study of the social significance and cultural meaning of race in the New World prior to the nineteenth century. Among the colonies studied are Brazil, Haiti, Surinam, Paraguay, and New Spain, as well as settlements in British North Africa. At least one course in History or Afro-American Studies is required for admission.

155. *Slave Societies in the English Speaking Caribbean* (History 155)

Mr. JONES.

Slave societies in such English speaking Caribbean colonies as Old Providence, Barbados, Florida, Belize, Jamaica, Trinidad, St. Kitts, and St. Vincent. Topics will include slave societies, Afro-Caribbean institutions, the sugar economy, maroon societies, mulatto populations, Afro-Indian communities, and emancipation. At least one course in History or Afro-American Studies, or written permission is required for admission.

166. *Problems in Afro-American History* (History 166)

Mr. JONES.

The course is in no sense an overview of Afro-American History, but rather seeks to explore issues that have been important in the evolution of black societies in the New World. Among the topics examined are the cultural unity of West Africa, the transit of West African civilization to the Americas, race relations in the colonial Americas, varieties of American slavery, the black response to slavery, the colonial roots of black nationalism, black ideologies, race and class, the black family in sociological thought, and cultural deprivation.

191, 192. *Independent Reading and Research*

The STAFF.

Work with individual students in connection with directed readings, problems of research, preparation of theses, or field work.

197C. *Comparative American Slavery* (History 197C)

Mr. JONES.

The literature on the treatment of African slaves and their Afro-American off-spring by the different European powers engaged in the colonization of the New World is vast and complex. Examines the major schools of thought. At least one course in History or Afro-American Studies required for admission.

The Center for Alcohol Studies

The Center for Alcohol Studies was formally established by President Swearer in 1982 and consists of affiliated multi-disciplinary faculty members who conduct psycho-social and bio-medical research.

The purpose of the Center is to reduce the health risks associated with excessive alcohol use through application of research findings to the development of alcohol and drug related public health policy. Such policies address methods of intervention into the interaction of excessive drinking with chronic disease, personal and familial dysfunction, lowered work productivity, and accidental injury and death which increase the costs of health care, goods and services, and security for society as a whole. Of particular interest are the needs of special populations such as adolescents, the elderly, and children of alcoholics.

Some of the types of activities the Center currently engages in are as follows: collaborative research projects with faculty and other university centers, state policy makers, and community service providers; guidance and support for undergraduate and graduate student research projects; post-doctoral fellowship program; resource development, technical assistance, and sponsorship of journal clubs and colloquia on alcohol issues; education of medical students, residents, and physicians on alcohol diagnosis and intervention; and alcohol education with campus and community groups.

If you would like to become involved with Center activities, please contact the Director, David C. Lewis, M.D., Donald G. Millar, Distinguished Scholar in Alcohol Studies, or Carol N. Williams, Ph.D., Project Coordinator.

American Civilization

The Program in American Civilization is directed by an Executive Committee composed of Professor BRUCE A. ROSENBERG (Chairman, English and American Civilization), Professor DAVID H. HIRSCH (English), Professor CHARLES H. NICHOLS (English), Associate Professor MUTLU K. BLASING (English), Associate Professor MARI JO BUHLE (American Civilization and History), Associate Professor HOWARD P. CHUDACOFF (History), Associate Professor WILSON J. MOSES (Afro-American Studies and American Civilization, on leave 1983-84), Assistant Professor RICHARD A. MECKEL (American Civilization), Mr. ROBERT G. LEE (Assistant Dean of the College), Mr. PATRICK M. MALONE (Lecturer in American Civilization and Director, Slater Mill Museum Site), and Mr. DAVID MARC (Lecturer and Executive Secretary American Civilization).

Brown University offers unusual facilities for research in American Civilization. The Americana of the John Carter Brown Library, the Harris Collection of American Poetry and Plays, the McClellan Collection of Lincolniana, and other special resources in the Libraries of Brown University afford a wealth of material for American studies. These resources are appreciably supplemented by the extensive holdings of the Library of the Rhode Island Historical Society, the Providence Athenaeum, and the Providence Public Library.

UNDERGRADUATE PROGRAMS

Concentration in American Civilization is designed to offer undergraduate students at Brown University the opportunity to study intensively the history, literature, and general culture of the United States. With the collections of Americana in the John Carter Brown Library and in the John Hay Library, Brown has unusual facilities for this type of study.

There are no prerequisites for concentration in American Civilization, but students are advised to consider taking American Civilization 1, two courses in American History and/or two courses in American Literature before the junior year. The courses in English and History or their equivalents are required of all concentrators, along with American Civilization 190. Candidates for honors are required to enroll in American Civilization 190 in the first semester of their junior year. They must also complete American Civilization 180 (the honors seminar) and American Civilization 192 (an honors project). All concentrations are planned in consultation with the undergraduate advisor, and students should contact their advisor before the second semester of their sophomore year.

GRADUATE PROGRAMS

Graduate study in American Civilization is intended to encourage the interdisciplinary study of American history, literature, society and culture. While the program does not attempt a formal synthesis of traditional scholarly fields, it does attempt to foster such insights as may be available only to a person who is at home in more than one body of knowledge and who is thus prepared to examine a civilization from an interdisciplinary point of view. According to their aptitudes and interests, students may pursue graduate work in history, literature, anthropology, folklore, political science, philosophy, religion, art and architecture, and any other discipline that may contribute to an understanding of the United States.

MASTER OF ARTS: The program of a candidate for the degree of Master of Arts will be planned individually to fit the background, interests, and intentions of the candidate. Eight units of coursework are required, including at least four graduate seminars, one of which must be American Civilization 201. Under the direction of the Chairmen of the American Civilization Program, the Executive Secretary is the advisor of all graduate students and must approve their programs.

DOCTOR OF PHILOSOPHY: Through a flexible program of graduate seminars, coursework, and independent reading, planned in consultation with the graduate advisor, students working towards the degree of Doctor of Philosophy prepare themselves for a preliminary oral examination in four fields of study. These four fields may be conceived either traditionally (e.g., American Colonial History, Historical Archaeology, Religion in America, The Novel in 20th Century America) or topically (The Family in American History, The Image of Women in the Domestic Novel, The Sociology of Modern Corporations, Religion and the Counter-Culture). These fields are defined by the student in consultation with the faculty members who will conduct the oral examination. It is expected, however, that the four fields will be related to one another in a manner that will reflect, not only depth, but also breadth and coherence. No more than two of the four fields may be in the same discipline, and the candidate's fields must be approved by the Executive Committee. At least two full years of course work (sixteen courses) are necessary for preparation for the preliminary examination.

All graduate students are required to enroll in American Civilization 201 during their first semester at Brown. This seminar is designed to examine an American period or topic from several points of view and to introduce students to scholarly research and writing.

Doctoral dissertations must be significant contributions to scholarly knowledge of an interdisciplinary nature. The dissertation topic must be approved by the Executive Committee.

I. PRIMARILY FOR UNDERGRADUATES

1. *Introduction to American Civilization: Ideas and Methods*

The STAFF.

An extensive survey of American Civilization as it is viewed by a number of different disciplines in the humanities and social sciences.

51, 52. *Introduction to Folklore*

Mr. ROSENBERG.

Introduction to the theory, methodology, and genres of American folklore. Collection of data, methods, and systems of classification and analysis, and familiarization with genres will be emphasized. The goal will be to develop techniques for the study of civilization from the perspective of small, homogenous "folk" groups.

II. FOR UNDERGRADUATES AND GRADUATES

152, 153. *Technology and Material Culture in America*

Mr. MALONE.

Selected topics from the 17th Century to the present will be covered in readings, slide lectures, and field trips. Crafts, architecture, transportation, city plans, and other subjects within the field of material culture.

161A. *Theories and Methods of Folklore*

Mr. ROSENBERG.

Examines the theoretical bases of folktale scholarship and methods by which those theories are implemented.

161B. *The Immigrant Experience*

Mr. MECKEL.

Focuses on the self-described experiences of those immigrants to America whose descendants constitute much of that large and heterogeneous group known today as white ethnics.

161C. *Ambition and Hedonism in American Culture*

Mr. MARC.

This course will survey what has been called "genteel" and "organic" impulses in American culture: Puritans and Heathens; Land Barons and Cowboys; Horatio Alger and Walt Whitman; Kultur vs. culture.

161D. *Death and Dying in America*

Mr. MECKEL.

Focus on American death-related behavior from social economic, psychological and cultural perspectives.

161E. *East Asian Relations*

Mr. LEE.

Deals with the relationships between America and the societies which lie in an arc from Korea to Vietnam along the western shore of the Pacific.

161F. *Asian Immigration to the United States*

Mr. LEE.

This course will examine the impact of Asian immigration on various fundamental aspects of American society.

163, 164. *History of American Women*

Ms. BUHLE.

Survey of women's history in the United States from colonial era to the present. Examination of the prevailing cultural prescriptions of Womanhood as related to the social context of daily life. Semester I: pre-industrial society, industrialism and woman's culture, the Woman's Rights movement, and social diversity of the Gilded Age. Methods of interpretation will be the primary concern. Semester II: New Woman and progressivism, the transformation of feminism in 1920s, individualism and mass society, and the emergence of the Women's Liberation movement in the 1960's. Interdisciplinary methods and research will be emphasized.

180. *Honors Seminar*

Mr. MARC.

Interdisciplinary interpretations of American experience. Selected topics. Required for Honor candidates.

190. Undergraduate Seminars in American Civilization

(Note: More than one American Civilization 190 may be taken for credit.) These courses are small interdisciplinary seminars for undergraduate concentrators. The topics vary from year to year, and all are designed to reflect the interests of students in the program. Examples of topics for 1983-84 include: The New England Town: From Plymouth to Peyton Place; American Women Playwrights of the 20th Century; American Society and Culture in the 1920s; Faulkner and the Literature of Unofficial History; the Harlem Renaissance; the Image of the Indian in American Art and Literature and The Halcyon Fifties.

192. Independent Reading and Research

Required of Honors candidates in the senior year. May be repeated for credit.

III. PRIMARILY FOR GRADUATES

201. Introduction to Interdisciplinary Methods

The STAFF.

Required for first year graduate students in American Civilization.

250. Problems in American Civilization

Mr. MALONE.

Topic: Industrialism in America: A Problem in Museum Interpretation. Open to all graduate students and to advanced undergraduates with written permission. The historical theories of industrial development and discussion of museum interpretation of this important subject. Involvement in the operation of a nearby industrial museum, The Slater Mill Historic Site.

263. Seminar in American Labor History

Ms. BUHLE.

Topics in cultural and institutional forms of working class life, historiography, and research. Topic for 1981-82: Women's Work: Family and the Labor Market, 1865 to present.

290. American Civilization Practicum

This course is designed to provide graduate students with significant and rigorous field-work learning experiences in agencies involved in the study and recording of American culture. Students will be assigned to one of several such agencies and will be required to acquire general background in that agency's field and to undertake a project that will provide knowledge and experience. Possible fields include museums, historical preservation, and archives and libraries. Students will work closely with agency supervisors and with a faculty coordinator.

*291, 292. Independent Reading and Research**Ancient Studies*

The Program in Ancient Studies is administered by a director (Professor TOOMER, History of Mathematics) and an executive committee composed of Professors RAAFLAUB and WYATT (Classics) and Professor MOEHRING (Religious Studies). Participants in the program include many faculty members from the Departments of Art, Classics, Egyptology, History of Mathematics, Philosophy and Religious Studies. The aim of the program is to promote understanding and study of the ancient world as a whole.

UNDERGRADUATE PROGRAM

The concentration in Ancient Studies is designed to encourage broad interests in the ancient world, including Mesopotamia, Egypt, ancient Israel and India as well as Greek

and Roman civilization. There are presently three standard concentration patterns, but concentrators may also, with the approval of the executive committee, propose individual programs within the general framework of ancient civilization.

Requirements:

1. Ancient Studies 1 and 2. The Ancient World. For a detailed description see Foundations Courses F13 and F14.
2. (Ancient History pattern). 4 courses from: Classics 121, 122, 131, 132, Egyptology 143, 144.
(Ancient Religion pattern). 4 courses from: Religious Studies 15, 16, 51, 63, 71, 72, 81, 82, 161, 164.
3. 4 other related courses. Recommended electives are: Art 42, 43, 143; Classics 54, 55, 57, 58, 113, 114, 116, 118, 121, 122, 129, 131, 132, 136, 151, 157; History of Mathematics 143, 144, 152, 153; Religious Studies 15, 16, 51, 63, 71, 72, 81, 82, 117, 161, 164, 171, 188, 190, 194, 195, 196; Judaic Studies 111, 112; Egyptology 131, 132, 143, 144, 143A, 143B; Philosophy 180; Engineering 94F.

Honors:

1. Ancient Studies 191, 192. Honors Thesis.
2. (a) Ancient History and Ancient Religion patterns; requirements as above, except that only 3 related courses are required. In addition, the candidate for honors must have passed one intermediate-level course in an ancient language (Egyptian, Hebrew, Aramaic, Sanskrit, Greek or Latin).
(b) Languages and Literatures of Greece and the Ancient East (available only as an honors concentration). Requirements: Ancient Studies 1, 2; 2 100-level courses requiring one of the languages Egyptian, Hebrew, Aramaic or Sanskrit, plus 2 courses in the literature or culture associated with that language; 2 100-level courses requiring knowledge of Greek, plus 2 courses in classical literature or culture. Interested students should discuss the program with Professor Toomer.

Anthropology

Professors ANDERSON (Chairman), GOULD, HEATH, JAY, LEIS; Associate Professors BEEMAN, FRUZZETTI, HICKS, LAMPHERE, Associate Professors (Research) NEWMAN, SCHMIDT; Assistant Professors HOLLOS, RUBERTONE.

The program of graduate instruction in the Department of Anthropology prepares students for a professional career in social and cultural anthropology, archaeology and linguistics. Faculty research experience covers many areas of the world: North and South America; the Circumpolar Region; Europe; Middle East; Asia; Africa; and Australia.

As part of its regular curriculum, the department has an orientation toward the study of cultural change in general and the following problem areas in particular:

Interethnic relations. Emphasis is given to the comparative study of institutions and cultural change in societies of various types, ranging from non-literate communities to complex societies. The program prepares students for research and teaching on problems of cultural dynamics in pluralistic settings. There are opportunities for preliminary summer field research in Rhode Island, with its multiethnic population, before undertaking dissertation projects in other parts of the world.

Archaeology. The curriculum integrates the archaeological discipline with methods and theory of social/cultural anthropology. There is special emphasis on the application of ecological, ethnohistoric and ethnographic data to archaeological problems, and the establishment of sound cultural sequences in selected world areas. Students are encouraged to utilize interdisciplinary approaches to generate archaeological research problems. The Laboratory for Circumpolar Studies, Foundation for African Studies, the John Carter Brown Library, and excellent collections of the Haffenreffer Museum of Anthropology offer a wide range of research possibilities.

Cognition and Communication. Emphasis is on the study of the role of cognition and communication, and the structure and use of symbolic systems. A joint program with the linguistics department offers the opportunity for additional training in formal linguistics.

Museum Studies. A two year graduate program in museum studies, a joint program with American Civilization, began in 1978. The program emphasizes either of the two disciplines and has more required courses than other graduate programs, as well as mandatory summer internship at various museums.

Population Studies. In cooperation with the University's Population Studies and Training Center, the department is able to offer a degree in anthropology with a major focus on population. The Center is a multidisciplinary unit involving sociology, history, the Bio-Medical Programs, and other departments, as well as anthropology. In addition to courses on demography and population, research facilities associated with the Center include Data Banks, a Demography Library, Population Research laboratory, and Social Science Data Center, which contains a variety of electronic desk calculators, key punches, and terminals tied into the University's central computing system.

EuroAmerican Ethnology. Several faculty and graduate students have conducted fieldwork in various European countries and EuroAmerican groups in the United States and Canada. The department welcomes students with research interests in modern European and EuroAmerican problems. The department's resources are enlarged by its links to the excellent facilities and faculty of the departments of English, History, and Sociology and the graduate program in American Civilization.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

A minimum of eight courses is required for the standard concentration. Candidates for honors must take no less than ten courses, including a thesis as part of an independent study project (Anthropology 193 and/or 194). The Senior Conference (Anthropology 198) is also included in the honors requirement; it is highly recommended for all concentrators.

A concentrator develops an individually focused program or "track" of study composed of a series of courses, through consultation with his or her faculty advisor and as approved by the Undergraduate Coordinator. A track should meet two objectives: 1) it should provide a sustained and integrated study of a topic or theme; and 2) it should have sufficient breadth to touch on the various contributions anthropology brings to the study of the human condition.

The department has designated a series of clusters, courses of varying levels of difficulty that focus on particular problem areas. A student's track may fall within one of these clusters or may cross-cut them in keeping with the desired objectives.

Clusters set out by the department include: Development and Tradition; Cognition and Communication; Cooperation, Conflict and Conflict Resolution; Culture and Environment; Archaeology of Complex Societies; Archaeology of Small-Scale Societies; Experi-

mental Archaeology; Living Archaeology; Health and Community; Comparative Sex Roles; Complex Societies; and Symbolic Worlds.

The course numbers reflect the levels of experience expected of students. Courses numbered below 100 are for students without an anthropological background: 100-level courses presuppose at least one previous course in the department (or permission of the instructor). 200-level courses are primarily for graduate students, but advanced undergraduates are encouraged to enter with permission of the instructor. When relevant, a course from another department or program can be substituted for one of the eight (or ten) required number of courses.

A project of independent study (Anthropology 193 or 194) may be accepted for concentration. Projects should be planned in consultation with a faculty member and might include assisting in archaeological or social anthropological research, designing and setting up exhibits at Haffenreffer Museum, or research on a topic of the student's interest.

Concentrators are encouraged to supplement their programs with the study of a foreign language and with courses in closely-related fields such as Biology, Egyptology, Geology, History, Linguistics, Psychology, and Sociology.

GRADUATE PROGRAMS

MASTER OF ARTS. The successful completion of eight approved semester courses, demonstration of research skills as evidenced by a research paper are required for the degree, and successful completion of a comprehensive examination.

Students are encouraged to study foreign languages and to acquire other skills, such as computer applications, related to their fields of research interest.

DOCTOR OF PHILOSOPHY. Students can generally expect to complete all requirements for the doctorate, except field work and the dissertation, within three years. Besides fulfilling the general requirements set by the Graduate School, to be admitted to Ph.D. candidacy a student is required to:

1. Fulfill the requirements for the M.A. degree.
2. Pass the Preliminary Examination. The examination is given orally, or in written form, or both, at the option of the faculty committee in consultation with the student. It should be taken by a student's fourth semester in residence (but not later than May 15 of that semester). Extension to the fifth semester may be requested. The objectives of the Preliminary Examination are to provide the faculty with an opportunity to evaluate a student's mastery of anthropological literature and to provide the advanced graduate student with an opportunity to explain in detail the ways in which his interests relate to the discipline as a whole. A student should demonstrate a thorough knowledge of method and theory either in social and cultural anthropology or in archaeology, and more specifically:
 - a) method and theory related to selected problems of anthropological concern (such as "religion," "political organization," "peasantry," "urbanization," "neolithic," "cultural ecology," etc.) using data drawn from various parts of the world, and
 - b) the ethnography or archaeology of at least one major world area, and the theoretical problems pertinent to that area.

Each student should request written approval from his Prelim Committee for the choice of theoretical aspects and world areas no later than two months before the examination.

3. Demonstrate a knowledge of those foreign languages requisite to doing field work in

the area selected for research. In all cases, a reading knowledge of at least one foreign language, approved by the department, is required and may be demonstrated either by written examination or by obtaining a grade of A or B in a 2-R course. With permission of the department, foreign students whose mother tongue is not English may use English to fulfill the language requirement.

4. Propose a research topic for a Ph.D. dissertation. A research proposal must be accepted by his or her faculty committee, composed of the dissertation advisor and two other faculty members, before a student applies to research foundations for support. Deadlines for applications to foundations usually occur at least nine months before the research project is to begin. Upon having the proposal accepted by his committee the student should distribute copies of his proposal to all faculty members and other graduate students.

Upon being admitted to candidacy a student completes the requirements for the Ph.D. degree by engaging in field work, writing a Ph.D. dissertation, and defending it.

1. Field Work: research for the dissertation may be carried out in any part of the world. The amount of time to be spent in the field depends on the problem, but a least a year and usually no more than two should be sufficient. A dissertation utilizing library materials alone may be substituted only in exceptional cases.
2. Ph.D. Dissertation and Examination: The specific procedures for preparing the Ph.D. dissertation are found in "Instructions for the Preparation and Presentation of Theses for Advanced Degrees," issued by the Graduate School. In order to receive the Ph.D. degree at Commencement in June, a candidate must submit the completed manuscript to his committee at least one month prior to the deadline set by the Graduate School for receipt of dissertations.

I. PRIMARILY FOR UNDERGRADUATES

10. *Cultural Meaning and Social Order: An Introduction to Cultural Anthropology*

Mr. HICKS.

A general inquiry into the question "What is Man?", emphasizing both the unity and the diversity in human culture. Emphasis on learning about ourselves by studying the varieties of social, economic and political systems, communicative processes, arts, and religions found among the world's people.

11. *Peace and War*

Mr. LEIS.

After reviewing the nature-nurture question of whether peaceful cooperative behavior is basic to human nature, the course will explore the connections between assumptions about humanness and social-cultural theories of social stability, power, rationality, conflict, and revolution.

12 *Magic, Science, and Religion*

Mr. JAY.

What is 'religion'? is the central topic, and the question is put to the students' experience, to the experiences of articulate and reflective "natives", and to the thought and work of major anthropological figures. The aim is not to gain a definitive answer, or answers, but to use the question to push out the limits of students' understanding on that mysterious topic.

13. *Cultural Ecology and Change*

Mr. HEATH.

Analysis of change (and continuity) in patterns of human belief and behavior, with special emphasis on relations to the environment. Theoretical and practical implications for the individual, society, and culture are considered. Illustrative case-studies include aspects of contemporary urban-industrial life as well as tribal and peasant cultures around the world.

14. *Women, Work, and Family*

Ms. LAMPHERE.

An introduction to broad issues concerning the relationship between work and family life with an emphasis on women's roles. Using data from anthropology, history and sociology, the first part will focus on 19th and 20th century U.S. experiences of women in selected ethnic groups (European immigrant women, Blacks, Hispanics, and Native Americans) as well as with the relationship between women, work, and family in Latin American countries.

20. *Culture and Human Behavior*

Ms. HOLLOS.

Principal objective is to examine stages of the human life cycle in a cross-cultural context. Problems and results in the field of psychological anthropology will be presented within this framework, including the relation between culture and personality, cross-cultural differences in perception, cognition, intellectual and personality development and the contemporary study of mental disorders.

22. *Transitions in Human Life*

Ms. HOLLOS.

This course will examine the human life cycle in a cross-cultural perspective, focusing on the life crises or transition points between different periods. Life crises may be taken to mean those periods in the life span in which there is some interruption in continuity—a transition from one culturally defined stage of life to another, and at which there is regularly expected individual stress. The course will concentrate on six critical transitions—birth, infancy to childhood, puberty, marriage, menopause and death. While the focus of interest is in the transition, it will be dealt with in the context of the periods of human life to which they mark entrances and exits.

50. *Interpreting Our Past: Introduction to Archaeology and Prehistory*

Mr. GOULD.

The physical origins of man and the development of human culture as revealed by archaeology. Focus on the significance and history of discovery of man's fossil ancestors, on the description and comparison of prehistoric lifeways, and on patterns of cultural development in response to changing habitat and technology. Basic principles and methods of archaeological research.

51. *Experimental Archaeology*

The STAFF.

The testing and refinement of archaeological techniques, methods and theory through the use of controlled data from historic and modern contexts.

80. *Sound and Symbols: Introduction to Linguistic Anthropology*

Mr. BEEMAN.

An introduction to the study of human communication emphasizing particularly the relationship between language and culture. Topics will include: "animal language"; the question of chimpanzee communicative competence; the effects of vocabulary and grammatical structure on human "world view"; language differences within society; and creative use of communication in literature, advertising, interpersonal interaction, and mass media.

II. FOR UNDERGRADUATES AND GRADUATES

100. *Communities*

The STAFF.

The course will survey a variety of types of communities ranging from small scale societies to ethnic groups within complex societies and will attempt to draw generalizations towards the definition of the concept of "community."

101. *Pluralism and Ethnicity*

The STAFF.

Relations among groups in the urban context of modern, complex societies are examined, using selected ethnographic materials. Some specific topics are: cultural and structural pluralism; assimilation, stratification, and boundary-maintenance of ethnic groups.

102. *Phenomenological Approaches to Anthropology* Mr. JAY.
To reveal and subject to critical examination the situatedness of anthropological description, as exhibited in that of the writer (the fieldworker) and that of its readers (course members). A small number of outstanding descriptive works that reveal specific phenomenological approaches are supplemented with carefully selected material.
105. *Development and Change in Small Scale Societies* Mr. ANDERSON.
A study of the problems of adaptation of hunting, fishing and gathering, and small-scale horticultural peoples throughout the world to changing natural, socioeconomic, and political environments. Particular attention will be given to the problems of indigenous ethnic minorities as perceived by themselves and by their national governments.
110. *Circumpolar Ethnography* Mr. ANDERSON.
A study of the traditional and modern Eskimo and other Arctic and sub-Arctic cultures focusing on the response of small-scale societies in the north to a changing ecology.
111. *Black Africa in Anthropological Perspective* Mr. LEIS.
An interpretive description of "traditional" cultures found in Sub-Saharan Africa; a review of theories offered to explain similarities and differences among them; and analyses of selected problems related to the development of colonial and post-independence societies.
112. *Peoples of Latin America* Mr. HEATH.
Exploration of both the unity and diversity found among contemporary societies and cultures throughout mainland Latin America. Emphasis is on the interrelations of values and behavior patterns with economic and political institutions; selected case studies include urban-industrial populations as well as tribal and peasant communities.
113. *European Ethnography* Ms. HOLLOS.
Principal objective is to familiarize students with the societies and cultures of Europe from an anthropological perspective. Historical material will be provided for the understanding of current cultural, linguistic, religious, and ethnic variation. Major emphasis on the analysis of a range of contemporary communities, from peasant to urban, from East to West, and from North to South.
114. *Native American Cultures* Ms. LAMPHERE.
An introduction to the cultures and contemporary status of Native Americans. Lectures, readings, and discussion will draw on selected case studies of Native American cultures. The history of American Indian contact with Europeans and issues relevant to present day reservation life will also be examined.
115. *The Middle East in Anthropological Perspective* Mr. BEEMAN.
Emphasis on the need to develop an understanding of the cultural bases of life in the Middle East, including Iran and Afghanistan. The role of Islam, ecological adaptation, problems of development, and sources of social conflict as a basis for comprehending contemporary issues in the region.
116. *Anthropological Perspective on Contemporary America* Mr. HICKS.
Selected aspects of American life are critically examined from the comparative perspective of anthropology. Emphasis is on analysis of American institutions, values, and the logic of public policy.
118. *Japanese Culture and Society* Mr. BEEMAN.
An interdisciplinary overview of Japanese society drawing on insights from anthropology, sociology, literature, history, political science and economics; but focusing on continuity and change in Japanese cultural tradition.
130. *Themes in Anthropology* The STAFF.

Writings of past and contemporary anthropologists focusing on selected problems will be discussed on a seminar basis.

132. *Social Organization and Thought*

Ms. FRUZZETTI.

The nature and organization of social relationships within a society. How elements of social structure can be understood in themselves and as a part of the whole.

133. *Politics, Community and the State*

The STAFF.

A comparative study of the phenomenon of power and authority in human societies.

134. *Comparative Sex Roles*

Ms. FRUZZETTI.

The analysis of female cultural roles and structural positions in society. The study of women and ideology will entail a cross-cultural comparative approach as well as a consideration of male sex roles.

135. *The Anthropology of Economic Life*

The STAFF.

A review of anthropological perspectives on economic activities in diverse cultural settings with an emphasis on critically analyzing the problems of economic development.

136. *Anthropological Perspectives on Education*

Ms. HOLLOS.

The course will focus on the cultural transmission of human knowledge in formal and informal contexts. It is an exploration of an area which is rapidly coming into its own: the interface between the disciplines of anthropology and education.

137. *Impact of Colonialism*

Ms. FRUZZETTI.

The relationship between the historical past and problems of the present. Questions of cultural change vis-a-vis political and economic development.

151. *Hunter-Gatherer Adaptations*

Mr. GOULD.

Addresses the question: to what extent can the concept of the ecosystem, as developed in evolutionary biology, explain variability in human behavior? It will examine the literature on contemporary hunting and gathering societies, both human and non-human, as well as relevant findings in archaeology and human biology. Background in general biology, ecology, and anthropology will be needed.

153. *American Material Culture*

Ms. RUBERTONE.

Surveys the many items of Native and European material culture. Processes of manufacture, distribution, and especially function, are addressed. The primary goal is to understand the relationships between human behavior and the world of objects.

154. *Archaeology of the Northeast*

The STAFF.

The glaciated northeast (New England, New York, and Pennsylvania) is an area that has had a fundamentally different natural and cultural history than the rest of the U.S. This course will provide an intensive introduction to what is known of the region's human ecology over the past 12,000 years in terms of previous and future archaeological research.

155. *Arctic Archaeology*

Mr. ANDERSON.

The cultural development of American Arctic peoples from their earliest known North Asian beginnings to historic times (the traditional Eskimo and northern Indian cultural period). The development of the study of Arctic archaeology by American, Canadian, Danish, and Soviet scholars. Archaeological interpretations will focus on the evolution of adaptive strategies and the development of techniques to cope with life in the north.

156. *Archaeology of Urban Societies.*

Ms. RUBERTONE.

The course examines the important contributions that archaeologists have made to the study of urban societies by making us aware of the range and diversity of ancient cities. This evidence and theories to account for urban origins are explored. Equal attention is given to issues of how cities operate and how they organize social and natural resources

across city and hinterland. Case studies are drawn from ancient Mesopotamia, Mesoamerica, Islamic North Africa and North America.

157. *American Indian Archaeology*

Mr. ANDERSON.

The course traces the development of North American Indian Cultures through the comparative study of prehistoric archaeological remains. The course will emphasize analyses of subsistence modes and settlement patterns within an ecological framework.

160. *Archaeological Field Methods.*

Ms. RUBERTONE.

The premise is that to learn archaeology one has to "do" archaeology and that "doing" archaeology is more than just "digging". Students will be familiarized with basic aims of archaeological field research and will learn field techniques and laboratory procedures. The class will be involved in the design of an archaeological field project and actually carry out the various field and laboratory operations.

180. *Sociolinguistics*

Mr. BEEMAN.

Focus on the anthropological study of meaning conceived of as the study of linguistic behavior in its social and cultural context. Topics will include: social class and language behavior, language and ethnic processes, the ethnography of communication, the study of inter-action as a phenomenological process, and speech act theory and its relation to linguistic anthropology.

193, 194. *Individual Research Project*

The STAFF.

Intensive supervised reading, ordinarily involving a research paper. A specific program will be arranged in terms of the student's individual needs and interests. One or two semesters of research, depending on the project, is required of all students who are candidates for Honors in Anthropology.

198. *Senior Conference*

Mr. HICKS.

Field methods and their applications in social-cultural anthropology.

III PRIMARILY FOR GRADUATES

200. *Applied Anthropology*

The STAFF.

A critical evaluation of real and potential applications of anthropological theory, data, and methods to the solution of immediate problems. Special emphasis on practical and ethical considerations related to the impact of Western "development" on peasant and tribal cultures around the world, and on various roles of anthropologists, non-academic as well as academic.

201. *Anthropology of Urban Societies*

Ms. LAMPHERE.

An introduction to topics related to the structure of social relationships in modern cities. The seminar will examine the concepts of role, network, social class and ethnicity as utilized in research on American and British urban contexts. These urban settings will then be compared with those in developing countries including Africa and Latin America.

202. *Political Organization*

Ms. LAMPHERE.

A focus on politics and the use of power in local communities and in complex, state societies. An exploration of important theoretical approaches to the study of politics and an examination of the interface between local and national level politics for a variety of foraging, tribal and "peasant" peoples.

203. *Medical Anthropology*

Ms. NEWMAN.

A seminar stressing theoretical perspectives in medical anthropology and including field observation and research methods. Course content includes ethnopsychiatry, ethnomedicine, population anthropology, varieties of the therapeutic encounter, and alternative health resources in the United States.

210. *Problems in the Ethnology of Latin America*

Mr. HEATH.

The purpose is to examine in detail selected aspects of contemporary cultures and societies in Middle and South America. A research-oriented workshop, in which each member actively pursues a topic of his/her choice in depth, with periodic discussions serving to address methods, problems, and findings and simultaneously to set each topic in a broader historical and ethnographic perspective. Languages and prior grounding in Latin American ethnology will be helpful but are not prerequisite.

211. *Circumpolar Ethnography*

Mr. ANDERSON.

An appraisal of the languages, physical traits, and cultures of the ancient and more recent peoples of the Arctic and Sub-Arctic regions.

220. *Principles of Cultural Anthropology*

Mr. LEIS.

A seminar on the science and art of understanding and explaining in social-cultural anthropology.

221. *History of Ethnological Theory*

Ms. LAMPHERE.

The historical developments of social and cultural theory during the 19th and early 20th century. These will be approached in relation to the major social and intellectual currents of the period. Writings of European thinkers (Marx, Weber, Durkheim, Engels and Maine) will be dealt with as well as American anthropologists (Morgan, Boas, and others).

222. *Methods of Anthropological Research*

Ms. HOLLOS.

A seminar on the methodological problems associated with field research in social and cultural anthropology. Designed to help students prepare for both summer and dissertation field work.

223. *Analysis of Social Structure*

Ms. FRUZZETTI.

The seminar will involve a review of the major theoretical and methodological issues in the classic British analysis of social structures. Next, detailed studies of empirical cases will be attempted. Afterwards, further attention to variables outside the classic analysis—e.g., class and networks—will lead to the study of complex societies.

224. *Current Theoretical Issues in Cultural Anthropology*

Mr. LEIS.

Intensive study of evolutionary theory and its history, current state and prospects.

225. *Problems of Psychological Anthropology*

Ms. HOLLOS.

An advanced treatment of psychological anthropology. The subject matter will vary from one semester to another. The seminar members will review carefully and critically the various anthropological approaches to the problem.

226. *Ethnicity and Minority Relations*

Mr. HICKS.

An effort to unravel some skeins, and perhaps tie some new ones, in the anthropological study of ethnicity. Some concepts to be examined are: group, category, pluralism, social and cultural; assimilation, acculturation, adaptation, and accommodation; rituals and symbols of ethnicity.

227. *Law and Conflict*

The STAFF.

Introduction to the range of variation and the methods, problems, and theories relevant to the anthropological study of law in various contexts.

250. *Problems in Archaeology: Frontiers and Boundaries*

Ms. RUBERTONE.

The seminar explores a variety of topics related to the study of frontiers and boundaries from an anthropological perspective. The range of material to be considered extends from prehistory to the historic period, and includes band societies and nation-states. The emphasis will be highly integrative and will focus on demographic, ecological, cultural and archaeological studies in exploring frontiers and human behavior.

251. *Environmental Archaeology.*

Mr. ANDERSON.

This course examines the relationship of habitat and culture from an archaeological (spatial and temporal) perspective. It critiques paleobotanic faunal, geoarcheological and human ecosystemic studies as sources of information for understanding human interactions with the environment.

252. *Ethnoarchaeology*

Mr. GOULD.

This seminar explores the relationship between observations of present day human behavior and evidence of the prehistoric past. On what basis can archaeologists make reliable inferences about past behavior by looking at the present? Will involve a local field exercise as well as more conventional reading and discussion format.

253. *Ethnohistory*

The STAFF.

A research seminar on anthropological interpretation of historical sources. Methods for collecting, evaluation, and analyzing historical evidence as it relates to problems in ethnography and archaeology. Original research is emphasized.

256. *Quaternary and Human Paleoecology*

Messrs. ANDERSON, GOULD and WEBB.

An advanced seminar on the method and theory of studying human interactions with the physical environment. Offered jointly with Geological Sciences.

261. *Circumpolar Archaeology*

Mr. ANDERSON.

A specialized course dealing with advanced problems in Arctic archaeology. Although primarily oriented toward the northern specialist, the seminar is designed to present by example methodological and analytic problems that are applicable to most archaeological areas and hunting, fishing, and gathering societies.

270. *Principles of Archaeology*

Mr. GOULD.

Discussion of current theory and method in physical anthropology and archaeology and the relationship between archaeology and anthropological sub-disciplines. An emphasis on archaeology as a technique for the study of cultural process and the development of integrative procedures, such as the use of ethnographic data.

271. *Historic Archaeology*

Ms. RUBERTONE.

Integration of theoretical and methodological approaches to the archaeology of historical sites. The first part of the course will focus on development of research designs—the second with substantive examples of current research in historical archaeology.

280. *Linguistic Theory and Practice*

Mr. BEEMAN.

Designed to provide graduate students in social science who have limited previous experience in technical or theoretical linguistics with an introduction to theory and practice in the field.

281. *Problems in Linguistic Anthropology*

Mr. BEEMAN.

This seminar is designed to deal with theoretical problems of interest to both linguists and anthropologists. The topic for the seminar will change yearly.

293, 294. *Reading and Research*

The STAFF.

Work with individual students in connection with special reading, problems of research, or preparation of theses.

295, 296. *Teaching Practicum*

The STAFF.

Applied Mathematics

Professors BANKS, C. DAFERMOS, S. DAFERMOS, DALENIUS (Visiting), DAVIS, FALB, FLEMING (Chairman), FREIBERGER, GRENANDER, HALE, HIKATA(Research), HSIEH,

INFANTE, KOLSKY, KUSHNER, MALLET-PARET, MCCLURE, PIPKIN, SIROVICH, and SU; Associate Professors BISSHOPP, GEMAN; Assistant Professors MAJDA, MAXEY, RALESCU, SOUGANIDIS; Visiting Assistant Professors EDELSTEIN (Research), KOCAK (Research).

The Division of Applied Mathematics offers standard concentration programs leading to the degree of Bachelor of Science, the degree of Bachelor of Arts, the Master of Science degree, and the Doctor of Philosophy in applied mathematics. The differences between the undergraduate degree programs lie primarily in the distribution of required courses in mathematics and its applications. Both concentrations have considerable flexibility and allow students to pursue courses of study to suit individual needs and interests. Programs are designed by the student and a faculty advisor to provide both strong terminal degrees and preparation for more advanced study in applied mathematics, mathematics, engineering, or any of the sciences. The broad interdisciplinary character of the Division and the strong science departments in the University make possible a diversity of programs which may emphasize applications to the physical sciences, engineering, economics, biomedical sciences, etc.

Since the summer of 1941, Brown University has continuously supported instruction and research in applied mathematics to meet the needs of universities, industry, and government for engineers, physicists, and mathematicians whose training extends beyond the accepted boundaries of their respective fields. The instructional program includes courses in mathematical fundamentals, as well as introductory and advanced courses in particular fields of applied mathematics. Emphasis in the program is placed on the development of the ability to formulate and analyze mathematical problems which arise in science and technology. Training in research is stressed, and instruction is integrated with a research program covering both theoretical and some experimental aspects of various fields.

The Division emphasizes the importance of modern computing methods in the study of applied mathematics. Computing activities are supported by a well-equipped University Computer Center as well as the Division's own network of powerful micro computers and extensive peripheral equipment.

In September, 1964 the Center for Dynamical Systems was formed within the Division. It is a Center for research on differential equations and the theory of dynamical systems in general with strong programs in the modern theories of stability and control. This Center has a world-wide reputation and is one of the largest in the western world working on these problems. A few postdoctoral appointments are available for advanced study in this Center.

There is a growing interest within the Division in the application of mathematics to the nonphysical sciences, particularly to problems arising in biology, medicine, linguistics, psychology, and economics. The Division is represented in the Center for Biophysical and Biomedical Engineering, and in the Center for Neural Sciences which promote cooperation among faculty from several departments.

Since applied mathematics involves many disciplines, students of varied backgrounds find their way into the graduate program. A strong background in and predilection for mathematics is essential, but an undergraduate may have majored in engineering, physics, biology, economics, psychology or other sciences.

The Division is not formally structured into isolated research groups and in fact stresses applied mathematics as a discipline in its own right. One can, however, distinguish the following research interests and activities of present staff members: (1) applied probability and mathematical statistics, (2) computer science and numerical analysis, (3) control and stability of dynamical systems, (4) stochastic control theory, (5) ordinary, functional, and partial differential equations, (6) fluid mechanics, (7) solid mechanics, (8) mathematical problems in biology, and (9) operations research and optimization.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Prerequisite: Mathematics 9, 10 or their equivalent.

Program: Ten additional semester courses approved by the Division of Applied Mathematics, including Mathematics 18, 52, Applied Mathematics 33, 34 and 1 or Computer Science 4 or 11. Of the unspecified courses four should be chosen from the 100-level courses taught by the Division of Applied Mathematics. Substitution of alternate courses for the specific requirements is subject to approval of the Division. Concentrators are urged to complete their introductory programming course before the end of their sophomore year.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE DEGREE

A. Eighteen approved semester courses in Mathematics, Applied Mathematics, Engineering, the Natural or Social Sciences, including Mathematics 9, 10, 18, 52; Applied Mathematics 33, 34, 1 or Computer Science 4 or 11, and 193 or 194. Of the unspecified courses six should be chosen from the 100-level or higher level courses. Students are urged to take Applied Mathematics 133, 134. Substitution of alternate courses for the specific requirements is subject to approval by the Division. Concentrators are urged to complete their introductory programming course before the end of their sophomore year.

B. Students who have not established proficiency in a foreign language will be encouraged to take French, German, or Russian.

RELATED COURSES OR PROGRAMS. In addition to the standard concentrations in Applied Mathematics there are also interdepartmental standard concentrations in Applied Mathematics-Biology, Applied Mathematics-Computer Sciences, Applied Mathematics-Economics, and Applied Mathematics-Psychology.

GRADUATE PROGRAMS

MASTER OF SCIENCE. The general requirements for this degree are the satisfactory completion of the equivalent of one year of study at a graduate level with the program of courses subject to the approval of the Division. The student may also be required to complete satisfactorily a project or thesis.

DOCTOR OF PHILOSOPHY. The general requirements for the degree of Doctor of Philosophy in Applied Mathematics include the satisfactory completion of two years of study at a graduate level of a program approved by the Division, the passing of a preliminary examination, the ability to read in mathematics and science an approved foreign language, the completion of a project of research and the writing of a dissertation, a final examination on the dissertation, and a public presentation of the dissertation.

I. PRIMARILY FOR UNDERGRADUATES

1. *Interactive Computing, with APL*

Introduction to computing using APL, including numerical applications, semi-numerical applications, and some non-numeric applications.

3. *Introduction to Applied Mathematics*

Designed to answer the question: "What is applied mathematics all about?" Using both case studies as well as historical and philosophical material, an overview will be given of some of the most significant achievements, past and present, of applied mathematics. Particular emphasis on the areas of applied mathematics in which the current faculty is strong. No prerequisites. Not a course in which specific mathematical techniques will be

learned. Should appeal to students interested in a general way in how mathematics is applied, or who would like to learn about the varieties of mathematical concern and expect to take specific courses later. Readings, two short papers and a final project.

4. *Mechanics with Computer Programming*

Lectures and computer labs. In the lectures, fundamentals of mechanics are introduced. They include: vector algebra; equilibrium of plane and space structures; concepts of forces and torques; Newton's law of motion; concepts of momentum, angular momentum and energy; orbital motion of artificial or natural satellites; simple pendulum; spherical pendulums and Lissajous figures; waves; rigid body motion and concept of moment of inertia. In the laboratory, the high level language PASCAL is to be taught from scratch and used to solve problems arising from the main lectures. They include: the equilibrium problems of structures; satellite orbits in Earth's gravitational field; motion of spherical pendulum and graphing of Lissajous figures. (The languages PLC and APL are also acceptable for solving problems). Corequisite: Mathematics 10 (or 18).

15, 16. *Fundamentals of Physics and of Methods of Applied Mathematics* (Physics 15, 16)

A basic sequence of courses in mathematics and physics for concentrators in Biology, Chemistry, Geological Sciences, Biological and Medical Sciences, and other fields requiring a serious foundation in physics and those aspects of mathematics encountered in applications. Six hours including lectures, recitations, and laboratories. Interested students should register for Physics 15 and Applied Mathematics 16, after consultation with a faculty advisor from the Mathematics, Applied Mathematics, or Physics Departments.

17, 18. *Fundamentals of Physics and of Methods of Applied Mathematics* (Physics 17, 18)

These two courses are the sequel to Physics/Applied Mathematics 15, 16: see description of these courses. Students should register for Applied Mathematics 17 in Semester I and Physics 18 in Semester II.

33A, 34A. *Methods of Applied Mathematics I, II*

Mathematical techniques involving differential equations used in the analysis of physical, biological and economic phenomena. Emphasis is placed on the use of established methods, rather than rigorous foundations. I: First and second order differential equations. II: Application of linear algebra to higher order differential equations. Numerical methods for the solution of differential equations, with computer applications. Non-linear problems and stability. Introduction to partial differential equations. Three hours lecture and one hour recitation. Prerequisite: Mathematics 10.

33B, 34B. *Methods of Applied Mathematics I, II*

A more intensive treatment of the material in Applied Mathematics 33A, 34A. Intended primarily for students who desire a rigorous development of the mathematical foundations of the methods used. Three hours lecture and one hour recitation. Mathematics 18 is desirable as a corequisite. Prerequisite: Mathematics 10.

II. FOR UNDERGRADUATES AND GRADUATES

107. *Quantitative Models of Biological Systems* (Biomed 107)

An intermediate course between Biomed 110 and 212/Applied Mathematics 222. Emphasis on the use of quantitative modeling techniques in solving real problems in molecular biology, physiology and ecology. Topics vary from year to year but will range from the sub-cellular level through the cellular level and the organ system level to the level of the whole organism and ultimately to population dynamics and ecosystem analyses. Mathematical techniques will be discussed as they arise in the contexts of these problems. Lectures and demonstrations. Prerequisites: 1 year chemistry, Biomed 110, 1 year physics plus Applied Mathematics 33-34 or written permission.

116. *Introduction to Computational Probability and Statistics*

Examination of probability theory and mathematical statistics from the perspective of computing. Topics selected from random number generation. Monte Carlo methods, limit theorems, stochastic dependence, estimation and hypothesis testing. Prerequisites: calculus, linear algebra, and Applied Mathematics 165 or equivalent. Some experience in programming is desirable. Offered in alternate years.

117. *Introduction to Numerical Analysis*

Basic numerical analysis. Topics include linear systems, eigenvalues and eigenvectors, nonlinear equations, interpolation and approximation, numerical integration and the solution of ordinary differential equations, optimization. A short course in Fortran is also given.

118. *Introduction to the Numerical Solution of Partial Differential Equations*

An introduction to the numerical solution of elliptic, parabolic and hyperbolic partial differential equations. Students will be required to write FORTRAN programs. Prerequisites: 33, 34, or 117. Previous experience with FORTRAN is helpful but not absolutely necessary. Offered in alternate years.

120. *Operations Analysis: Probabilistic models*

Basic probabilistic problems in operations research; methods of problem formulation and solution. Markov chains, birth-death processes, stochastic service and queuing systems, sequential decision theory, dynamic programming. Prerequisite: 165, or Mathematics 161, or equivalent.

121. *Introduction to Mathematical Programming*

An introduction to the basic mathematical ideas and computational methods of optimizing allocation of effort or resource utilization, with or without constraints. Linear programming, network models, integer programming.

125. *Analytical Mechanics* (Engineering 137)

An analytical approach to the study of dynamics of particles and rigid bodies. Variational principles and Lagrangian formulation of mechanics, rigid body motion, introduction to Hamiltonian formulation of mechanics.

126. *Introduction to Field Theory*

Vector and tensor calculus. Mechanics of continuous media. Electric and magnetic fields. Special relativity. Waves in fluids and solids, and electromagnetic waves.

133, 134. *Methods of Applied Mathematics III, IV*

Complex variable and other techniques in the solution of partial differential equations. First order equations. Second order linear equations. Fourier series and general eigenfunction expansions. Fourier and Laplace transforms. Analytic functions of a complex variable. Prerequisites: Mathematics 18, 52 or equivalent and Applied Mathematics 33, 34 or written permission.

151. *Applied Modern Algebra*

Development of basic concepts of algebra with emphasis on applications to computer science, engineering, operations research, and other areas which make significant use of discrete mathematics. Introduction to logic, set theory, algebraic structures, graph theory and combinatorics.

165, 166. *Statistical Inference I, II*

Systematic introduction to mathematical statistics, including point and interval estimation, hypothesis testing, linear statistical models and nonparametric methods. Statistical software packages are introduced and used in 166. Prerequisite: Mathematics 10. Basic linear algebra is presumed in 166.

167. *Statistical Inference III*

Different topics in different years: time series analysis, stochastic processes, nonparametric statistics, etc. May be repeated for credit. Prerequisite: 166.

169. *Mathematical Population Models (Mathematics 169)*

Population models with age structure; matrix projection and renewal equation methods. Differential equation models of interacting populations. Probabilistic models; birth and death processes, branching processes. Applications to models from demography, ecology and population genetics. Prerequisite: Mathematics 52 and a course in differential equations.

170. *Introduction to Automatic Language Analysis*

Interested students should register for Linguistics 170.

183, 184. *Linear Operator Theory and Applications*

An introductory course on the basic facts of functional analysis in a form suitable for applications. Introduction to integration and measure theory. Metric spaces and linear spaces. Banach and Hilbert spaces. Analysis of linear compact operators and unbounded operators.

186. *The Mathematics of Insurance*

Mathematical theory of risk analysis, as applied to insurance. Actuarial concepts. The collective theory of risk. Reinsurance. Management games. Prerequisites: calculus, linear algebra, and Applied Mathematics 165 or equivalent. Computing experience is useful but not required. Offered in alternate years.

188. *Advanced Matrix Theory*

Canonical forms of orthogonal, Hermitian, and normal matrices, Rayleigh quotients. Norms. Eigenvalues. Matrix equations. Generalized inverses. Banded, sparse, non-negative, and circulant matrices. Prerequisites: 34 or Mathematics 52 or permission of the instructor. Offered in alternate years.

193, 194. *Senior Seminar*

Independent study and special topics seminars in various branches of Applied Mathematics offered by the Staff.

III. PRIMARILY FOR GRADUATES

205, 206. *Mathematical Methods of Applied Science*

Designed to introduce science and engineering graduate students to a variety of fundamental mathematical methods. Topics to be covered include linear algebra, complex variables, Fourier series, Laplace transforms and applications, ordinary differential equations, integral equations, tensor analysis, differential geometry and partial differential equations.

211. *Real Analysis*

Topics in real analysis which are fundamental to the study of Applied Mathematics with emphasis on metric spaces and integration theory.

212. *Hilbert Spaces and their Applications*

Metric and normed spaces; theory of bounded operators; spaces l^2 and L^2 ; unbounded operators; integral equations and partial differential equations.

213. *Methods of Applied Mathematics: Partial Differential Equations*

Theory and solution of first and second order partial differential equations, Riemann's method, separation of variables, integral transforms and distributions, Green's function, quasilinear systems.

214. *Methods of Applied Mathematics: Integral Equations*

Integral equations. Fredholm and Volterra theory, expansions in orthogonal functions, theory of Hilbert-Schmidt. Singular integral equations, method of Wiener-Hopf. Calculus of variations and direct methods.

216. *Methods of Applied Mathematics: Asymptotics*

Calculus of asymptotic expansions, evaluation of integrals. Solution of linear ordinary differential equations in the complex plane, WKB method, special functions. May be taken concurrently with Applied Mathematics 214.

217. *Functional Analysis and Applications*

Linear spaces, metric spaces, operators, contraction principle, fixed point theorems, linear functionals, adjoint spaces, spectral theory. Non-linear operators. Special spaces and selected applications to differential equations, control theory, integral equations, quantum mechanics, and numerical analysis.

218. *Topics in Functional Analysis*

Topics of current interest in applications of functional analysis.

219, 220. *Ordinary Differential Equations and Their Applications*

Existence and general properties of solutions, linear systems, Floquet theory. Stability, Liapunov's method, some general properties of nonlinear systems. Two-dimensional systems, Poincaré-Bendixson theory. Boundary value problems. Non-linear oscillations and asymptotic methods.

221. *Topics in Differential Equations*

Topics of interest in ordinary, partial and functional differential equations.

222. *Mathematical Models in Physiology* (Biomed 212)

The development and use of mathematical models for describing physiological systems will be illustrated by examples taken from the literature and from the experience of the instructors and the class. Techniques for the formulation and solution of systems of linear and nonlinear algebraic and differential equations will be emphasized. Applications of optimization techniques and parameter identification methods will also be discussed. Prerequisites include (1) Applied Mathematics 33, 34, or their equivalents; (2) at least one 100-level course in biology; (3) permission of one of the instructors. Students should also be familiar with programming and the use of computers or be willing to learn both.

223, 224. *Partial Differential Equations* (Mathematics 237, 238)**226. *Introduction to Stochastic Control Theory* (Engineering 254)**

Sources of stochastic control problems in Economics, automatic control theory and communications, finite Markov chains, dynamic programming, finite and free time problems, discounted and average cost per period problems, stability, linear systems with quadratic cost and with or without filtering, numerical methods, heuristic introduction to continuous time models and to diffusion processes.

227, 228. *Topics in the Stability and the Control of Systems*

Topics will vary but will include deterministic and stochastic systems.

229, 230. *Mathematical Methods in Operations Research*

Basic topics in operations research, with examples drawn from engineering, economics, business control theory, and other areas of application: Linear programming and duality theory, applications to scheduling, allocation of resources, PERT, etc.; optimization methods for static systems (hill climbing); nonlinear programming, theory and computational methods. Semester II will concentrate on Markov chains and process, modelling of systems by Markov chains and processes, queueing theory, and applications, dynamic programming and applications; and utility theory.

233. *Foundations of Continuum Mechanics* (Engineering 221)

Mathematical foundations of continuum mechanics. Vectors and tensors, properties and basic operations. Kinematics of deformation. Conservation laws. Thermodynamics. Stress. Constitutive equations. Elastic, viscous, and viscoelastic response. Linearization. Simple problems in finite and linear elasticity, and in Navier-Stokes flows. Creep and relaxation in linear viscoelasticity.

234. *Linear Elasticity* (Engineering 224)

General theorems in linear elasticity. Basic singular solutions. Boussinesq-Papkovich and Galerkin representations. Curvilinear coordinates. Cavity, inclusion, crack, and contact problems in three dimensions. States of plane strain, plane stress and axial symmetry. Complex variable techniques. Torsion. Thermoelasticity.

235. *Advanced Elasticity* (Engineering 227)

Large elastic deformations. Controllable deformations of incompressible materials. Initial stress problems. Elastic stability. Additional topics may include membrane theory, fiber-reinforced materials, second-order elasticity.

236. *Topics in Continuum Mechanics* (Engineering 228)

Advanced topics in continuum mechanics. Examples are: non-linear viscoelastic constitutive equations, strain gradient and micropolar theories of elasticity, coupled mechanical and thermal or electromagnetic phenomena, continuum thermodynamics.

237. *Plasticity* (Engineering 229)

Theory of the inelastic behavior of materials with negligible time effects. Experimental background for metals and fundamental postulates for plastic stress-strain relations. Variational principles for incremental elastic-plastic problems, uniqueness. Upper and lower bound theorems of limit analysis and shakedown. Slip line theory.

238. *Stress Waves in Solids* (Engineering 226)

Elastic wave propagation theory with an introduction to waves in viscoelastic and plastic media. Waves in unbounded media, half spaces, layered media, plates, rods and beams. Solutions to transient problems. Relation of theory to experiment. Stress waves and fracture.

239. *Viscoelasticity* (Engineering 225)

Creep. Stress relaxation. Sinusoidal oscillations. Boltzmann's principle of linear superposition. Memory functions. Relaxation and retardation spectra. Time and temperature dependence. Second order transitions. Experimental determination of linear viscoelastic properties. Relation between molecular structure and macroscopic properties. Volume viscosity. Non-linear behavior.

241. *Fluid Dynamics I*

Tensor notation and curvilinear coordinate systems. Thermodynamics. Eulerian and Lagrangian description of fluid motion. Conservation laws. Constitutive relations and irreversible processes. Initial and boundary conditions. Vorticity and Bernoulli theorems. Potential flow in two and three dimensions. Surface waves in liquid.

242. *Fluid Dynamics II*

Dimensional analysis and similarity. Classification of flows according to dimensionless ratios. Exact, incompressible, viscous flow. Stokes and Oseen approximations and Stokes' formula. Boundary layer theory of the Blasius problem. Hydrodynamic stability: Inviscid theories; The Orr-Sommerfeld equation; Qualitative theory of viscous instabilities. Turbulence. Compressible flow. Simple waves and shock waves. Sound propagation.

243. *Viscous Flow I* (Engineering 283)

Dimensional analysis and groups. Self-similar and other exact solutions of the Navier-Stokes equation. Incompressible, laminar boundary layer in two and three dimensions: Forced and free heat convection; Methods of solution; Integral methods; Leading and trailing edges and separation points. Compressible boundary layers. Low Reynolds number flow.

244. *Viscous Flow II*

Shock structure. Hydrodynamic stability: Thermal instability; Curved flows; Parallel flows and boundary layers. Turbulence: Statistical approach; Mixing length theories and turbulent boundary layers.

245. *Compressible Flow*

Hyperbolic systems of equations and characteristics. The hodograph transformation. Simple waves. Limit and critical lines. Discontinuous solutions. One dimensional unsteady flow. Two dimensional steady flow. Subsonic and transonic flow. Axisymmetric flow.

246. *Asymptotic Methods in Fluid Dynamics*

Regular and singular perturbation theories. Differential equations containing a large parameter. General boundary layer methods. Inner and outer expansions. Multiple scaling techniques. Application to problems in fluid mechanics.

247, 248. *Topics in Fluid Dynamics*

Topics chosen from: Advanced rarefied gas dynamics; Hydromagnetics; Non-Newtonian fluids; Stability Theory; Turbulence.

250. *Rarefied Gas Dynamics* (Engineering 272)

Qualitative theory. The Boltzmann equation. H-theorem. Initial and boundary conditions. Free molecule flows. Equilibrium and near-equilibrium flows. Hilbert-Chapman-Enskog theory. Transport phenomena. Linearized Boltzmann equation. Eigentheory. Theory of kinetic models. Methods of solution: Integral iteration; Moments methods; Half-range techniques. Initial value problem. Boundary value problems; Couette flow; Heat flow; Sound propagation.

251. *Analytical Mechanics*

Mathematical study of the dynamics of particles, Lagrangian and Hamiltonian formulations, transformation theory, perturbation theory.

252. *Topics in Analytical Mechanics*

Mathematical study of modern developments in mechanics. Topics will vary.

254. *Topics in Analysis of Algorithms* (Computer Science 254)

Interested students should register for Computer Science 254

255. *Numerical Analysis I*

Matrix computation and solution of elliptic partial differential equations.

256. *Numerical Analysis II*

Numerical solution of parabolic and hyperbolic partial differential equations.

257. *Numerical Analysis III*

Finite difference methods. Polynomial interpolation. Numerical solution of ordinary differential equations.

258. *Numerical Analysis IV*

Approximation theory and application of functional analysis to numerical analysis.

263, 264. *Theory of Probability* (Mathematics 263, 264)

This course presents a rigorous development of the theory of probability. Measure theory will not be required before the second semester.

266. *Stochastic Processes*

The main emphasis in the course is on the continuous time case. The precise content depends on the interests of the instructor and the students in the particular year, but generally includes the following: 1. Second order stationary processes, their spectral representation, and applications to linear prediction; 2. Ergodic and other "mixing" processes, and their applications; 3. Continuous time Markov processes, including jump processes, and Brownian motion and other diffusions. Prerequisite: Applied Mathematics 263, 264 (Probability theory).

267, 268. *Topics in Probability and Statistics*

Advanced topics of general interest varying from year to year.

281, 282. *Seminars in Applied Mathematics*

291, 292. *Research in Applied Mathematics*

As part of the program of the Center for Fluid Dynamics at Brown University, the above group of courses in fluid dynamics is integrated with the following group of courses offered through the Division of Engineering: 284, Plasma Dynamics; 285, Gas Dynamics; 287, Dynamics of Reacting Gases; 288, Dynamics of Radiating Gases; 289, 290, Lecture Series in Dynamics and Physics of Fluids (this is presented in part by members of the Applied Mathematics staff).

RELATED COURSES

Attention is also drawn to the following courses which are of particular interest to graduate students of applied mathematics: Mathematics 201, 202; 221, 222; 225, 226; 227, 228; Physics 205; 206, 207; 209; 214; 215, 216; 232; 233; 234; Chemistry 201; 277, 278; Engineering 203, 204; 235; 236; 239, 240; 241; 242; 243; 251; 252; 263; 264; 268; 273, 274; 291, 292; 293, 294.

Art

Professors CHAMPA (Supervisor, Graduate Program), FELDMAN, FISHMAN, JORDY (Art History Director), SCHULZ, TOWNLEY; Associate Professors MAYER (Chairman and Director of Studio Division), WINKES, ZERNER; Adjunct Associate Professors KOREN, SCHER; Visiting Associate Professor BERGER; Assistant Professors DRISKEL, EDWARDS, GILLERMAN, MILLER; Visiting Assistant Professors KENT, MALIK, STOREY; Visiting Lecturers HITCHCOCK, MACAULAY.

UNDERGRADUATE PROGRAM

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Prerequisite: Art 1 and 10

Program: Eight other courses, chosen to emphasize either the history or the practice of art. If history is emphasized, they shall include two courses each in the three fields of the history of art, the Concentration Seminar, and a course from either division; the three fields are Ancient and Medieval Art, Renaissance and Baroque Art, and Nineteenth-Century and Modern Art. If practice is emphasized, they shall include drawing, five other studio courses, two courses in the history of art distributed over two fields, and a Senior Thesis Exhibition (not for course credit). Students wishing to emphasize history are urged to take German as a foreign language. Courses in art history taken outside the Department by concentrators are normally not counted in fulfillment of concentration requirements.

Honors: Each candidate for Honors in art will take 198-199, reading in the course on a selected topic and summarizing the results in a senior thesis for those emphasizing art history; completing a project in a standard studio discipline or in a tangential area which has met with the approval of the Studio Honors Advisor for those emphasizing studio art. Normally the two Honors courses will be taken during semesters 7 and 8.

CENTER FOR OLD WORLD ARCHAEOLOGY AND ART: See listing under Other University Activities.

GRADUATE PROGRAMS

MASTER OF ARTS. Applicants to the degree program must possess the Bachelor of Arts degree or its equivalent and submit Graduate Record Examination (Aptitude) results. Each student takes a balanced program of 12 courses through four semesters, culminating in a written Master's Thesis. The basic program of study provides experience in both art history and museum training. (See below for a chart of this program arranged by semesters.)

A central feature of the program is the requirement that all students prepare, over a span of two semesters, a loan exhibition of art historical interest, accompanied by a scholarly catalog. Several of these exhibitions have been supported by the National Endowment for the Arts and have gained nationwide public recognition.

Candidates for the degree are expected to have completed between their junior year as an undergraduate and the granting of the Master's degree a year's course work in each of at least three periods of the history of art. These periods are: Classical, Medieval, Renaissance, Baroque, or 19th- and 20th-century art. Students who are upon entry into the program deficient in this requirement, or whose undergraduate work lies many years in the past, should expect to do more than the minimum program of 12 courses for the Master's degree.

Students are required to take one seminar in the Department in each of the first four semesters. Department seminars include both 200-level courses and 100-level courses, with the permission of the instructor. Students may not substitute seminars outside the department for this requirement. Students are required to write papers in three of the four required seminars. They may select the seminars for which they wish to write papers, but are encouraged to take the no-paper option in the second year. Students must take graduate seminars for a grade, with the exception of Art 235 and 237 for which courses the grade option is at the discretion of the instructor, and Art 236 which must be taken S/NC.

No research paper is required of graduate students taking undergraduate courses for credit. The mid-term and final exams prepared by the instructor must be taken. With the approval of their advisor, students may, and are encouraged to, take courses related to their area of interest in other departments of the University. Optional electives may be undergraduate lecture courses, departmental seminars, seminars or lecture courses in other departments, or language courses. Students are encouraged to take undergraduate lecture courses in Art History S/NC. At the end of the first year overall performance is reviewed by the Graduate Supervisor with the student.

First Year:

<i>Fall</i>	Art 235	<i>Spring</i>	Art 236 (2 credit units)
	Department Seminar		Department Seminar
	Elective		Elective
	Elective		

Second Year:

<i>Fall</i>	Art 237 (2 credit units)	<i>Spring</i>	Art 280 (2 credit units)
	Department Seminar		Department Seminar
	Elective (optional)		Elective (optional)

Candidates are required to pass language examinations in German and French (or Italian instead of French). One language must be passed in the first year. The second language must be examined by the Fall semester of the second year. A score of 540 or above on the GSFLT may be submitted to fulfill language requirements. The Master's thesis will not be accepted until *both* language requirements have been completed.

Master's Thesis: The thesis is a research paper (of article length) which may be either a brief, original treatment of an existing scholarly problem or a critical review of the state of the question on such a problem. In practice, the Master's thesis is most often a revised seminar paper. It is expected that it demonstrate a thorough command of research techniques and a sound interpretation of its art historical theme. Students work closely with their advisor in the Department. In cases when research is supervised by a scholar outside the Department, there is also an advisor within the Department who is responsible for the project. Students must submit their revised seminar paper or independent study which is to serve as the Master's thesis by the end of the second year.

DOCTOR OF PHILOSOPHY. Admission to this program requires completion with distinction of a Master of Arts degree.

Students holding an M.A. from other institutions are not admitted directly to the Ph.D. program. Their first year is probationary. In order to be accepted into the Ph.D. program the student must present the M.A. thesis for approval by the Department. This should be done as soon as possible after arrival. The students should arrange to fulfill both language requirements during the probationary year. All students, including probationary students, must complete the methodology sequence: Art 235/236/237. The exhibition course is waived only in the exceptional cases when a student enters the program with extensive museum experience which includes the preparation of scholarly catalogues. All students take the required program of Art Department Seminars. Students in residence who are completing their Masters degrees are not automatically admitted to the Ph.D. program but must be confirmed upon petition to the Department and presentation of the M.A. thesis.

The residence requirement for the degree is expressed in a total of years of enrollment for graduate study. A minimum of three years of full-time enrollment is required, up to two years of which may be completed in studying for the M.A. degree. However, students transferring to Brown University from other graduate programs will receive no more than one year's credit toward the residency requirement, no matter how long they were enrolled at their previous institution or institutions.

The doctoral program prepares the student for specialized research in one of the fields regularly taught in this department. A dissertation is required together with the expertise in the art of one particular period and knowledge of the art or thought of a chronologically or otherwise related period. The latter means often that the candidate must take courses in other departments. One or more additional languages are sometimes necessary to pursue the research for the dissertation. Decisions concerning course work and languages necessary for this research are made by the dissertation advisor in consultation with the student.

A colloquium defines the exact subject matter of the dissertation, a major and two minor fields to be studied in order to pass the subsequent oral examination. The colloquium should be held during the student's third year of graduate study. The student is required to submit a prospectus of the dissertation including an outline of the subject, description of the proposed research, and a critical evaluation of previous scholarship, which has been prepared in consultation with the dissertation advisor. The oral examination may be taken before preparation of the dissertation.

The dissertation should be a substantial contribution to the history of art, embodying original research and suitable for publication as submitted or in revised form.

Financial Aid. The following forms of financial aid are available on a competitive basis to first-year students: (Application must be completed by January 10th).

1. University Fellowships

2. Tuition Scholarships

University Fellowships are available to first year students. Second year students may receive a Teaching Assistantship or a Proctorship. Second year students are not normally asked to teach independently but are expected to assist in an undergraduate course; Proctorships may also involve specific duties in the Library, Bell Gallery, etc.

The Department also assists holders of Masters degrees who are enrolled in our Ph.D. program to find part-time visiting teaching positions at neighboring institutions. Our students have regularly taught at a number of colleges in the area.

Application. Inquiries about the program should be addressed to the Graduate Representative of the Art Department. Formal application and inquiries about application procedures must be addressed to the Graduate School of Brown University, Providence, R.I. 02912. Completed applications are due January 15th and must be accompanied by an application fee of \$25, U.S. resident. Applications outside U.S., \$30.

Courses in the History of Art

I. PRIMARILY FOR UNDERGRADUATES

Courses numbered below 100 are open to all undergraduates and graduate students (extra work is required for graduate credit); prior completion of Art 1 is recommended. They deal broadly with the development of styles and motifs and the major artistic personalities of a particular period in art history. Lectures are illustrated with slides; outside readings and written papers are assigned.

1. *Introduction to the History of Art*

The STAFF.

Key periods in the history of western art. This course, for which the subject matter varies from year to year, is intended to appeal on an interdisciplinary basis to both under- and upperclassmen. Written permission required. Some places will be reserved for freshmen.

42. *Greek Art and Architecture*

Mr. WINKES.

The subject matter is announced annually. An introduction to Greek Art and Architecture, which concentrates on a specific period or subject matter, but which covers basic aspects of Greek Art generally. It is especially recommended for students who have little or no prior knowledge of this period.

43. *Roman Art and Architecture*

Mr. WINKES.

The subject matter is announced annually. An introduction to Roman Art and Architecture which concentrates on a specific period or subject matter, but which covers basic aspects of Roman Art generally. It is especially recommended for students who have little or no prior knowledge of this period.

44. *Early Medieval Art*

Ms. GILLERMAN.

Art and Architecture of the first Millennium: actual topics will be announced. The development of Early Christian Art in East and West will alternate with the study of Art of the West from the 8th to the 11th century.

45. *Medieval Art*

Ms. GILLERMAN.

The development of architecture and the figural arts in the West will focus in alternate years on the Romanesque or Gothic Periods.

46. *Northern Renaissance Painting*

Ms. GILLERMAN or Mr. MULLER.

Study of major painters and printmakers in Flanders and Germany with a concentration on the work of Van Eyck, van der Weyden, Bosch, and Dürer.

47. *Renaissance Architecture: Fifteenth and Sixteenth Centuries* Ms. ZERNER.
Architecture and planning of the western tradition in the 15th and the 16th centuries.
48. *The Art of the Early Renaissance* Mr. SCHULZ or Ms. ZERNER.
The course deals with the figural arts in Italy from the time of Giotto to the close of the 14th century or the origin of Renaissance Art in Florence and its development in individual styles and major centers through the 15th century.
49. *The Art of the Cinquecento* Mr. SCHULZ or Ms. ZERNER.
The sculpture and painting of the Italian Renaissance of the 16th Century.
50. *Studies in Seventeenth-Century Art* Mr. MULLER.
Baroque artistic expression in Europe. Annual topics will treat major personalities in terms of problems of style, content and attitude of the period in either northern or southern centers.
51. *Baroque and Eighteenth-Century Architecture* Ms. ZERNER.
Architecture and planning of the western tradition during the 17th and 18th centuries.
52. *Studies in Eighteenth-Century Art* Mr. DRISKEL.
European art from the Rococo period to the development of neo-classicism. Focus will be on France, England and Italy.
56. *Nineteenth-Century Architecture* Mr. JORDY.
European and American developments in architecture contributing to the modern movement.
57. *Nineteenth-Century Art* Messrs. CHAMPA or DRISKEL.
Painting in Western Europe; the replacement of the Renaissance-Baroque tradition by modern points of view. Neo-Classicism, Romanticism, Realism, Impressionism. In different years this course will focus on developments in either the first or second half of the century.
58. *Modern Art (Post-Impressionism and Twentieth Century)* Mr. CHAMPA.
Painting in Western Europe and the United States, late 19th Century to the present. The focus of this course alternates in different years between early 20th Century European developments and Post-War American developments.
59. *Twentieth-Century Architecture* Mr. JORDY.
European and American developments in modern architecture and planning to the present.
60. *Modern Sculpture* Mr. JORDY.
The history of European and American sculpture from Rodin to the present.

II. FOR UNDERGRADUATES AND GRADUATES

Courses numbered above 100 are open to upperclassmen and graduate students. They deal intensively with specific problems in a particular period and ordinarily presuppose some prior knowledge of the period. Discussion is invited; outside reading and oral or written reports are assigned. Limited enrollment. Written permission of instructor required. For Ancient Art also consult offerings by the Classics Department.

141. *Topics in Etruscan and Italic Art* Mr. WINKES.
143. *Topics in Classical Art and Architecture* Mr. WINKES.
144. *Topics in the Art of the 1st Millenium* Ms. GILLERMAN.
145. *Topics in Medieval Art* Ms. GILLERMAN.
146. *Topics in 15th Century Northern Painting* The STAFF.

147. <i>Topics in Architecture before 1800</i>	Ms. ZERNER.
149. <i>Topics in Renaissance Art</i>	Mr. SCHULZ or Ms. ZERNER
150. <i>Topics in Baroque Art</i>	Mr. MULLER.
152. <i>Topics in Eighteenth-Century Art</i>	Mr. DRISKEL.
157. <i>Topics in Nineteenth-Century Art</i>	Messrs. CHAMPA or DRISKEL.
158. <i>Topics in Twentieth-Century Art</i>	Mr. CHAMPA.
159. <i>Topics in Modern Architecture</i>	Mr. JORDY.
160. <i>Topics in Modern Sculpture</i>	Mr. JORDY.
161. <i>Topics in American Art and Culture</i>	The STAFF.
190A. <i>Concentration Seminar</i>	The STAFF.
192. <i>Individual Study Project in the History of Art</i>	The STAFF.
Reading and reports on an approved topic, supervised by an individual member of the staff. Project proposals must be filed with the Department no later than the first week of the semester.	
198, 199. <i>Honors Thesis</i>	The STAFF.
The subject of the thesis and program of study will be determined by the needs of the individual student. Prerequisite: written permission of the instructor and concentration advisor.	

III. PRIMARILY FOR GRADUATES

201. <i>Research Seminar in Greek Archaeology</i> (Students who wish to take this course should register for Classics 201).	Mr. HOLLOWAY.
231. <i>Individual Reading Course</i> (single course credit)	
232. <i>Individual Reading Course</i> (double course credit)	
235, 236, 237. <i>Methods of Research and Art Historical Interpretation</i>	The STAFF.
Work of the first semester centers partly in methods of research, both historical and technological, partly in theories of art historical interpretation. These studies focus on a specific exhibition project during the second semester, a project which culminates in the third semester, in an exhibition. The organization of the exhibition and the preparation of the critical catalogue are executed by the students under faculty supervision. Required of all M.A. candidates (235, single course credit; 236, 237, double course credit.)	
243. <i>Research Seminar in Classical Art and Architecture</i>	Mr. WINKES.
244. <i>Research Seminar in the Art of the 1st Millennium</i>	Ms. GILLERMAN.
245. <i>Research Seminar in Medieval Art</i>	Ms. GILLERMAN.
246. <i>Research Seminar in Northern Renaissance Art</i>	Ms. GILLERMAN.
247. <i>Research Seminar in Architecture before 1800</i>	Ms. ZERNER.
248. <i>Research Seminar in the Renaissance of the Fifteenth Century</i>	Mr. SCHULZ.
249. <i>Research Seminar in Italian Renaissance Art</i>	Mr. SCHULZ or Ms. ZERNER.
250. <i>Research Seminar in Baroque Art</i>	Mr. MULLER.
251. <i>Research Seminar in Eighteenth Century Art</i>	Mr. DRISKEL.
257. <i>Research Seminar in Nineteenth Century Art</i>	Messrs. CHAMPA or DRISKEL.
258. <i>Research Seminar in Twentieth Century Art</i>	Mr. CHAMPA.

259. *Research Seminar in Nineteenth and Twentieth Century Architecture* Mr. JORDY.
 280. *Thesis Research, Master's Degree* (double course credit)
 Required of all M.A. candidates.
 291. *Individual Reading Course for the Doctoral Candidate*
 299. *Dissertation Research, Doctoral Degree*

Studio Courses

I. PRIMARILY FOR UNDERGRADUATES

10. *Foundation Design* The STAFF.
 An introduction to visual design, exploring a wide range of materials with emphasis on experimentation and analysis of visual relationships. Art 10 is prerequisite to any advanced studio work at Brown or the Rhode Island School of Design. Enrollment is limited. Students must have written permission from the Art Department prior to registering for the course. A limited number of openings are available for freshmen.

II. FOR UNDERGRADUATES AND GRADUATES.

These studio courses provide introduction to the major media of the visual arts, while continuing to explore and develop visual principles which were initiated in the basic studio course. Limited enrollment. Written permission is required. Art 10 is a prerequisite. In exceptional cases a bypass of Art 10 is permitted on the basis of approval of a portfolio; however, this does not guarantee a place in an advanced course.

120. *Color Theory* Mr. MAYER.
 A studio seminar dealing with the theoretical aspects of color. The emphasis is on the interaction of color as applied to the language of visual arts. Thresholds of color perception and cultural implications of color phenomena are considered. Studio problems incorporating pigments, light, color aid paper, and computer graphics are used to explore color. Considerable outside work is required. The course may not be repeated for credit. Written permission required.

- 121, 122. *Painting* Ms. EDWARDS, Messrs. FELDMAN and MAYER, and STAFF.
 This course is designed to accommodate a variety of interests and attitudes. Basic instruction in media and painting procedure is given, but the emphasis is toward the development of the image as a visual statement. Individual criticism is given and participation in regularly scheduled group discussions is strongly encouraged. Limited enrollment. Written permission required. 121 is a prerequisite for 122. 122 may be repeated for credit.

- 123, 124. *Printmaking* Mr. FELDMAN, Ms. KENT, and STAFF.
 Investigations into various printmaking techniques, emphasizing the image and form. No prior experience in printmaking is required but background in drawing and design is desirable. Individual criticism will be given, and participation during group criticism periods is encouraged. Enrollment is limited. Written permission required. 123 is prerequisite for 124. 124 may be repeated for credit.

- 125, 126. *Sculpture* Messrs. FISHMAN and TOWNLEY.
 Exploration of basic sculptural concepts using both traditional and experimental materials. Specific techniques covered will depend on the individual instructor in a given semester. Considerable outside work is required. Group and individual criticism, slides and viewing original works of art will form an integral part of the course. 125 is a prerequisite for 126. 126 may be repeated for credit. Written permission is required.

127, 128. *Drawing* Messrs. EDWARDS, FELDMAN, FISHMAN, TOWNLEY, and STAFF. Drawing from nature, still life, the model and the imagination in a variety of media. A continuing series of outside assignments is required. Visits to galleries and museums and pertinent exhibitions will be undertaken. The portfolio of the individual student will be the basis for evaluation. Great emphasis is put on classroom participation. Limited enrollment. Written permission required. 127 is prerequisite for 128. 128 may be repeated for credit.

129. *Painting: Methods and Materials of the Artist* Mr. FELDMAN. Analysis and investigation of materials and methods of the artist. Lecture, demonstration, workshop, and outside reading. Egg tempera, burnished gold, mosaic, and pigment properties are some of the areas that will be developed. Limited enrollment. Written permission required. May not be repeated for credit.

130. *Drawing: Methods and Materials* Mr. TOWNLEY. An investigation of some aspects of drawing, both technical and historical, not usually considered in the regular drawing classes. Silverpoint, chalks, and various other media will be used. Texts and outside work will be assigned. Limited enrollment. Written permission of the instructor required. May not be repeated for credit.

131. *Advanced Studio Seminar* Messrs. FISHMAN or MAYER. An approach to contemporary art outside the traditional studio contexts. The seminar will meet twice each week for discussions of assigned readings and works done by students. Readings will engage contemporary issues in art. The students' work will be self-directed in media of their choice. Written permission required, and Junior or Senior standing. May not be repeated for credit.

191. *Individual Study in the Practice of Art* The STAFF. Work on an approved project, leading to the presentation of a portfolio or body of work, under supervision of an individual member of the staff. Project proposals must be filed with the department no later than the first week of the semester.

198, 199. *Honors Thesis* The STAFF. The subject of the thesis and program of study will be determined by the needs of the individual student. Prerequisite: written permission of the instructor and concentration advisor.

Note: All Studio Art Concentrators are required to arrange and present an individual exhibition of their work in their final semester.

Courses at the Rhode Island School of Design

It is possible under certain conditions for students enrolled at Brown to take courses in studio work and art history at the Rhode Island School of Design and to have such work credited toward their degree requirements. No more than four courses may be taken at the Rhode Island School of Design for Brown credit during a student's undergraduate career. A student registers at Brown for either Art 93, 94 or 193 as appropriate.

Written permission to enroll in Art 93, 94 or 193 is required as follows:

- (a) From the RISD instructor
- (b) From the RISD Registrar

For a list of courses which qualify as Art 93, 94 or 193, please consult list of approved courses in the Office of the Registrar. Art 10, Foundation Design is a prerequisite for taking courses at RISD. At the discretion of RISD, a portfolio may be submitted to satisfy this prerequisite.

If an applicant wishes to take a course not listed in the Office of the Registrar, either on the list of art courses or those approved through other departments, he/she may consult with the Registrar to determine possibilities for petitioning the Committee on Academic Standing or the Educational Policy Committee.

Forms to be used in obtaining permission to register for Art 93, 94 or 193 are available in the Registrar's office.

93. *Studio Work Elected from Approved Offerings at RISD*

Written permission is required (see above).

94. *Art History Elected from Approved Offerings at RISD*

Written permission is required (see above).

193. *Advanced Studio Work Elected from Approved Offerings at RISD*

Written permission is required (see above).

Bibliography

Professor ADAMS.

102. *Introduction to Manuscript Theory and Practice*

The STAFF.

Through readings in standard texts, supplemented by current articles and discussions, the course will require students to master basic archival and manuscript theory and practice. In addition, special seminars will illustrate methods of conducting research at the primary source level. As such, students will approach the processing of manuscripts both as archivists and historians or literary scholars. A written, mid-term examination, followed by the organization and analysis of two or three small manuscript collections will demonstrate the students' general understanding of manuscript theory and practice and their basic ability at organization and analysis.

105. *Bibliographical Organization*

The STAFF.

A study of the development of man's record of manuscripts, books, periodicals, films, etc. Students will examine national, international, and special types of bibliographies. Subject bibliography will receive secondary consideration.

193. *Seminar in Printed Sources on the early History of the Americas*

(American Civilization 193).

Biochemistry

The program in biochemistry draws on the resources of several departments. It is designed to permit flexibility in the selection of areas of research and courses of study. The study will have available the facilities of the Chemistry Department, the Division of Biology and Medicine, and the affiliated hospitals. See page 110, under Standard Interdepartmental Concentration Programs, for details of standard concentration programs leading to the A.B. and the Sc.B.

A Ph.D. is granted in Biochemistry. The requirements are the passing of a preliminary examination and the presentation of an acceptable thesis. Specific requirements and individual study will be tailored to meet the needs of the student.

Biology and Medicine

Professors S. ARONSON, BALDINI (E), BARNES (E), BIGGINS, W. BROWN, CALABRESI, CARLETON, S. CHA, CHASE (E), CHU, CHURCH (E), COBB (E), J. R. COLEMAN, CSERR, CURRAN, DAHLBERG, DIAMOND, DYER (E), EBNER, ELLIS, EPSTEIN, ERIKSON, EVRARD, FAIN, FAUSTO, FISCHER (E), FORMAN, GALLETTI, GANN, GERBI, A. GLICKSMAN, GOLD (E), L. GOLDSTEIN, GOSS, GREER, HAGY, HAMOLSKY, HANDELSMAN, HERBERT, HERN- DON, S. HOFFMAN, HOPKINS, B. JACKSON, D. JACKSON, KARLSON, KATZ, J. KIDWELL, KNOPF, LANDY, LEDERBERG, LEDUC, LEITH, LEONE, LEV, LEWIS, LICHTMAN, LIPSITT, LONGABAUGH, MARSHALL, H. MARTIN, McDONALD, MCILWAIN, McMASTER, MEISS- NER, MORRIS, MORRISON, MORSE, MOST, NICHOLS, OH, PARKS, POVAR, QUEVEDO, RANDALL (E), ROTHMAN, ROTMAN, R. SCHWARTZ, SENFT, SIMEONE (E), SINGER, SLABY, STEINER, STERN, P. STEWART (E), STURNER, J. SUSSET, TEFFT, TEPLITZ, W. THAYER, TSUANG, M. TURNER, WEISZ (E), WESSEN, WINCZE, YANKEE, ZACKS, ZIM- MERING, ZINNER; Associate Professors AGARWAL, ALBALA, AMBLER, ARNOLD, BEALE, BEHAR, BIANCANI, BISHOP, BRAMAN, CALDWELL, R. CAPONE, CASHORE, C. CHA, CHAPMAN, M. CHU, A. COLEMAN, CONSTANTINE, COUSTAN, COWETT, J. CROWLEY, CULPEPPER, CUMMINGS, CUNNINGHAM, DEXTER (Adj.), DYCKMAN, EDSTROM, FARNES, FAUSTO-STERLING, FINK, FRANASZEK, FRESQUEZ (V), HEYWOOD, HOCHHEISER, HOLOWINSKY, HOPPIN, JAUREGUI, L. JOHNSON, KAEMMERLEN, S. R. KAPLAN, KAYE, A. KHAN, M. KIDWELL, KIM, LAUCLAN, LENT, LIU, MADDOCK, MANIS, McCULLY, McENTEE, McKINLAY, MEDEIROS, MIECH, K. MILLER, M. MILLER, MONTEIRO, MONTI, L. NEWMAN, J. O'SHEA, PAOLINO, PATRICK, PETER, PUESCHEL, REE, REIN- STEIN, ROLAND, SHANK, SHEFF, SHIPP, SHULMAN, S. SMITH, SPENCE (Adj.), STRAUSS, T'ANG (V), TUCCI, TYSON, WAAGE, WAGGONER, WESTLAKE, WHEELER, WILLIAMS, ZAWADZKI; Assistant Professors AARON, ABRAMS, J. ABUELO, ALLEN-ROWLANDS, ALPER, AMOLS, BALKO, BANSAL, BAUSSERMAN, BERTNESS, BODEN, BODENHEIMER, BOGAARS, BOOR, BOSTIAN, BOUGH, BOWEN, BRADEN, BRAUTIGAN, BREM, BRUBAKK (V), BURCHARD, BURNS, BUSATH, CANICK, CARLSON, CARPENTER, A. CARVALHO, J. CARVALHO, CHANG, CHEN, COHEN (Adj.), COHN (Adj.), COLLINS, CORRAO, CORTRIGHT (Adj.), DAAMEN, DARIO (V), DAVIS, DEGNAN, DELANCEY, DeROSSI (V), DETTMAN, DOOLITTLE, EL KOUNI, ELDER, ENGELAND, A. ERICKSON, ETTENSOHN, EVANDER (Adj.), FALTUS, FAUST, FINDLEY, FINELLI, FOGEL, FOLLICK, FRETWELL, FRIEDMAN, FULTON, GANDSMAN, GARCIA COLL, GEWIRTZ, GIAMBALVO (Adj.), GILBERT, GINS- BERG, GOLDBERG, GRIFFITHS, GRUPPUSO, HAIER, HELLER, HILLEMEIER, HUBBARD, JANIS, R. JOHNSTON, KANE, D. KAPLAN, KAREIVA, KEITNER, KENNEY, KIESSLING, KORR, KRAMER, LABRESH, LALLY, LANCE, LASATER, LAUGHREN, LEDERER, LEPORE, LEY, LIBBEY, LIEPMAN, MACKO, MAGINNISS, MAIR, MALHOTRA, MALIK, MATARESE, MATES, K. MAYER, MCCARTNEY, MCCOOL, McMILLAN, McSHAN, MEITNER, B. MILLER, I. MILLER, MOONAN, MOR, P. MURPHY, MUURINEN, MYERS, NAYAK, NEAVE, NIRENBERG, NORMAN, NOVACK, P. O'SHEA, PADRE-MENDOZA, M. A. PASSERO, M.A.C. PASSERO, RAO, REUBEN, RIGGS, SASKEN, SASSAMAN, SAVARESE, SCHABERG, SCHMITT, SELTZER, SHARMA, SHEARER, SHERRETS, SILVERMAN, SIMPSON, SIROTA, SLOTMAN, P. SMITH, SOLOMON, SPREMULLI, SRINIVSAN, STAUNTON, STEINFELD, STOECKLER, STONESTREET, STOUT, SUBRAMANYAM, SUSAN, P. THOMPSON, TRAMON- TANA, TREBBIN, VAN ZUIDEN, VANDENBURGH, VEZERIDIS, B. VOHR, WACHTEL,

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GRADUATE PROGRAMS

The Division of Biology and Medicine presents four programs of graduate study lead- ing to the degrees of Master of Science and Doctor of Philosophy. These programs are 1) Molecular and Cell Biology, 2) Pharmacology and Experimental Pathology, 3) Physiol- ogy and Neuroscience and 4) Ecology and Evolutionary Biology. The Division also offers a Medical Education Program and Program in Medicine leading to the degree of Doctor of Medicine. Students in the Program in Medicine may also pursue a degree of Master of Medical Science and/or Doctor of Philosophy. Thesis research is carried out in the laboratories of the faculty, which contain many pieces of specialized equipment. Three major shared Divisional facilities are the Animal Care Facility, the Biological Con- tainment Facility for Recombinant DNA Investigations, and the Electron Microscope Facility. Research facilities are available for work with a wide variety of prokaryotic and eukaryotic organisms.

The collections of the Biological Sciences Library are now housed, along with those of the Physical Sciences Library, in the Sciences Library, located at the corner of Thayer and Waterman Streets. This library provides access to more than 4,700 current periodicals

and 268,000 volumes in the fields of bio-medicine, psychology, and all the physical science disciplines.

Students entering these programs must have, in addition to college courses in Biology, a background in Physics, Chemistry, and Mathematics (see below). Courses are chosen with the advice of Program counselors, and may include, in addition to Divisional offerings, courses offered by other University Departments, such as Applied Mathematics, Chemistry, Engineering, Geological Sciences, Mathematics, Physics, and Psychology. The language requirements of the Division may be satisfied in any modern foreign language in which there is significant and copious literature relevant to the student's special area of study. As a part of the doctoral training each student will be required to participate in the teaching of one or more courses related to the program.

THE PROGRAM IN MOLECULAR AND CELL BIOLOGY. The Graduate Program in Molecular and Cell Biology is intended for students of exceptional ability and interest who plan to pursue a career which includes research in biology or medical sciences. Admission is generally limited to candidates for the Ph.D. degree, though in special cases candidates for the M.S. degree will be admitted. The program is interdisciplinary, focusing on molecular and cellular aspects of biochemistry, developmental biology, genetics, immunology, physiology and virology. An individual program is designed to meet each student's needs and interests while providing a firm background in molecular and cell biology and in biochemistry.

THE PROGRAM IN PHARMACOLOGY AND EXPERIMENTAL PATHOLOGY. The Ph.D. Program in Pharmacology and Experimental Pathology is sub-divided into three interrelated fields, i.e.:

1. Cancer Biology
2. Biochemical Pharmacology
3. Experimental Pathology (to be developed)

The faculty of this program includes over twenty pharmacologists, biochemists, cytologists, immunologists, parasitologists, pathologists, and radiologists located either on the campus or at affiliated hospitals, who participate in graduate training in Pharmacology and Experimental Pathology. Joint research programs already exist between members of this group and other graduate training programs.

Applications will be welcomed from students holding the Bachelor's or Master's degree who are proficient in the areas of biochemistry, biology or chemistry. Basic prerequisites are:

1. A Bachelor's or Master's degree.
2. Four courses in chemistry, two of which are in organic chemistry.
3. Two courses in physics.
4. A course in calculus.
5. Two courses in either biology, biochemistry, physiology, zoology, or any combination of these.

A student deficient in any of the above may petition the governing board of our Program for consideration as an applicant.

All students in the Program, regardless of the particular sub-program chosen, are expected to become proficient in Molecular Biology, Biochemistry, Biochemical Pharmacology (especially Chemotherapy), Cancer Biology, Experimental Pathology, Statistics, and laboratory procedures. In addition, students in the Biochemical Pharmacology sub-program will be required to demonstrate proficiency in physiology, the neurosciences, and clinical pharmacology; and students in the Cancer Biology and Experimental Pathology sub-program will be required to demonstrate proficiency in Developmental Biology and Cytology.

THE PROGRAM IN PHYSIOLOGY AND NEUROSCIENCE. The Graduate Program in Physiology and Neuroscience offers advanced training appropriate to academic and research careers in fields of biology and medical sciences which include cellular, comparative and organ systems physiology, neurophysiology, neuropharmacology, neuroanatomy, and related areas of biophysics and bioengineering. Admission is ordinarily limited to applicants for the Ph.D. degree, but admission for the M.S. may also be permitted in exceptional circumstances. Specific degree requirements of the program are to pass a comprehensive examination and a preliminary research examination according to established schedules, to complete and publicly defend an original research dissertation, and to meet the teaching and foreign language requirements of the Division of Biology and Medicine. There are no specific course requirements. Programs of study and research are developed individually in consultation with the student's advisor and advisory committee according to his or her qualifications, interests, and career goals, and are expected to insure expertise in the students' fields of research as well as competence in broadly related areas of physiology and neuroscience. Interdisciplinary work is encouraged where appropriate, and may be undertaken within the Center for Neural Science, with other graduate programs in the Division of Biology and Medicine, or can be arranged with other departments in the University. Students with particular interests in Bioengineering may apply either to the Program in Physiology and Neuroscience, or instead to the graduate program of the Division of Engineering, as appropriate to background qualifications and career goals.

THE PROGRAM IN ECOLOGY AND EVOLUTIONARY BIOLOGY. The Graduate Program in Ecology and Evolutionary Biology is intended for highly qualified students who plan to pursue a career that includes research in ecology and/or evolutionary biology. Admission to graduate study is open to candidates for both the Ph.D. and M.S. degree. Individual programs are designed to meet each student's needs and interests while providing a strong background in ecology, evolutionary biology and relevant related areas. All students are expected to attain proficiency in ecological theory, field research methods, evolutionary theory, and statistics. Depending on the student's interests, he/she may be expected to demonstrate proficiency in other areas as well, such as ethology or genetics. This proficiency may be attained through course work, seminars, independent reading, and laboratory and field programs. The faculty of this program includes ecologists, evolutionary biologists, and geneticists, and provides opportunities for interactions with other programs in the Division as well as those without (e.g., Applied Mathematics, Geological Sciences).

Students will demonstrate proficiency in the language most appropriate to their area of thesis research. A preliminary examination and a thesis defense are required, and every candidate must write a dissertation and present it in proper form to the Graduate School. GRE Aptitude and Advanced test scores are required.

MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING. A program leading to the Master of Science in Biomedical Engineering is sponsored jointly with the Division of Engineering and is described on page 273 (Engineering Graduate Programs).

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Biology. Prerequisites: Mathematics 9, 10 or equivalent (9, 12, or 17 or Applied Mathematics 33) and Chemistry 3, 11 or equivalent. In addition, Physics 3, 4 or equivalent is strongly recommended. Courses: Ten courses including at least seven in the Division of Biology and Medicine. The three remaining courses may be chosen in other sciences among courses beyond the introductory level, with approval of the concentration advisor. As many as two semesters of Independent Study (Biomed 195/196) may be counted for

concentration credit. Students are advised to consult with the Dean of Biology for possible revisions in Biology concentration programs.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE DEGREE

The curriculum is based on the fact that much of biology is interpreted and understood in terms of mathematics, chemistry, and physics. The needed background in the physical sciences should be acquired early. Students are advised to consult with the Dean of Biology for possible revisions in Biology concentration programs.

Program: A total of 20 courses including:

- a. Mathematics 9, 10 or equivalent; Chemistry: 3 courses; Physics 3, 4 or equivalent. In addition, three more courses in the above subjects (or Applied Mathematics, Computer Science or Engineering) as approved by the concentration advisor.
- b. A total of 10 courses including at least seven in the Division of Biology and Medicine, as approved by the concentration advisor. The three additional courses may be selected with the approval of the concentration advisor from those offered in Applied Mathematics, Chemistry, Computer Science, Engineering, Geological Sciences, Mathematics, Physics, and Psychology. At least one semester of Independent Study in Biology (Biomed 195 or 196) is required.

INTERDEPARTMENTAL PROGRAMS. Students who are interested in the following concentration programs should see descriptions beginning on page 107; Applied Mathematics-Biology, Aquatic Biology, Biochemistry, Biophysics, Health and Society, Human Biology, Biology-Geology and Neural Sciences. For Biomedical Engineering, see page 256.

HONORS: All candidates for Honors in biology must elect Biomed 195 and/or 196. This course may count as concentration credit for two semesters only. Participation in the Honors program in biology may start at any time, but candidates must file a formal application for the program, by the beginning of their *seventh semester and no later than October 15*, with the Honors Advisor. Successful completion of the Honors program requires a 3.3 grade point average in the concentration (or the equivalent), a written Honors thesis, and an oral presentation of their independent research.

THE MEDICAL EDUCATION PROGRAM

The Division of Biology and Medicine, in conjunction with other departments, offers a seven (or eight) year program leading to the degree of Doctor of Medicine to students admitted to the program as freshmen. The curricular requirements are given under Requirements for Degrees on page 126.

I. PRIMARILY FOR UNDERGRADUATES

Introductory Courses

1. *Introduction to Biology*

Mr. QUEVEDO.

An introduction to the principles of biology with emphasis on the human organism for individuals not planning to concentrate in this subject. Lectures examine the human species in the light of current knowledge of the origin and evolution of life. Major events of the human life cycle including prenatal development, learning, disease, sex, reproduction, aging, and death are considered from the viewpoints of their hereditary and environmental control, generation of controversy in present society, and long-range evolutionary significance. Readings are drawn broadly from the current scientific and popular literature. Written permission required. (Not for concentration credit.)

5. Dynamics of Living Systems

Messrs. BIGGINS and HEYWOOD.

A broad overview of current knowledge in biology including the structure, function and reproduction of cells in their organelles and the correlation of structure and function in animals, plants, and microorganisms. This basic knowledge will be applied to issues of contemporary biological interest drawn from such topics as nutrition, exercise, stress, reproduction, disease, radiation, chemical mutagens, genetic engineering, biotic interactions, management of ecosystems, and the development of agriculture. It will be emphasized that cells, organisms and ecosystems are highly dynamic and are affected by many factors including natural influences and interactions with humans. Course includes weekly laboratory or discussion section. (Not for concentration credit).

6. Introduction to Human Physiology

Mr. GOLDSTEIN.

The aims of this course are twofold: A) to provide an introductory level course in Human Physiology, aimed primarily at students who are not concentrating in biology and who want to learn more about their body functions; B) to increase the general level of awareness, particularly among nonscientists, of normal bodily functions, as a basis for more rational and well-informed responses to personal health care decisions, health-related aspects of consumerism, and problems of survival. Topics will include basic cardio-vascular, respiratory, kidney, gastrointestinal, endocrine and neuromuscular function, as well as aspects of nutrition, reproduction, and environmental physiology. (Not for concentration credit).

7. Radiation and Life

Messrs. GLICKSMAN, AMOLS, and GANDSMAN.

This course has been designed for non-bio, non-physics concentrators. Its content will be descriptive, not quantitative. The objective of the course will be to give the student broad-based knowledge of the biological effects of radiation, the uses of radiation in medicine, industry and national defense, and an approach to an assessment of the hazard-to-benefit ratio for the individual and for society. The involvement of the student as a responsible citizen in policy making concerning radiation will be emphasized. (Not for concentration credit.)

8. Genetics, You and Society (Special Themes and Topics 68)

Mr. HAGY.

Genetics is a particularly exciting, relevant area of modern biology. New technology is leading to rapid expansion of knowledge in human genetics which has implications both for individuals and for society. Topics include gene-chromosome relationships, modern concepts of gene structure and function, experiments with recombinant-DNA, cloning and genetic engineering, genetic counseling, prenatal diagnosis, and genetic screening programs. Not intended for students who are completing a premedical/pre dental program. Written permission of the instructor is required. (Not for concentration credit.)

11, 12. Current Concepts in Biology

Messrs. ELLIS, HOLOWINSKY, MILLER, MORSE, QUEVEDO, WAAGE, and STAFF.

A two semester lecture and laboratory sequence intended to serve as a comprehensive foundation for concentrators. The course focuses on selected concepts drawn from various specialties of biology and emphasizes the experimental basis of current views. The fall semester is devoted to a consideration of molecular mechanisms of cell function. Evolution is the guiding theme for the second semester which focuses on the diversity of living systems and their complex interactions. Three hours of lecture and three hours of laboratory. No prerequisites but a strong background in high school biology and chemistry is recommended.

28. Comparative Biochemistry

Mr. GOLDSTEIN.

An approach to biochemistry from a biological standpoint, with the emphasis on function rather than mechanisms. Course will deal primarily with metabolic topics, including the synthesis of ATP from fuels, the synthesis of fats and carbohydrates and the formation of

nitrogenous end-products. Examples will be taken from a wide variety of animals and, where appropriate, processes will be compared to show how varying environmental pressures and physiological demands have combined with evolutionary factors to determine the biochemical differences between organisms. In addition, a brief introduction to enzyme structure and action will be given together with an account of nutrition and a selection of more specialized topics in comparative biochemistry. Prerequisites: Chemistry 11 and Biomed 11 or written permission.

32. *Vertebrate Embryology*

Ms. FAUSTO-STERLING and Mr. COLEMAN.

An introduction to the developmental anatomy of vertebrate embryos, including humans. The course involves intensive microscope slide study of chick, frog, and pig embryos supplemented by lectures and discussion. Topics covered include gametogenesis, fertilization, cleavage, gastrulation, and the formation of embryonic tissues and organ systems. The course is taught in three two-hour sessions per week in a combined lecture-lab format with enrollment restricted to laboratory capacity. Prerequisites: Biomed 11 or 12 and written permission.

36. *The Biology of Gender* (Special Themes and Topics 37)

Ms. FAUSTO-STERLING.

This course examines the question of gender. Topics include: (1) the phenomenon of sexual dimorphism, (2) genetic and embryological bases of sex determination, (3) sex reversal in non-human vertebrates, (4) the evolution of sex differences in non-human vertebrates and (5) the development of gender differences in humans. Prerequisites: written permission of the instructor and an introductory course in *one* of the following areas: biology, sociology, psychology, or anthropology. S/NC.

37, 38 *Experimental Morphogenesis*

Mr. Goss.

Growth and regeneration of organs and tissues. Prerequisite: introductory biology. Knowledge of histology recommended.

42. *Principles of Ecology*

The STAFF.

The principles, concepts and controversies involved in the study of the distribution, abundance and interactions of plant and animal populations and their integration into natural communities. Emphasis is placed on an evolutionary approach to ecology. This course is intended as an in-depth but broadly based study of ecology for biology and other science majors (including environmental sciences concentrators). Prerequisites: Biomed 11, 12 or equivalent biology background, Mathematics 9.

45. *Animal Behavior: Ecological and Evolutionary Determinants*

Mr. WAAGE.

The role behavior plays in the survival and reproduction of animals in nature. The course will run the spectrum from ethology to behavioral ecology and sociobiology. Basic topics include: avoiding predation, obtaining food and mates, communicating, producing and caring for offspring and living in groups. Prerequisites: Biomed 11, 12. Written permission. The course will be offered in Spring '84 and then in the Fall of 1985.

46. *Genetics*

Mr. ZIMMERING.

An introduction to genetic phenomena at the organismal, cellular and molecular level. One 2-hour discussion session each week. Not recommended for students who have taken Biomed 47 or 151.

47. *Human Genetics*

Mr. HAGY.

Principles and concepts of genetics with emphasis on man, including transmission genetics, cytogenetics, biochemical and developmental genetics, and population genetics. Laboratory experiments utilize *Drosophila* and human or mammalian cell cultures. Prerequisite: written permission. Recommended: Biomed 11, 12. Biomed 46 may not be taken in addition to Biomed 47.

48. *Vertebrate Adaptation and Diversity*

Mr. MORSE.

The relationships of vertebrates to other animals and to their environment. Major topics include feeding adaptations, responses to predators, reproductive adaptations, and responses to the physical environment. The behavioral patterns, evolutionary history, morphology, and physiology of vertebrates are woven into this theme wherever possible. Laboratories and field trips will concentrate on living vertebrates. Occasional weekend field trips. Prerequisites: Biomed 12 and written permission.

51. *Diversity and Adaptation of Seed Plants*

Ms. SCHMITT.

An introduction to the mechanisms and results of adaptive radiation in higher plants. A major goal is to provide familiarity with local flora, characteristics of major plant families, and identification techniques through weekly labs or field trips. Prerequisites: Biomed 11, 12. Enrollment limited; permission required.

52. *Plant Organism*

Mr. BEALE.

A lecture-laboratory course. An introduction to the biology of vascular plants. Structural and functional design of higher plants and its adaptive significance is studied in relation to the challenges posed by the organism's immediate environment. The organismal concept is examined through a discussion of developmental and reproductive strategies and the integrative factors of individual tissue and organ systems. This course, which is a prerequisite to several of the plant sciences courses, also covers some taxonomy, anatomy, morphology, physiology and ecology. Six hours of attendance. Prerequisites: Biomed 11 or 12, or permission of instructor.

61. *Invertebrate Zoology*

Mr. BERTNESS.

A comparative survey of the invertebrates, stressing ways in which functional morphology, physiology, reproduction and behavior of the animals relate to their ecology. Laboratory exercises and field trips provide first-hand experience with the animals. Prerequisite: written permission.

81. *Histology*

Ms. LEDUC and Mr. RIPLEY.

An analysis of the four basic types of tissue (epithelium, connective tissue, muscle, nerve) and their integration into organs. The course is developed during laboratory periods which are preceded by surveys of the material to be studied. Prerequisite: written permission. May not be taken in addition to Biomed 82.

82. *Mammalian Histology*

Mr. STRAUSS.

Will elucidate via lectures and laboratories the light microscopic organization of mammalian organs, tissues, and cells, with special reference to the functions of those units. The structures also will be described at the electron microscopic level and related to the biochemical compositions and function of cells. Prerequisites: Introductory biology or equivalent. May not be taken in addition to 81.

91. *Nervous System: Introduction* (Neural Science 1)

Ms. SMITH and STAFF.

Designed as a systematic introduction to the structure and function of the central nervous system of mammals. The lectures assume some background in animal biology and chemistry, although no formal prerequisites are required. The main topics will be: 1) structure and function of neurons; 2) neural integration underlying sensory and motor function; 3) neuronal mechanisms related to complex functions such as learning and memory.

92. *Integrative and Organismal Neurobiology* (Neural Science 2)

Mr. EBNER.

Intermediate level lectures on the anatomy, physiology and pharmacology of the central nervous system of vertebrates emphasizing many of the current research strategies used in these disciplines. Prerequisite: Neural Science 1.

II. FOR UNDERGRADUATES AND GRADUATES

Cell Biology, Physiology, Biophysics

101. *Radiobiology*

Mr. LEITH.

Biophysical effects of ionizing and non-ionizing radiations on living organisms. Topics include mechanisms of cellular injury, repair processes, cell transformation, tumor radiobiology, and effects on the organism level. Three hours of lecture. Prerequisites: Biomed 11, 12, Physics 3, 4 or written permission.

105. *Biology of the Eukaryotic Cell*

Ms. GERBI and Mr. MILLER.

The subcellular organelles and macromolecular components of eukaryotic cells are considered in detail within the context of major cellular activities. This course emphasizes the experimental basis for factual knowledge and current concepts in modern cell biology; accordingly, critical analysis of the research literature from both recent molecular and classical cytological investigations comprises the major class activity. Demonstrations of selected major research instrumentation on the Brown campus are arranged. Suited both for advanced undergraduate and beginning graduate students. Recommended as an "ecology course of the cell" for Biochemistry concentrators. Prerequisites: Biomed 11 and Chemistry 11 *and* written permission. Complementary to Biomed 151, and may be taken concurrently.

106. *Plant Cell Biology*

Mr. HEYWOOD.

A detailed survey of cell structure, function, and organelle evolution in algae, fungi, and higher plants. Topics include: structure and function of organelles, nuclear behavior, cell and organelle motility, morphogenesis, secretion, and cell wall formation. The potential of plant cells as experimental systems in biological research will be emphasized. Prerequisites: Biomed 11; Chemistry 11 or equivalent (may be taken concurrently).

107. *Quantitative Models of Biological Systems* (Applied Mathematics 107)

Mr. KAREIVA and Ms. EDELSTEIN.

An intermediate course between Biomed 110 and Biomed 212/Applied Mathematics 222. Emphasis on the use of quantitative modelling techniques in solving real problems in molecular biology, physiology and ecology. Topics vary from year to year but will range from the sub-cellular level (e.g. solution chemistry, reaction-diffusion interactions, enzyme kinetics, mass transport) through the cellular level (e.g. compartment analysis, membrane excitation) and the organ system level (e.g. fluid mechanics and the cardiovascular system), to the level of the whole organism (e.g. biological clocks, growth equations, chemostats, morphogenesis and pattern formation) and ultimately to population dynamics and ecosystem analyses. Mathematical techniques will be discussed as they arise in the contexts of these problems, and may include numerical solution of differential equations, control theory and system analysis, optimization techniques, parameter search and identification, modelling theory. Lectures and demonstrations. Prerequisites: 1 year chemistry, Biomed 110, either 1 year physics plus Applied Mathematics 23 (or Applied Mathematics 33-34) or Applied Mathematics/Physics 15, 16, 17, 18 or written permission.

108. *Mammalian Neuroendocrine Physiology*

Messrs. CARLSON and ENGELAND.

Integrative function of the nervous and endocrine systems as it relates to homeostasis in mammalian organisms. Topics covered include: sensory afferent control of the neuroendocrine system, hypothalamic-pituitary relationships, autonomic and endocrine control of endocrine glands, and the integrated response to complex stimuli. Lectures and selected readings. Prerequisites: Biomed 11, 12 or Biomed 91. Offered in alternate years.

110. *Cell Physiology and Biophysics*

Mr. DEGNAN and STAFF.

Integration of structure and function in living cells. The functional unit of biological systems is the cell. Defining and understanding the principles governing biological processes at the cellular level provide an appreciation of the overall function of a tissue and its contribution to the organism. Topics covered are general and specialized cellular processes and functions (cell organelles and membranes; cell-cell interactions; metabolism; bioelectricity; nerve, muscle, epithelia and other specialized cells). Prerequisites: Biomed 11, Physics 4, Mathematics 10, or written permission. Recommended: Chemistry 3.

111. *Microbial Ecology in Aquatic Environments*

Ms. COLEMAN.

Physiology of the lower aquatic forms including marine bacteria, fungi, and algae. Biochemistry and cellular physiology of basic mechanisms of processes related to nutrition, bioenergetics, metabolism, and transport will be discussed together with cellular fine structure and phenomena of developmental interest. The relation of parameters of the aquatic environment to the functioning of these processes and their interactions will be examined. Prerequisite: Biomed 11, 12 or elementary biochemistry or permission of instructor. Knowledge of college chemistry and physics strongly recommended. Offered in alternate years.

113. *Secretory Processes in Biology*

Mr. STRAUSS.

The structure and function of biological membranes which relate to secretory processes, such as pancreatic acinar cell secretion, acid secretion by the stomach, absorption and secretion by kidney and intestine, and the synthesis and secretion of hormones. Prerequisite: Biomed 11 or equivalent.

114. *Photobiology*

Mr. HOLOWINSKY.

This course focuses attention on primary photoprocesses in biology. Major consideration is given to photochemistry of biological macromolecules and photoactive pigments, molecular architecture of complex photoreceptors, amplification of the light signal, and the nature of principal photoresponses. Offered in alternate years. Prerequisite: written permission. (Alternates with 234).

115. *Introductory Plant Physiology*

Mr. BEALE.

Fundamentals of plant growth and behavior. Lecture and laboratory topics will include: plant organs and their functions; physical and chemical bases of water and solute movement, mineral nutrition, transpiration and translocation, energy metabolism, photosynthesis, and nitrogen metabolism; patterns of spatial and temporal organization, hormones, phytochrome, geo- and phototropism, flowering, bud and seed germination, dormancy, and senescence; environmental and stress physiology, parasites, disease, and symbiosis. Prerequisite: Biomed 11; Biomed 52 recommended.

117. *Mammalian Physiology*

Ms. CSERR and STAFF.

Organ system function with emphasis on human physiology. Topics covered include: cardiovascular, respiratory, renal, acid-base and gastrointestinal physiology. Material is presented through lectures, small group conferences and laboratory analysis of human and animal physiological responses. Prerequisites: Mathematics 9, 10; Chemistry 3; Physics 3, 4. Enrollment limited to students in the first year of the Program in Medicine plus qualified undergraduate and graduate students up to a total of 72 students.

118. *Comparative Animal Physiology*

Messrs. JACKSON and MAGINNISS.

Comparative and environmental approach to the operation and regulation of animal systems with emphasis on vertebrate functions. Topics discussed are circulation, respiration, excretion, osmotic and ionic regulation, and temperature regulation. Course examines the physiological adaptations and behavioral strategies which permit animals to exist in different and changing environments. Prerequisites: Biomed 12 and Chemistry 11 or equivalent. Recommended: Biomed 185.

Biochemistry, Pharmacology and Developmental Biology

122. *Endocrinology*

Messrs. FAIN, CANICK and MORRIS.

A basic course in endocrinology with emphasis on biosynthesis of hormones, release of hormones and their mechanisms of action. Prerequisite: Chemistry 11.

124. *Advanced Biochemistry*

Mr. BRAUTIGAN.

An advanced treatment of the biochemical control mechanisms which operate to coordinate genetic expression and metabolic activity in biological systems. Prerequisite: Biomed 126.

125. *Drugs in Our Society*

Mr. MIECH.

The properties and effects of: a) drugs which are commonly used in our society, and b) chemicals which affect our environment. Emphasis will be placed on pharmacological properties of abused drugs, psychotherapeutic drugs, antibiotics, anticancer drugs, and environmental pollutants. The course provides an introduction to pharmacology for students contemplating graduate school in biology, biochemistry, chemistry, psychology or applied mathematics of biological systems. Prerequisites: Biomed 6 or Biomed 11, and Chemistry 10 or 11.

126. *Biochemistry*

Mr. ROTHMAN and Ms. LUSK

An introductory course with emphasis on the continuity between organic and biological chemistry, structure and function of macromolecules, energy transfer in cells, intermediary metabolism and its regulation at the cellular level and information transfer. Prerequisites: Chemistry 3, 11, 12 or equivalent.

128. *Biochemical Pharmacology*

Messrs. PARKS and MIECH, Ms. MARSHALL, Messrs. CHA and PATRICK.

A basic consideration of the biochemical and physiological factors that affect the actions of drugs. Topics include: drug receptor kinetics; pharmacokinetics; bioavailability of drugs; enzymes as sites of drug action; the absorption, distribution, and metabolism of drugs; the interaction of drugs with the autonomic nervous system; and the biochemical mechanisms of drug action in bacterial, viral and cancer chemotherapy. Lectures, laboratories, and discussion sections. Prerequisite: written permission or Biomed 126. Recommended for background information: Biomed 151. Required of students in the first year of the Program in Medicine; others by written permission if space is available.

130. *Medical Biochemistry*

Mr. DAHLBERG and STAFF.

An advanced course in regulatory biochemistry with a medical orientation. Covers regulation of carbohydrate and lipid metabolism in muscle, liver and adipose tissue and biochemical aspects of inherited metabolic disorders, including heme, amino acids, proteins and nucleic acids. Prerequisites: 126 or equivalent. Required of students in the first year of the Program in Medicine; others by written permission if space is available.

131. *Analysis of Development*

Ms. FAUSTO-STERLING and Mr. COLEMAN.

A critical analysis of developmental mechanisms with particular emphasis on the animal embryo. Topics considered include the initiation of development, morphogenetic movements, tissue interactions, morphogenesis of complex patterns, cell differentiation, and gene action in development. The laboratory includes observation and experimentation with living embryos. The course assumes a basic background in morphology, cell biology, and genetics. Prerequisites: Biomed 11, 12. Recommended: Biomed 46 or 47.

132. *Evolution and Development*

Mr. QUEVEDO.

Examines how prebiological and living systems may have been channeled into various phylogenetic pathways through constraints imposed by their changing living and non-living environments and by their own genetic/developmental programs. The current debates in evolutionary biology are explored in the light of this concept. Prerequisites: Biomed 11, 12 plus one additional Biomed course or written permission.

136. *Topics in Plant Biology*

Mr. BEALE and STAFF.

Advanced level seminar-style course for those wishing to pursue plant biology beyond the level offered in other courses. The subject matter will differ each year, to reflect the state of current research and the interests of the instructors. Future topics may include: plant molecular biology, photosynthesis and bioenergetics, physiological ecology, and plant developmental physiology. Prerequisite: Biomed 52.

Genetics, Ecology, Population Biology**141. *Behavioral Ecology: Evolutionary and Ecological Determinants of Animal Behavior***

Mr. WAAGE.

This seminar examines current literature on the evolutionary and ecological determinants of animal behavior. Topics include: foraging behavior, predator avoidance, communication, competitive behaviors, mate finding, breeding systems, parental care and social behavior. Focus is on critical reading and discussion of scientific literature in behavioral ecology, ethology and sociobiology. Emphasis is on experimental and comparative methods for testing theory and resolving current debates within the disciplines. Assumes an understanding of ecological and evolutionary principles and background in organismal biology and behavior. Minimal prerequisite is Biomed 45 or 42 and junior standing. Strongly recommended: additional courses in ecology, organismal biology, genetics/evolution and behavior. Permission required.

142. *Evolutionary Genetics*

Ms. KIDWELL.

The modern synthetic theory of evolution is developed in detail. Forces causing gene frequency change are considered and emphasis is placed upon speciation as a genetic and ecological problem. Offered in alternate years. Prerequisite: background in genetics or written permission.

143. *Problems in Field Biology*

Mr. MORSE and STAFF.

The focus is on the recognition, formulation and answering of questions about natural populations under field conditions. The areas of evolutionary and behavioral ecology will be stressed. The first two-thirds of the course concentrates on field work (informational and quantitative studies), while the last third stresses the theoretical and experimental literature. Discussion/field trip format Tuesday and Thursday afternoons 12:30 to 5:00 plus additional weekend field trips. Seniors, juniors and graduate students only and limited enrollment. Prerequisites: Biomed 42, 51 and/or 61 and written permission.

144. *Marine Ecology*

Mr. BERTNESS.

An examination of current topics in the evolutionary ecology of marine organisms. Topics to be covered will include community structure and dynamics, predation and competitive processes and life history phenomena. A field trip will be taken during the spring break. Prerequisites: Biomed 42 and 61 and written permission.

146. *Genetics and Human Disease*

Ms. ABUELO and STAFF.

An analysis of human diseases, including the elucidation of basic processes leading to genetic syndromes, the role of environmental agents in the induction of genetic diseases, the cellular and molecular basis of selected genetic disorders, genetic screening and diagnosis, and approaches to minimizing genetic risks to future generations. Prerequisite: Biomed 46 or 47, or 151, or written permission.

147. *Population Genetics*

Mr. KIDWELL.

The basic principles of Mendelian genetics are extended to the population level in two steps, the first dealing with the genetic properties of populations and the second with the inheritance of metric traits. The development is deductive, employing elementary algebra and calculus to elucidate the dynamics of genes in populations under the influence of evolutionary forces. The basic theory developed is required for an understanding of areas as

diverse as evolution, ecological genetics, major segments of medical genetics and applied plant and animal improvement. Prerequisites: a course in basic genetics (e.g. Biomed 46 or 47). A course in elementary statistics is recommended.

150. *Plant Ecology*

Ms. SCHMITT.

An evolutionary exploration of the special ecological problems related to the biology of plants. Topics include physiological ecology and adaptation, seed ecology, demography, competition, plant-animal interactions, coevolution, breeding systems, life history strategies, ecological genetics, and community ecology. Labs emphasize experimental design and data analysis. Field trips introduce students to local plant communities. Prerequisites: Biomed 42 and 52 and written permission. Offered in alternate years.

151. *Molecular Biology and Microbiology*

Messrs. LEDERBERG, KNOFF, LANDY and SHANK.

The relationship of cellular functions to the properties of genetic elements is explored, with emphasis on the organization, mutation, and rearrangement of genes and chromosomes and the regulation of gene expression. Systems involving cells in culture are stressed with examples drawn from studies on viruses, bacteria, yeasts and animal cells. Designed to follow 126. Prerequisite: 126 or biochemistry or written permission. Introductory genetics is useful.

152. *Advanced Microbiology and Molecular Biology*

Mr. LEDERBERG.

Selected topics on the physiology and genetics of viruses and microbes. In 1983-85 the topics emphasized will include the biochemical genetics of yeasts and the genetic engineering of yeasts and selected microbes of environmental, industrial and medical importance. The course will be structured on lectures, directed discussions and seminars based on a critical analysis of the research and review literature. Prerequisite: written permission. Molecular biology or genetics is recommended.

153. *Principles of Immunology*

Messrs. ROTMAN and KNOFF.

Designed to introduce the field of experimental immunology. Topics to include: Immunoglobulin (structure, function, synthesis); cells of the immune system (organization, identification, function); antigens; immunochemistry; induction of immune response; genetics of immune response; effector mechanisms; applications of immunology to research problems. Standard immunology textbooks will be used to supplement classroom discussion of original research articles. Prerequisites: Chemistry 12 and written permission; molecular and cellular biology recommended.

156. *Virology*

Messrs. SHANK and LANDY.

This course will present a molecular treatment of animal viruses. Emphasis will be on the experimental basis of the present state of knowledge and on the concepts and methods available for further investigations. Equal time will be given to lectures and to discussion of readings derived from current research literature. Prerequisite: Biomed 151 or equivalent and written permission. Offered in alternate years.

158. *Medical Microbiology*

Messrs. SHANK, KNOFF, MEDEIROS and SENFT.

Emphasizes both experimental and theoretical aspects of medical microbiology. Development of immunity to infectious diseases is analyzed in terms of induction of immunocompetent cells, structure and function of antibody, and the mechanisms of antigen elimination. Viral infections are examined in terms of molecular models for virus penetration, viral multiplication or integration, host resistance factors, and pathogenesis of virus-induced diseases. The physiology and pathogenicity of bacteria and the rationale for antimicrobial therapy are considered in the context of molecular, cellular, and host parameters. Demonstrations and experiments in the laboratory will parallel and extend the lectures. Prerequisites: general microbiology and molecular biology at the level of Biomed 151. Required of students in the first year of the Program in Medicine; others by written permission.

Neurosciences

162. *Experimental Neurobiology* (Neural Science 100) Mr. LENT.
An intensive laboratory course emphasizing cellular neurophysiological recording techniques. The form and function of identifiable neurons will be studied using extracellular and intracellular methods. Vertebrate and invertebrate nervous systems will be investigated with several techniques including dye injection, iontophoresis, and statistical analyses. Informal lectures will be utilized to discuss methods, results and underlying concepts. Prerequisites: Neural Science 2, Biomed 11, Physics 4, Chemistry 11 and written permission of instructor.

167. *Neuropharmacology and Synaptic Transmission* Mr. PATRICK.
Synaptic transmission will be studied from a pharmacological and biological point of view. Factors regulating neurotransmitter synthesis, storage, release, inactivation and receptor interaction will be discussed. Transmitters covered will include catecholamines, serotonin, acetylcholine, histamine, GABA, amino acids and peptides. Proposed mechanisms of action of psychoactive drugs and biochemical theories of psychiatric disorders will also be analyzed. Prerequisite: One semester of biochemistry recommended.

Radiation Biology

171. *Introduction to Research Methods in Radiation Medicine, Physics and Biology*
Messrs. GLICKSMAN, AMOLS, GANDSMAN, MCSHAN, REINSTEIN and SHEARER.
Modern medicine relies heavily on recent advances in radiation physics, computers, and modern technology in the diagnosis and treatment of various diseases. In this course, special topics in radiation medicine, physics and biology will be discussed in weekly seminars given by faculty and students. Student research projects will be directed towards areas of current interest in radiation oncology, diagnostic radiology, nuclear medicine, and radiological physics and biology. Research topics may involve work at one of the Brown Teaching Hospitals. Research techniques, as well as methods of presentation will be stressed. Primarily for undergraduates. Limited to 10 students. Written permission required.

Morphology, Histology, Pathology

175. *Biology of the Vertebrate Integument* Mr. QUEVEDO.
The comparative anatomy and physiology of the integument in vertebrates is explored in the light of evolutionary principles and patterns. The fully integrated processes which occur at different levels of biological organization in the skin are illustrated with particular emphasis on the developmental events through which they become established. Attention is focused on the normal and atypical features of human skin which contribute to an understanding of general skin biology. Lectures include presentations by invited speakers and students in the course. Four hours of attendance.

180. *Human Histology* (380) Ms. LEDUC, Messrs. ZACKS, LEV, LIBBEY, and SASKEN.
A course in human histology for first year medical students will cover the microscopic structure of normal human tissues and organs in relation to their functions. Emphasis will be placed upon personal microscope work with guidance from faculty and textbooks. Examinations will be practical exercises in the laboratory which will test ability to recognize microscopic anatomy and relate it to physiology. (A placement examination will be held during the first week for those with previous training in this field.) Laboratory hours: two 2-hour sessions per week. May not be taken in addition to Biomed 81 or 82.

181. *Human Morphology* (double credit) Mr. ERIKSON and STAFF.
The functional anatomy of man in the perspective of his evolutionary and embryological development and in the focus of its relevance in medical practice and research. Teams of

four students will carry out a complete dissection. A double credit course. Restricted to students in the first year of the Program in Medicine.

182. *Parasitology*

Mr. SENFT.

Acute and chronic parasite infections constitute an enormous health problem throughout the world. This course seeks to introduce the major classes of parasitic and tropical diseases of man. The class format consists of lectures, laboratory sessions, and films. Student participation by presentation of special topics is expected. About ten separate diseases will be considered, among them various intestinal and tissue nematodes and cestodes. Trematodes, including the schistosomes, along with intestinal, liver, and lung flukes will also be studied. The effect of epidemic and endemic diseases on aspects of world history or on development of various regions of the world will be discussed. Biochemistry of the organisms and host/parasite relations will be considered, and approaches to chemotherapy will be stressed. Preparation in basic courses in biology, physiology and biochemistry is strongly urged. Offered only odd-numbered years.

183. *Basic and Environmental Pathology*

Mr. FAUSTO.

A study of the relationships between the pathogenesis of very common human diseases (hypertension, atherosclerosis, cancer, radiation injury, etc.) with environmental factors such as nutritional imbalances, occupational exposure to toxic agents, stress, etc. Environment is broadly defined as involving metabolic, physical and psychological components and emphasis is placed on the transition of normal homeostatic mechanisms into disease processes. Prerequisites: Biomed 11, 12 and another course in Biology or in a related area such as Environmental Studies. Limited enrollment (40 students); S/NC grading. Offered in alternate years.

184. *General Pathology* Drs. FAUSTO, KANE and members of the Section of Pathology. The mechanisms of disease production at the molecular, cellular, and organ level. The pathogenesis of cellular degeneration, inflammation, abnormalities of immune response, atherosclerosis, neoplasia, inborn disorders of metabolism, nutritional deficiencies and aging are analyzed in the light of current concepts in biology. Morphological and biochemical aspects of human diseases are described in lectures, seminars and laboratory sessions, observation of autopsy at the affiliated hospitals is required. Required for students in the first year of the Program in Medicine; others by written permission, depending on number of places available and student qualifications.

185. *Comparative Biology of the Vertebrates*

Ms. JANIS.

A course investigating the basic biology, evolutionary history, and structure of the main groups of vertebrates. The vertebrates will be considered phylogenetically, with emphasis on the evolution of the major body systems. Pertinent comparative embryological and fossil evidence will be included. Emphasis will be placed on correlations of structure and function in adaptation to particular ways of life. Discussions of controversial evolutionary problems will be held throughout the semester. In laboratory, students will do detailed dissections of four representative vertebrates. Three hours of lecture plus one afternoon of laboratory. Prerequisite: written permission.

186. *The Primates*

Mr. ERIKSON.

The natural history and functional anatomy of man and his primate kin—an evolutionary consideration of the taxonomy, ecology, geographic distribution, locomotion, behavior, development, reproduction, and general biology of the primates. The primary focus is on a close study of our rich collection of primate materials, with the intention of seeing first-hand the evidence constantly cited in discussions of the evolution of man and other primates. The course is largely anatomical but the lectures and independent laboratory can be adapted to the special interests of the participants. Prerequisite: written permission. Offered in alternate years.

General Offerings

190. *Human Biology Seminar*

Mr. HAGY.

An evaluation of subjects of current interest in Human Biology, utilizing a seminar-discussion format to interrelate biological, psychological, sociological and anthropological views. Required of all students concentrating in Human Biology, usually during semester VIII; others by written permission.

195, 196. *Independent Study*

The STAFF.

Special projects, predominantly laboratory oriented research, supervised individually by members of the staff. Required of senior candidates for Honors and of candidates for the Sc.B. degree in Biology. Prerequisite: Junior standing or permission of the Honors Advisor. This course may be taken more than once for credit, but no more than two semesters of independent study may be counted towards a student's concentration program. *A permission slip signed by the student's Concentration Advisor and faculty sponsor is required for course registration.*

Honors Program in Biology.

The STAFF.

Candidates for Honors in the Division of Biology and Medicine should apply for admission to the Honors Program by the beginning of their *seventh semester and no later than October 15*. Application forms are available from the Honors Advisor (Room 111 Partridge Hall) and must be signed by two faculty members (including the Faculty Sponsor) who are familiar with the student's qualifications. Candidates are expected to carry out a research project while taking Biomed 195 and/or 196, maintain at least a 3.3 grade point average (or the equivalent) in their concentration, submit an Honors thesis, and present an oral report at the end of their eighth semester. The research project must also be approved in advance by the candidate's Concentration Advisor.

III. PRIMARILY FOR GRADUATES

Cell Biology, Physiology, Biophysics

202. *Biophysical Problems in Radiation Biology*

Mr. LEITH.

Effects of ionizing and non-ionizing radiations on mammalian cells. Topics include discussion of current models of damage and repair, and use of techniques such as flow cytometry and elutriation centrifugation in analysis of cellular responses. Three hours of discussion. Prerequisites: Biomed 101 or Physics 114 and written permission.

203. *Cellular Repair Processes in Mammalian Cells*

Mr. WHEELER.

The course covers the current concepts associated with repair and recovery processes that lead to increased clonogenic survival or functional capacity in mammalian cells *in vitro* and *in situ*. These concepts include: sublethal damage repair, potentially lethal damage repair, and recovery as a set of competing biochemical and metabolic processes after treatment with ionizing and non-ionizing radiation or chemicals. Students will present one seminar and a paper in the form of a research proposal. Reading will be from original papers. Three hours of discussion. Prerequisites: a course in calculus, physics, biochemistry, cell biology, and permission of the instructor. (Alternates with 205).

205. *Molecular Repair Processes in Mammalian Cells*

Mr. WHEELER.

The course covers current concepts associated with molecular repair processes in mammalian cells. Relationships between these repair processes and clonogenic survival, differentiation and aging will be developed. Types of repair pathways, types of repair enzymes and the production and removal of various lesions in the genetic material after treatment with ionizing or nonionizing radiation and chemicals will be covered. Students will present one seminar and a paper in the form of a research proposal. Readings will be from original papers. Three hours of discussion. Prerequisites: a course in calculus, physics,

biochemistry, cell biology, and permission of the instructor. (Alternates with Biomed 203).

208. *Advanced Physiology*

Ms. CSERR.

A seminar course intended to provide an opportunity for intensive study of selected areas drawn from a broad range of physiological topics. The historical development and experimental bases of current physiological concepts will be emphasized. Topics include: membrane phenomena, neurophysiology, respiration, cardiovascular and renal physiology. The course is intended for juniors, seniors and graduate students with some prior introduction to physiology, e.g. in Biomed 110 or 117 and 118. Prerequisite: written permission.

210. *Advanced Cytology*

The STAFF.

Seminar based on research interest of the participants.

212. *Mathematics Models in Biology (Applied Mathematics 222)*

Ms. EDELSTEIN.

Each student will develop his/her own model addressing a current question in biology (at anywhere from the molecular to population level). Although models need not necessarily be mathematically intricate, they should offer some insight into real biological systems. Students will work under close supervision of the faculty and there will be weekly meetings for progress reports and advice. Final project reports will be prepared in publishable format. Prerequisite: Applied Mathematics 107 or written permission.

214. *Principles in Experimental Surgery*

Messrs. POVAR, HOPKINS and TRUDELL.

An introduction to the principles and techniques of anesthesia, asepsis and surgical operations required for the preparation of animal models used in laboratory investigation. Techniques are introduced which elucidate essential principles and provide specific experimental models. Both standard experimental models and preparations developed in areas of students' specific research interests are used. Students should have a knowledge of physiology at the level of Biomed 117 or equivalent. Prerequisite: written permission.

216. *Ultrastructure*

Mr. ELLIS

The principles and practice of the electron microscopy of biological systems. Prerequisites: Biomed 81, 103, 105 or 109 and written permission.

218. *Theory and Technology of Artificial Internal Organs*

Messrs. GALLETTI, RICHARDSON and TRUDELL.

An introduction to the concept, design and development of mass transfer devices and energy transfer devices commonly known as artificial heart, lung, kidney, pancreas, liver and placenta. In addition to lectures and seminars, laboratory projects offer the student an opportunity to participate in the evaluation of prosthetic devices. Offered in alternate years. Prerequisites: Biomed 110 and 117 or written permission.

Biochemistry, Physiological Chemistry, Biochemical Pharmacology

220. *Bioenergetics*

Mr. BIGGINS.

Experimental and theoretical aspects of bioenergetics will be treated at an advanced level. Particular emphasis will be placed on electron transfer and energy coupling systems in mitochondria, chloroplasts, and micro-organisms. The course format will include introductory lectures by the staff and student-faculty seminars dealing with current research. Where possible advanced experimental techniques will be demonstrated. Offered in alternate years. Prerequisite: Biomed 126 or written permission.

221. *Current Topics in Cancer Biology and Chemotherapy*

Messrs. PARKS, STOECKLER, SAVARESE, and STAFF.

Designed for students interested in fundamental aspects of cancer biology and chemotherapy. Topics considered include the natural history of selected neoplasms, epidemiology

of cancer, chemical carcinogenesis, processes of tumor metastasis, the biochemistry of cancer, mechanisms involved in drug action, resistance and transport into tumor cells. Emphasis is on original research literature and active participation by students as well as faculty. Offered in alternate years, two days per week. Prerequisite: Biomed 128 or written permission.

225. *Enzyme Chemistry*

Mr. CHA.

Principles of enzyme purification and assay, advanced treatment of kinetics and the mechanism of enzyme action. Topics include: derivation and analysis of the rate equations, initial velocity and product inhibition studies, effect of modifiers, subunit interactions, effect of pH, isotope exchange studies and reaction mechanisms. The course combines lectures with seminars and meets twice weekly.

227. *Hormonal Regulation of Cellular Metabolism*

Mr. FAIN.

A study of mechanisms by which animal hormones control metabolism with emphasis upon hormone action via cyclic AMP, membrane transport and protein synthesis. The course is based on recent research papers in selected areas. (Alternates with Biomed 229).

229. *Lipid Metabolism and Biochemistry*

Mr. FAIN.

The course covers the role of lipids in membranes, fatty acid synthesis and oxidation, regulation of uptake and release of lipids from liver and adipose tissue, cholesterol synthesis, inherited disorders of lipid metabolism, prostaglandins and related subjects.

Development, Embryology, Evolution

232. *Topics in Developmental Biology*

The STAFF.

A critical evaluation of current research in developmental biology in a seminar or discussion group format. A specific topic is selected each year for detailed analysis. Prerequisite: Biomed 131 or equivalent experience. Written permission required for undergraduates.

234. *Continuity of Cytoplasmic Organelles*

Mr. HOLOWINSKY.

Inheritance and development of plastids and mitochondria. A critical review of pertinent research literature concerning the nature and informational content of organellar genomes, functional and structural differentiation of the organelles, regulatory interactions among various intracellular compartments, and theories of their possible evolutionary origin. Prerequisites: Biomed 105, 106 or equivalent and written permission. (Alternates with Biomed 114).

Molecular Biology, Microbiology, Immunology

254. *Advanced Immunology*

Mr. ROTMAN.

Original immunological research articles will be assigned and subsequently critically evaluated in class discussions. Students will be required to write a hypothetical research proposal and to defend it in an oral presentation. Limited enrollment determined by interview with instructor. Prerequisite: written permission and/or Biomed 153 (151 recommended).

256. *Biochemical Genetics*

The STAFF.

Selected topics gathered from the current literature dealing with biochemical genetics in its broadest sense are analyzed. Recent topics have included somatic cell genetics, structure-function relationships of genetic regulatory elements, recombinant DNA techniques, ribosomal DNA, genetic dissection of microbial physiology. Three hours of discussion. Prerequisites: Biomed 151 or equivalent and written permission.

Neurosciences

264. *Physiology of Smooth Muscle*

Mr. BIANCANI and Ms. MARSHALL.

Contractile properties of gastrointestinal, genitourinary and vascular smooth muscle, particularly the biophysical and neural mechanisms for contraction. Emphasis on current research and literature. Open to graduate and undergraduates with appropriate backgrounds in physiology or bioengineering. Prior interview with instructors recommended.

266. *Physiology of the Visual System*

Mr. McILWAIN.

Selected topics in visual physiology are examined through a close and critical reading of original research articles. Emphasis is on the optical, anatomical and neurophysiological bases of visual function, particularly as they are related to transformations of spatial information. Primarily for graduate students with a strong background in neuroscience and a working knowledge of the anatomy and physiology of the mammalian visual system. Offered in alternate years.

General Offerings

291, 292. *Research*

The STAFF.

293, 294. *Special Topics*

The STAFF.

295, 296. *Graduate Independent Study*

The STAFF.

297, 298. *Seminar*

The STAFF.

Related courses, not for concentration credit in Biomed

BI/C031. *Health and Society*

Ms. MONTEIRO.

This course is designed to provide an introduction to Health and Society for concentrators and other interested students. It will present a view of the breadth and depth of health-related issues in the social milieu. Utilizing interdisciplinary collaboration, it will emphasize the ramifications in society of health care activities; in the process, it will serve to introduce students to the basic scholarly disciplines which relate to health in society from the varied points of view of scholars, administrators, practitioners, and planners.

BI/C034. *Health and Human Reproduction: Anthropological Perspectives* Ms. NEWMAN.

Review of anthropological perspectives on the human life cycle and health behavior relating to human reproduction. Cultural aspects of life cycle events will include fertility and fertility regulation, family formation and kinship structure, medical management and health care providers, ritual recognition of status change, pregnancy and birth, early human learning and interaction. Student evaluation will be on basis of a research paper. While there are no required prerequisites, BI/C031 and ST/0105 are recommended.

BI/C035. *Family and Medicine*

Ms. RETSINAS.

Will introduce a family-centered paradigm of medicine, where the role of the family in the etiology, impact, and treatment of illness will be considered. Each student will work with a family through the Family Care Center at the Pawtucket Memorial Hospital. This will provide the student with first-hand experience for evaluating the validity of the paradigm. Assigned readings in sociology as well as medicine will complement the field work. The prerequisite is either an introductory biomed or introductory sociology course.

BI/C 132. *Social Science Research in Health Care*

Mr. FULTON.

Emphasizes the development of sociological/demographic/epidemiological research skills appropriate to the health care field. Built around individual student survey projects with secondary emphasis on demographic and epidemiological measures. Intended as a junior-level course in preparation for the senior research projects of concentrators in Health and Society. Prerequisites: introductory statistics.

BI/C168. *Social and Community Medicine*

Messrs. CONSTANTINE and WACHTEL.

A series of seminars in health care delivery including the various modes of health care delivery, i.e., hospitals, group practice, solo practice, health insurance, foreign medical systems, and public health responsibilities, with emphasis on primary care.

BI/C191. *Health and Society Senior Seminar*

Mr. WESSEN.

An intensive study of the research literature concerning a problem area in the field of this concentration. Required of all students concentrating in *Health and Society*; others by written permission.

BI/B071, BI/B072. *Introduction to Human Behavior*

Mr. BAUERMEISTER.

An integrated interdisciplinary study of the science and ethics of human behavior and intervention as reflected in a wide range of bio-psycho-sociological views of man. Seminar type instruction with emphasis on independent reading and writing. Two meetings a week with chief lecturer, one additional meeting in small group settings. Recommended for upperclassmen. Preference will be given to students in the Medical Education Program. No prerequisites. Written permission required. Enrollment limited to 30.

IV. FOR PROGRAM IN MEDICINE ONLY**Core Clinical Clerkships**

- 301. Medicine
- 316. Surgery
- 331A. Obstetrics and Gynecology
- 331B. Pediatrics
- 346. Psychiatry
- 381. Community Health

Integrated Medical Sciences

- 361. Neuroscience I (J. McILWAIN)
- 362. Neuroscience II (S. ARONSON)
- 363A,B. Clinical Pharmacology and Therapeutics (P. CALABRESI)
- 364. Nutrition (M. CALDWELL)
- 369. Introduction to Clinical Psychiatry (E. FINK)
- 370. Introduction to Clinical Medicine (T. GILBERT)
- 371. Cardiology (A. GEWIRTZ)
- 372. Endocrinology (J. TUCCI)
- 373. Nephrology (B. CHANG)
- 374. Human Reproduction: Growth and Development (M. ARNOLD, R. SCHWARTZ, J. EVRARD)
- 375. Respiratory Disease (M. PASSERO, W. CORRAO)
- 376. Gastroenterology (J. BEHAR)
- 377. Hematology (M. STEINER)
- 378. Infectious Disease, Parasitology, Supporting Structures (G. PETER, A. SENFT, S. KAPLAN)
- 379A,B. Systemic Pathology (N. FAUSTO)

Clinical Elective Offerings***Medicine***

- 302A. Clinical Nephrology (DRS. GARELLA, KAHN, ABUELO, and STAFF)
- 302B. Clinical Nephrology (DR. VANCURA and STAFF)
- 302C. Clinical Nephrology (DR. SOLOMON and STAFF)

- 303A. Clinical Dermatology (DRS. McDONALD, ALPER, FLAXMAN, FRAGOLA, KERN, QUEVEDO, RIVERA, SAWYER, and SCHIFF)
- 304B. Clinical Neurology (DR. TRIEDMAN)
- 304C. Clinical Neurology (DRS. MCENTEE, FINELLI, and STAFF)
- 304D. Clinical Neurology (DRS. MORGAN, MCENTEE, FINELLI, and AMBLER)
- 304E. Principles and Practices of Chemical Neurology (DR. JENKYN)
- 305A. Clinical Gastroenterology (DRS. THAYER, BEHAR, and STAFF)
- 305B. Clinical Gastroenterology (DRS. IANNUCILLI and THAYER)
- 306A. Infectious Diseases (DRS. PETER, ZINNER, GINSBERG, MEDEIROS, and STAFF)
- 307A. Electrocardiography (DR. KITZES)
- 307B. Clinical Adult Cardiology (DRS. WILLIAMS, CAPONE, MOST, and STAFF)
- 307C. Cardiology (DR. SHULMAN and STAFF)
- 307D. Coronary Care (DR. CAPONE and STAFF)
- 307E. Cardiology (DR. ARIF and STAFF)
- 307F. Clinical Cardiology (DRS. CARLETON, KHAN, and STAFF)
- 307G. Clinical Adult Cardiology (DR. K. LABRESH, S. SHARMA, and W. LEVIN)
- 307J. Studies in Cardiac Rehabilitation (DRS. CARLETON and KHAN)
- 308A. Introduction to Oncology (DRS. CUMMINGS, E. SPREMULLI, M. WIEMANN, TRIEDMAN, and CALABRESI)
- 308B. Clinical Immunology and Oncology (DR. ZAWADKI)
- 309A. Rheumatology (DRS. KAPLAN, E. LALLY, HO, HIMMEL, and STAFF)
- 310B. Clinical Endocrinology (DR. TUCCI and STAFF)
- 310C. Clinical Diabetes and Endocrinology (DRS. C. KAHN and D. KRAUSS)
- 310D. Clinical Endocrinology (DR. B. LEY)
- 311A. Clinical Hematology (DRS. LICHTMAN and WITTELS)
- 311B. Clinical Hematology (DRS. BARKER, FORMAN, and MEISSNER)
- 311C. Clinical Hematology (DR. STEINER)
- 311D. Clinical Hematology and Medical Oncology (DRS. KNISLEY and D'AMICO)
- 311F. Clinical Hematology (DRS. CROWLEY, ALBALA, and STAFF)
- 312A. Clinical Allergy (DRS. SETTIPANE, WELTMAN and STAFF)
- 314A. Pulmonary Diseases (DRS. BRAMAN, CORRAO, FOX, and STAFF)
- 314C. Pulmonary Diseases (DR. LEDERER)
- 314D. Pulmonary Diseases (DR. KAEMMERLEN and STAFF)
- 314E. Pulmonary Diseases (DR. PASSERO and STAFF)
- 315A. Advanced Clerkship in Clinical Medicine (DRS. WITTELS, KAPLAN, ERICKSON, MATARESE, LEY, and STAFF)
- 315B. Medical Intensive Care (DRS. CORRAO, BRAMAN, FOX, and STAFF)
- 315C. Ambulatory Care Internal Medicine (DR. VANCURA and STAFF)
- 315D. Pathophysiologic Concepts in Internal Medicine (DRS. MATARESE, WITTELS, KAPLAN, LEY, and ERICKSON)
- 315E. Critical Care Medicine (DRS. KAYE, LEDERER, and BODEN)

Surgery

- 317D. Surgery of the Alimentary Tract (DRS. BOWEN, COLEMAN, DORMAN, PAHIGIAN, CAPALBO, THOMPSON, and ROCCHIO)
- 317F. Principles of General Surgery (DR. FELDER)
- 317G. Surgical Intensive Care (DR. SLOTMAN)
- 318A. Orthopedic Surgery (DRS. LITCHMAN, MOTAMED, SILVER, SIMON, and DEUTSCH)
- 318B. Orthopedic Surgery (DRS. HERNDON and STAFF)

- 318C. Psychological Care of Orthopedic Patients (DRS. SCALA, MARIORENI, and SPINDELL)
- 319B. Clinical Principles in Anesthesiology (DRS. MCNAMEE, BARCOHANA, and HAIRABET)
- 320A. Neurosurgery (DRS. STOLL, GELCH, LAURELLI, McOSKER, and WELCH)
- 320B. Neurosurgery (DRS. SELVERSTONE and PETERS)
- 321A. Ophthalmology (DR. KINDER and STAFF)
- 321B. Clinical Ophthalmology (DRS. GELTZER, BAHR, and DOWLING)
- 321C. Ophthalmology in a Missionary Hospital (DRS. KINDER, STEPHENS, and STAFF)
- 321D. Clinical Ophthalmology (DRS. SCHINAZI, McKENDALL, SCHINAZI, and STAFF)
- 322A. Pediatric Surgery (DRS. DeLUCA and WESSELHOEFT)
- 323A. Clinical Thoracic and Cardiovascular Surgery (DRS. KARLSON, COOPER, RIEMER, VARGAS, and SINGH)
- 323B. Principles of Cardiovascular and Thoracic Surgery (DRS. YASHAR and YASHAR)
- 323C. Vascular Surgery (DR. VAN DE WATER and STAFF)
- 323E. Endocrine Surgery (DR. MONCHIK and STAFF)
- 324A. Clinical Urology (DRS. LAWLOR, BRESLIN, IANOTTI, MACANDREW, MARCACCIO, MAYNARD, MEISELMAN, CALLAGHAN, and ROTELLI)
- 325A. Surgical Oncology (DRS. COLEMAN and ROBIDOUX)
- 326A. Plastic Surgery (DRS. VERSACI, SEXTON, STURIM, IACONO and BOWEN)
- 326C. Advanced Clerkship in General Surgery (DRS. HOPKINS, FELDER, and STAFF)
- 326D. Advanced Clerkship in General Surgery (DR. GANN)
- 327A. Introduction to Clinical Otolaryngology (DR. WEXLER)
- 327B. Otorhinolaryngology (DRS. McNELIS, LEKAS, BELLINO, and LANGENBRUNNER)

Pediatrics

- 332A. Pediatric Hematology-Oncology (DRS. FORMAN, FARNES, BARKER, and SMITH)
- 333A. Clinical Pediatric Neurology (DR. SHETTY and STAFF)
- 334A. Human Sexuality (DR. EVRARD, MSES. GOLDMAN and HANSEN, DR. MOUBAYED, and MR. STEWART)
- 335B. Child Development and Developmental Disabilities (DR. PUESCHEL, SASSAMAN, and STAFF)
- 336A. Introduction to Pediatric Cardiology (DRS. CORWIN, SINGH, and ROMPF)
- 336B. Pediatric Infectious Diseases (DR. PETER and STAFF)
- 336C. Pediatric Respiratory Diseases (DR. PASSERO)
- 337A. Pediatric Endocrinology (DRS. ARNOLD and ORSON)
- 338A. Ambulatory Pediatrics (DR. O'SHEA and STAFF)
- 338B. The Care of Children and the Practice of General Pediatrics (DRS. BELLIN, FORMAN, BARRETT, DENHOFF, GIUNTA, GRADY, MARKS, MONTGOMERY, ORSON, O'SHEA, ROSENBERG, STEARN, TOSELLI, and UTTER)
- 339A. Perinatal Medicine (DRS. OH, CASHORE, COWETT, WIDNESS, and STONESTREET)
- 340A. Advanced Clerkship in Pediatrics (DR. O'SHEA and STAFF)
- 341A. Clinical Gynecology (DRS. LATHROP, ANDERSON, and STAFF)
- 344A. Introduction in Gynecologic Oncology (DRS. CALABRESI, GLICKSMAN, and STAFF)

Psychiatry

- 347A. Outpatient Psychiatry (DR. ROSEN and STAFF)
- 347B. Advanced Clerkship in General Psychiatry (DR. FINK)
- 348B. Treatment of Persons with Alcohol Problems (DRS. MCCRADY and FINK)
- 348C. Diagnosis and Management of Alcohol and Drug Related Problems (DRS. LEWIS, JOHNSTON and FOX)
- 348D. A survey of Medical and Community Interaction Strategies for the Alcohol Troubled Person (DR. DIMASE)
- 352B. Community Psychiatry (DRS. INGALL, SILVER, and STAFF)
- 352C. Family Concepts and Treatment in Medical Practice (DRS. BISHOP, N. EPSTEIN and social work staff)
- 353G. Child Community Mental Health (DR. NIRK and STAFF)
- 353I. Child Psychiatry (DRS. B. MYERS and G. NIRK)
- 354A. Psychology in Medicine (DR. DAUMEN)
- 354B. Psychiatry in Medical Practice (DRS. GOLDBERG and SLABY)
- 354D. Psychiatry in a Private Practice Setting (DR. CAPONE)
- 355C. Psychosocial Factors in Cardiology (DRS. MCCARTNEY, FOLLIICK and SHULMAN)
- 355D. Behaviorial Neurology (DR. JANATI)
- 356A. Clinical Psychiatric Research (DR. W. BROWN)
- 356B. Therapy of Sexual Problems (DRS. QUALLS and WINCZE)
- 357A. Psychiatry of Late Life (DR. WESTLAKE)
- 358A. Behavioral Management of Chronic Pain (DR. FOLLIICK)

Community Health

- 382B. Chronic Diseases/Rehabilitation/Long-Term Care (DR. GRANGER and STAFF)
- 382C. Geriatric Medicine (DRS. BECK and VIRKS)
- 383A. Research in Medical Care and Administration (DRS. WESSEN, MONTEIRO, and STAFF)
- 384B. College Student Health (DR. HOFFMAN)
- 385B. Preparation for Clinical Medicine (DRS. DEROLF, CUNNINGHAM, and STAFF)
- 385C. Teaching in Academic Medicine and Medical Practice (DR. T. GILBERT)
- 386. Alternate Modes of Health Care (DR. GREER)
- 386C. The Frontier Nursing Service, Leslie County, Kentucky
- 386E. Mississippi Family Health Center, Jackson, Mississippi
- 386F. Indian Health Service Unit, Hopi Reservation, Keams Canyon, Arizona
- 386G. Blue Hill Memorial Hospital, Hancock County, Maine
- 386I. Rural Health Care Delivery (DR. ST. PIERRE-ENGELS)
- 387A. Emergency Medicine (DR. FRANASZEK and STAFF)
- 387B. Emergency Medicine (DRS. HOCHHEISER, DEROLF, and STAFF)
- 387D. Emergency Medicine (DR. MACKO)
- 388A. Primary Medical Care in an HMO Setting (DR. CUTLER and STAFF)

Family Medicine

- 387C. Clerkship in Family Medicine (DRS. HOCHHEISER, CUNNINGHAM, and DEROLF)
- 389B. Issues in Delivery of Primary Health Care (DR. HOCHHEISER and STAFF)
- 389C. Applied Clinical Nutrition (DRS. HOCHHEISER and LASSWELL)
- 389D. Family Medicine Community Preceptorship (DR. GILBERT)

Pathology

- 391A. Clinical Pathology Conferences (DRS. FANGER, DAHQUIST, ESPARZA, MEISSNER, REE, O'SHEA, TEPLITZ, NAYAK, and FIJMAN)
- 391B. Forensic Medicine (DR. STURNER)
- 391C. Applied Pathology (DRS. DIAMOND, DYCKMAN, MEISSNER, and STAFF)
- 391E. Research in Perinatal Pathology (DR. SINGER)
- 391G. Gynecologic Pathology (DR. LAUHLAN and STAFF)
- 391H. Pathology of the Neuromuscular System (DR. ZACKS)
- 391I. Seminar in Developmental and Pediatric Pathology (DRS. SINGER, O'SHEA, AMBLER, and STAFF)
- 391J. Neuropathology and Clinical Correlation (DR. AMBLER)

Radiation Medicine

- 392A. Clinical Radiation Oncology (DRS. GLICKSMAN, TEFFT, and STAFF)
- 392B. Nuclear Medicine (DRS. GANDSMAN, and STAFF)
- 392C. Diagnostic Radiology Preceptorship (DR. UDIS and STAFF)
- 392D. Diagnostic and Nuclear Radiology (DRS. HALLMAN, RYAN, HUDSON, SOLL, JAMESON, and SCHWARTZ)
- 392E. Preceptorship in Diagnostic Radiology (DRS. HANSON, SCOLA, and STAFF)
- 392F. Clinical Nuclear Medicine Preceptorship (DR. FRATER and STAFF)
- 392G. Diagnostic Radiology (DRS. COLAIACE and ENTEZARY)
- 392H. Interventional Radiology (DRS. CRONAN and DORFMAN)
- 392I. Nuclear Medicine (DR. CLAUNCH and STAFF)
- 392K. Diagnostic Radiology (DRS. DEUTSCH, RYVICKER, COHEN, and SCHATZ)
- 392L. Computerized Tomography (DR. LAND)

Interdisciplinary

- 334A. Human Sexuality (DR. EVRARD, MSES. GOLDMAN and HANSEN, DR. MOUBAYED, and MR. STEWART)
- 393B. Living with Dying (DR. SCALA)
- 393C. Medical Jurisprudence (DR. STURNER)
- 393F. Caring for Terminally Ill Persons (DR. BORENSTEIN and REV. PARKER)
- 393G. Law and Medicine: An Analysis of Assumptions, Values and Practices (PROFESSORS BEISER and FREIDMAN)
- 393H. Medical Statistics (DR. ARONSON)
- 393I. Analytical and Social Epidemiology (DR. ARONSON)
- 393J. Ethical Issues in Clinical Medicine (DR. LEDERER and REV. BURKE)
- 394H. Biochemical Basis of Pulmonary Disease (DR. PASSERO)
- 395A. Basic Portuguese (PROFESSOR VIERA and MR. BOTELHO)

Bio-Medical Ethics

The program in Bio-Medical Ethics is administered by the Committee on Bio-Medical Ethics composed of Professor DAN W. BROCK (Philosophy), Associate Professor EDWIN N. FORMAN (Bio-Medical Sciences), Professor JOHN LADD (Chairman; Philosophy), Professor LEWIS P. LIPSITT (Psychology and Bio-Medical Sciences), and Professor SUMNER B. TWISS, JR. (Religious Studies).

UNDERGRADUATE PROGRAMS

The concentration in Biomedical Ethics focuses on interdisciplinary exploration of ethical problems associated with recent advances in biology and medicine and their impact on the individual as well as on contemporary social and political life. The concentration is intended not only for students interested in a career in the life sciences, but also for those with a general interest in ethical issues arising from biomedical practice and research. Each student in consultation with at least one member of the Committee on Biomedical Ethics devises a concentration program. The student presents for approval by the Committee a written statement of the objectives of the program and a list of component courses. The program is expected to have a firm foundation in ethics and in the biomedical sciences. Each concentration program must have a total of 10 courses including: 1) at least two courses in ethics selected from Philosophy 20, 143, 158, 164, and Religious Studies 22, 125, 128; at least one of these must be Philosophy 158 or 164 (preferably by the end of the sophomore year); 2) at least two courses in biomedical science selected from Biomedical Sciences 46, 47, 108, 109, 117, 122, 124, 125, 126, 127, 128, 129, 130, 131, 132, 141, 142, 146, 148, 151, 158; one of these courses may be 11, 12, 81, 91, or 92; 3) at least two advanced courses in Biomedical Ethics. Students are also strongly urged to take at least one related course in the social sciences, such as Sociology 155 or Economics 136. Other recommended courses include Philosophy 159, 160, 165, 178; Religious Studies 123, 138, Anthropology 281, and University 123. With the approval of the Committee other relevant courses in psychology and the social sciences, independent and group study projects, or graduate seminars may be used as part of the concentration program. A concentration in Biomedical Ethics with Honors requires, in addition, an Honors thesis (Biomedical Ethics 192, during one semester of the senior year) directed by a member of the Committee on Biomedical Ethics. Students interested in this concentration should contact Mr. Ladd in the Department of Philosophy.

FOR UNDERGRADUATES AND GRADUATES

Two courses from among Bio-Medical Ethics 150, 151, 152, 154, 155 and 156 will be offered in each year.

150. *Topics in Bio-Medical Ethics*

Messrs. LADD and FORMAN.

An interdisciplinary seminar devoted to an exploration in depth of some of the ethical problems arising out of medical care and delivery of health services. Particular topics to be covered include: a) the doctor/patient relationship: truth-telling; privacy; paternalism; b) a critical examination of the notion of "informed consent" and an exploration of alternatives in the context of treatment and experimentation; c) ethical problems relating to death: suicide; the right to life and the right to die; active and passive euthanasia; d) the allocation of medical resources: the use of triage and of exotic technology; e) ethical issues in health maintenance: patient rights, physician responsibilities, refusal of treatment. Attention will be given to basic ethical principles as they relate to medical care and such concepts as respect for persons, obligation, justice, and rights. Readings will include selections from *Moral Problems in Medicine* (Gorowitz, 1982) and *Ethical Issues Relating to Life and Death* (Ladd) as well as articles in medical and philosophic journals. Intended not only for students interested in medicine as a career but also for students with a general interest in questions relating medicine to society, particularly on the ethical level. Written permission required. Prerequisite: one course in ethics; previous work in bio-medical science desirable. S/NC.

151. *Ethical Problems in the Field of Mental Health*

Mr. BROCK.

This course will investigate a wide range of ethical problems which arise in the areas of mental health such as: the use of concepts of health, disease, cure, indoctrination, etc. in psychiatry; informed consent for treatment; involuntary treatment and commitment; privacy and confidentiality in mental health care; labeling and stigmatization of patients; the role of values and the determination of goals in psychiatry; behavior modification and control—including psychosurgery, drug therapy, etc.; conflicts between the needs of the patient and society; family vs. societal responsibility of the patient to make decisions; problems of justice in the distribution of mental health services; psychological research and experimentation. Readings will be drawn from a wide variety of sources, but particularly from medical and philosophical literature. The course will be conducted as a seminar. Enrollment limited to 20 students. Prerequisite: one course in ethics. Written permission required; inquire at Maxcy 308.

152. *Ethical Issues in the Research and Use of Bio-Medical Technology*

Mr. TWISS

Ethics of Human and Animal Experimentation. The course will focus on the ethics of experimenting with human and non-human animals, and its concerns are framed by the following questions. What is the moral justification for involving human subjects, whether singly or in groups, in experimentation in bio-medical and behavioral research? How is the conflict between the personal and the social—i.e., rights of the individual versus the needs of the population—to be resolved? Should the principles for such research be different for nonclinical (e.g., social scientific) as opposed to clinical (e.g., medical) settings? What rights and protections, if any, ought to be accorded to nonhuman experimental subjects? Are the present mechanisms of social control (e.g., DHEW regulations, institutional review boards, etc.) adequate to ensure that both human and animal experimentation is conducted in conformity with basic moral requirements? The course will consider these and related issues in the widest social and philosophical contexts, including those of religion, ethics, law, and public policy. The course will be conducted as a seminar. Enrollment limited to 25 students. Prerequisite: one course in ethics and prior course work in bio-medical sciences. Written permission required.

154. *Ethical Issues in Preventive Medicine*

Mr. LADD.

This course will focus on ethical issues connected with preventive medicine and public health. In particular, it will be concerned with questions concerning individual and social responsibility for promoting, maintaining and protecting health. The first part of the course will be devoted to a critical examination of the concept of health and its relationship to medical science, to cultural norms, to ethics and to theory of value in general. Discussion will center on the notion of health as an individual and a social value. In the middle part of the course, a number of specific cases involving preventive medicine will be studied with a view to understanding their ethical implications, e.g. the problem of controlling infectious diseases (like small pox), occupational hazards (like asbestos), the use of drugs (like saccharine, thalidomide, valium) and other environmental, natural and social hazards (like pollution, smoking). The last part of the course will be concerned with ethical problems relating to the nature and types of control that are permissible and desirable in a democratic society for maintaining the health of the community. For example, the problem of reconciling individual rights with each other and with the public interest. The course will be conducted as a seminar in which students will be expected to participate in discussion and to give reports on topics of special interest to them. Written permission required. Prerequisite: one course in ethics. S/NC.

155. *The Rights of Children in Pediatric Medicine*

Mr. FORMAN and Ms. LADD.

A consideration of moral dilemmas encountered in the medical care of children and a critical examination of the concepts and arguments offered by philosophers to help resolve the dilemmas. Focus will be on the concept of rights and its application to the unborn, to

future generations, to defective newborns, to experimentation with children and fetuses, to decision-making by parents and adolescents, to informed consent, to refusal of treatment, to behavior modification and the use of drugs, and to the management of the dying child. Readings will be drawn from medical journals, psycho-social studies, and philosophical literature. Prerequisites: one course in ethics; one course in Bio-Medical Sciences.

156. *Introduction to the Philosophy of Medicine*

Mr. LADD.

The course will examine the special aspects of the philosophy of science relevant to contemporary medicine and will attempt to develop a logic of medicine sensitive to the ethical implications of any particular philosophy of medicine. Typical issues to be discussed are: the distinction between illness and disease; autonomy and reductionism in medical science; theories of medical explanation; the logic of diagnosis; definition and models of disease; the objectives of medical intervention and criteria of successful treatment; medical professionalism and the social dimensions of medical science. Readings will be in philosophy and medical journals and in books such as A. Caplan, *Concepts of Health and Disease*, and Henrik Wulff, *Rational Diagnosis and Treatment*. The course will be taught as a seminar. No special knowledge of medical science will be presupposed. However, one course in biomedical science and one course in ethics are prerequisites. Written permission required. S/NC.

191. *Individual Study Project*

Directed reading and research in bio-medical ethics. Members of the Committee. Prerequisite: one course in Bio-Medical Ethics.

192. *Thesis Preparation*

Required of students in the Honors program. Open to others only by permission of the Committee. Members of the Committee. Prerequisite: one course in Bio-Medical Ethics.

Chemistry

Professors BAIRD, CANE (Chairman), CARPENTER, COLE, EDWARDS, ESTRUP, GREENE, LAWLER, MASON, PARKER, RIEGER, RISEN, STEIM, WARD,¹ WOLD; Associate Professors LUSK, SWEIGART; Assistant Professors C. H. CLAPP, DIEBOLD, MARICQ, SQUILLACOTE, STRATT, SUGGS, WILLIARD; Lecturer, Ms. MORSE.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Chemistry, Foreign Language: A reading knowledge of one or more modern languages: German, Russian, or French are recommended. The requirements may be satisfied by: (1) presenting two years of credit upon entrance, or (2) passing a 3-level course in one of these languages, or (3) passing a 1R-2R sequence in one of the languages.

Courses: Chemistry 3 or 5, 11, 12, 15, 114, 113 or 115, plus three advanced electives. Note that differential and integral calculus and physics are prerequisites for Physical Chemistry (113, 114, and 115).

See also descriptions of standard interdepartmental concentration programs in Biochemistry, Geology-Chemistry, and Chemistry-German, listed on page 106.

¹ Environmental Studies

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF SCIENCE DEGREES

Chemistry. Foreign Language: Same as for the Standard Concentration Program for the Bachelor of Arts degree in Chemistry (see above).

Courses: Twenty semester courses in Chemistry, Mathematics, and Physics with a minimum of ten semester courses in Chemistry, four semester courses in Mathematics and two semester courses in Physics. With the permission of the Department, two of the courses may be Chemistry 97, 98 or independent study approved by the Department. Approved courses in Biological and Medical Sciences, Computer Science, Applied Mathematics, Geological Sciences, and Engineering may be substituted for some of the twenty.

Other Specific Requirement: Six courses in the Humanities or Social Studies

Biochemistry. Foreign Language: Same as for Chemistry (see above).

Courses: Twenty semester courses in Biology, Chemistry, Mathematics, and Physics with a minimum of four semester courses in Biology (generally including Biomed 126 and a course in molecular biology, e.g. Biomed 151, 124, or 105), seven semester courses in Chemistry (generally including Chemistry 3 or 5, 11, 12, 113, 124, and 127), three semester courses in Mathematics or Applied Mathematics, two semester courses in Physics, and one (preferably two) independent study courses (Biomed 195, 196 or Chemistry 97, 98).

Other Specific Requirement: Six courses in the Humanities or Social Studies.

Honors. Candidates for Honors should enroll in the Honors program prior to the Senior year. In the senior year, the program will generally include Chemistry 97, 98 or Biomed 195, 196.

Leallyn B. Clapp Prize. An award in chemistry for an undergraduate thesis of outstanding merit.

GRADUATE PROGRAMS

The graduate program in chemistry is intended for students of exceptional ability and interest who wish to study for the degrees of Master of Science and Doctor of Philosophy. Admission to graduate study is usually limited to candidates for the doctor's degree. The thesis, based on original research, may be written in the field of biochemistry, inorganic, organic, or physical chemistry. The research program is the most important, as well as the most stimulating, part of graduate study and is initiated in the first year. Formal instruction stresses fundamental principles and developments; it may include courses in mathematics, physics, and biology, as dictated by the student's interests and preparation. In addition, regular and informal seminars are conducted by the students and the staff in which research and other topics of current interest are discussed. Departmental colloquia are held throughout the year for outstanding chemists from universities and industries to present and discuss their work.

The Chemical Laboratories in the new research building provide generous laboratory space for each student. Among other facilities, they house an excellent shop staffed with skilled instrument makers, a glassworking shop with an able glassblower, and an electronics shop supervised by an expert electronics technician. The laboratories are well equipped with modern instruments which are supervised by a specialist in chemical instrumentation.

Admission to graduate study in chemistry is normally accompanied by the award of a teaching assistantship. Assistants devote about twelve hours per week to the supervision of undergraduate laboratories, which allows three-quarters of their time for research and study. Several University Fellowships are available to entering students. Research fellowships are seldom awarded for the first year, but are available for the later work of all qualified doctoral candidates; they provide for full-time research and study. Summer research fellowships are available to graduate students in good standing.

Research in experimental physical and inorganic chemistry is conducted in a number of fields for which the laboratory is especially well equipped. These include: (1) molecular and crystal structure determination, utilizing spectroscopic and x-ray techniques; (2) molecular interactions and energy transfer, studied using the optical properties and dielectric behavior of matter; (3) studies of elastic, inelastic, and chemically reactive scattering with molecular beam techniques; (4) study of surfaces by electron diffraction, Auger electron spectroscopy, photoemission and related techniques; (5) observation of excited and transient molecular states by radiofrequency and optical methods; (6) studies of vibrational spectroscopy; (7) the structural and thermodynamic properties of materials; (8) catalysis of metalloporphyrin reactions; (9) spectra and magnetism of rare earth and transition metal complexes; (10) magnetic resonance studies of the chemistry of transition metal complexes; (11) reactions of and catalysis by transition metal complexes; (12) kinetics and mechanisms of inorganic reactions; (13) laser induced fluorescence studies of vibration-to-electron energy transfer and chemical reaction dynamics, (14) spectroscopy and reaction dynamics of ions; and (15) solid state chemistry.

The department is also active in theoretical research. Various chemical applications of quantum and statistical mechanics are being pursued. Among these are: (1) the study of transport properties in gases; (2) the statistical mechanics of molecules in solution and (3) the nature and properties of surfaces.

Research in organic chemistry includes work on the mechanisms and stereochemistry of organic reactions and on the synthesis, reactions, and bioorganic role of several classes of compounds. Areas of particular emphasis include (1) synthesis of natural products; (2) biosynthesis of natural products; (3) synthetic methods; (4) organometallic reactions; (5) chemically induced dynamic nuclear polarization (CIDNP); (6) biochemical reaction mechanisms; (7) environmental chemistry; (8) radical chemistry; and (9) photochemistry.

Research in biochemistry emphasizes the structure and function of biological membranes and the mechanism of enzyme reactions. Current research includes studies of (1) the mechanisms of active transport and oxidative phosphorylation; (2) the development of active-site directed enzyme inhibitors and the mechanism of oxygenases; (3) the physicochemical properties of phospholipids, lipoproteins, and biological membranes.

THE POTTER PRIZE IN CHEMISTRY

A fund of \$5,000 was established in 1942 under the will of William R. Potter. The income is awarded annually to the graduate student in chemistry who submits a doctoral thesis of outstanding merit.

I. PRIMARILY FOR UNDERGRADUATES

3. *Equilibrium, Rate and Structure* Messrs. BAIRD, ESTRUP, RISEN, STEIM, and STRATT. A discussion of these topics at the level of introductory physical chemistry. A limited amount of descriptive organic and inorganic chemistry is introduced to exemplify the principles. In the laboratory, basic quantitative techniques are developed and applied to the study of equilibrium and rate phenomena. Three hours of lecture and four hours of conference and laboratory attendance. Prerequisite or corequisite: Mathematics 9.

4. *Introductory Inorganic and Physical Chemistry* Mr. EDWARDS. Kinetics and mechanisms of reactions, electrochemistry, descriptive inorganic chemistry, transport properties, radiation and radiochemistry, macromolecules and surfaces. Not for concentration credit in Chemistry or Biochemistry. Three hours of lecture and four hours conference and laboratory. Prerequisite: Chemistry 3. Chemistry 3 and 4 comprise a year of introductory chemistry.

5. *Kinetics, Equilibrium, and Chemical Analysis*

Mr. RIEGER.

Introduction to chemical kinetics and reaction mechanisms, solution equilibrium, electrochemistry, and separation techniques and applications to chemical analysis. Three hours of lecture, one hour of conference, and four hours of laboratory attendance. Prerequisite or corequisite: Mathematics 9 or equivalent, and written permission. Intended primarily for those students contemplating concentration in chemistry or biochemistry. May not be taken in addition to Chemistry 3 and/or 4.

11. *Organic Chemistry*

Ms. PARKER, MESSRS. CANE, CLAPP, LAWLER, and SUGGS.

The constitution and properties of the different classes of organic compounds, with considerable attention to reaction mechanisms. The laboratory work includes preparation of representative compounds and use of a broad range of experimental techniques. Three hours of lecture and five hours of laboratory attendance. Prerequisite: Chemistry 3 or 5.

12. *Organic Chemistry*

Messrs. SQUILLACOTE, SUGGS, and WILLIARD.

Sequel to Chemistry 11. Attention to the constitution, properties, and reactions of additional classes of organic compounds at a fundamental level. The laboratory work is largely concerned with identification of organic compounds. Prerequisite: Chemistry 11.

15. *Inorganic Chemistry*

Mr. RIEGER.

The chemistry of main group and transition metal elements with an emphasis on bonding and molecular structure. Three hours of lecture and five hours of laboratory attendance. Prerequisite: Chemistry 12 and written permission.

97, 98. *Research*

The STAFF.

II. FOR UNDERGRADUATES AND GRADUATES**106. *Advanced Inorganic Chemistry***

Mr. EDWARDS.

Discussion of a number of topics chosen from: bioinorganic chemistry of phosphorus and arsenic, chemistry of the lanthanides and actinides, structure and reactivities of transition metal species in solution, and electronic and molecular structures of metal cluster compounds. Laboratory work will consist of independent projects. Prerequisite: Chemistry 15.

113. *Physical Chemistry* (formerly 63)

Mr. STEIM.

The elements of classical physical chemistry. Chemical thermodynamics with applications to phase and solution equilibria; electrochemistry; transport phenomena; polymers; surface phenomena; reaction kinetics. Recommended for students in the biomedical sciences as well as in chemistry. Three hours of lecture and five hours of conference and laboratory attendance. Prerequisite: Chemistry 12, Mathematics 10. Prerequisite or corequisite: Physics 4, 6 or equivalent.

114. *Physical Chemistry: Quantum Chemistry*

Messrs. BAIRD, CARPENTER, and MASON.

An introduction to the quantum theory of chemical systems. Elements of non-relativistic quantum mechanics; electronic structure of atoms and molecules; study of molecular structure by spectroscopy and other techniques; chemical bonding. Fifth semester course for concentrators in chemistry. Three hours of lecture and four hours of laboratory attendance. Prerequisites: Chemistry 3, Mathematics 29, or equivalent, Physics 4, 6 or equivalent.

115. *Physical Chemistry: Thermodynamics and Statistical Mechanics* (formerly 151)

Messrs. DIEBOLD and MARICQ.

An introduction to the equilibrium and non-equilibrium behavior of physico-chemical systems from the microscopic point of view. Elements of kinetic theory and statistical mechanics; derivation of the laws of thermodynamics and selected applications. Recommended sixth semester course for chemistry concentrators. Three hours lecture and eight hours laboratory attendance. Prerequisite: Chemistry 114 or written permission.

124. *Biochemistry*

Mr. CLAPP.

A close examination of several aspects of biochemistry emphasizing the relationship between chemical structure and biological function. Topics will be chosen from the following: protein structure, enzyme mechanisms, regulation, biosynthesis, and membranes. Prerequisite: Biomed 126.

127. *Biochemistry Laboratory*

Ms. LUSK.

Proteins, nucleic acids, carbohydrates and lipids will be isolated and their properties and metabolism will be studied. Techniques will include ion exchange, thin layer and gas chromatography, spectrophotometric assays, gel electrophoresis, cell fractionation, and the use of radioisotopes. One lecture and nine hours of laboratory attendance. Prerequisite: Biomed 126 and written permission.

145. *Advanced Organic Chemistry*

Mr. SQUILLACOTE.

The use of conformational analysis and elementary results from molecular orbital theory to explain the reactions of organic and organometallic molecules. The laboratory will include the isolation and synthesis of natural products and the use of infrared and nuclear magnetic resonance spectrometers. Ten hours laboratory attendance. Prerequisite: Chemistry 12.

156. *Topics in Advanced Chemistry*

The STAFF.

Lecture units on topics of current interest in chemistry, varying from year to year. The number of units taken may be arranged so that one course credit may be earned in one semester or over a period of two semesters. Prerequisite: written permission.

162. *Quantum Chemistry*

Mr. MASON.

Identical to the lecture portion of Chemistry 114 plus additional written work. Prerequisite: written permission.

III. PRIMARILY FOR GRADUATES

201. *Advanced Thermodynamics*

The fundamental principles of thermodynamics are developed and applied to homogeneous and heterogeneous systems including those in which chemical reactions may take place or on which external forces may act. Offered every year, but taught alternately by the Engineering and Chemistry departments (Engineering 173).

202. *Statistical Mechanics*

Mr. STRATT.

Introduction to the statistical mechanics of equilibrium phenomena for classical and quantum-mechanical systems. Ensemble theory: fluctuations; statistical interpretations of the laws of thermodynamics; applications to ideal and real gases, chemical equilibrium, simple crystals, magnetic and dielectric materials, radiation, and condensation phenomena. Offered every year, but taught alternately by the Engineering and Chemistry departments (Engineering 274).

203. *Statistical Mechanics*

Mr. STRATT.

The principles of statistical mechanics are applied to various areas of significance in chemistry. The kinetic theory of gases, the nature of liquids, the properties of polymers, the kinetics of chemical reactions, the elucidation of surface phenomena, and interpretation of phase transitions are among the topics discussed. Offered in alternate years.

221. *X-ray Crystallography*

Mr. CARPENTER.

The determination of atomic arrangements in crystals, molecules, and ions by x-ray diffraction and related methods. Offered in alternate years.

231. *Advanced Inorganic Chemistry*

Mr. SWEIGART.

Modern synthetic inorganic and organometallic chemistry, emphasizing topics of current research interest such as rare gas compounds, bioinorganic chemistry, oxidative addition reactions, and homogeneous catalysis.

232. *Physical Inorganic Chemistry*

Mr. RISEN.

Electronic structure of inorganic molecules, with particular attention to coordination and organometallic compounds. Spectra, structure, and magnetism of inorganic compounds and materials.

241. *Physical Organic Chemistry*

Mr. SQUILLACOTE.

Principles of chemical bonding, of electron displacements within molecules, of steric effects of reactivity, of isotope effects, and of conformational analysis. Basic mechanisms of ionic and radical reactions.

242. *Synthetic Organic Chemistry*

Mr. WILLIARD.

A survey of the classes of reactions used in synthesis. Emphasis on mechanisms and multi-step schemes; use of the organic chemistry literature.

243. *Topics in Organic Chemistry*

The STAFF

Advanced topics of current interest, varying from year to year.

277, 278. *Quantum Mechanics*

Messrs. MARICQ and BAIRD.

The principles of quantum mechanics are developed systematically, making considerable use of group theory, and applied to such problems as chemical bonding theory, molecular spectroscopy, chemical reactivity, and other topics of interest to chemists.

281, 282. *Seminars*

The STAFF.

Discussions by staff members and graduate students of topics of current interest. No credit.

287, 288. *Department Colloquia*

Invited speakers from other institutions. No credit.

291, 292. *Special Topics in Chemistry*297, 298. *Research*

The STAFF.

Credit to be arranged.

Child Study Center

The Child Study Center—Founded in 1967, to succeed the Institute for Life Sciences, its initial responsibility was that of administering Brown University's participation in a large research program on the birth and development of infants born at Women and Infants Hospital of Rhode Island. A total of 4,000 children were extensively studied to eight years of age. Special sub-groups of these children are now followed up as adolescents and young adults. The follow-up unit, now located on the grounds of Butler Hospital, is the focal point of such studies, and serves also as a location for studies of newly born infants. Ongoing research within the Child Study Center includes studies of (1) sensory and learning development of infants and young children, (2) effects of perinatal risk factors, including adverse health behavior, on development, (3) crib death and its causes, (4) the precursors in adolescents of depression, suicide, and antisocial behavior, and (5) cultural determinants of birth style.

The Child Study Center provides laboratory resources for post-doctoral studies, graduate and undergraduate students, and for faculty members to engage in interdisciplinary studies relating to child development and behavior.

The Director of the Child Study Center is Dr. Lewis P. Lipsitt, Professor of Psychology and Medical Science.

Classics

Professors BOEGEHOLD,¹ COOK, DONOVAN,² FORNARA,³ HOLLOWAY, PINGREE, PUTNAM,¹ RAAFLAUB,¹ SEGAL, TOOMER, WORKMAN, WYATT (CHAIRMAN);⁴ Assistant Professor ELLIOTT; Visiting Assistant Professors BROWNING, LOENING, SCAFURO.

The Department provides both specialized training for those who wish to enter graduate school in preparation for a career in scholarship, and a broad liberal education for those of more general interests. Courses are offered in the principal fields of Greek and Latin language and literature, including elementary courses in Greek and in Latin, and also courses in ancient history, classical art and archaeology, and linguistics.

The Department of Classics offers graduate work in Greek and Latin literature, Greek and Latin linguistics, Greek and Roman history, classical art and archaeology, and Classics and Sanskrit, all leading to the degrees of Master of Arts and Doctor of Philosophy. The work of the Department is carried on in formal courses, seminars, and guided research, with considerable flexibility in the case of students' special interests and programs. An overall command of Greek and Latin language, literature, and history is stressed. Students are encouraged, especially at the beginning of advanced work, to select their courses from a reasonably wide area of interest, and to take account of appropriate study in related departments, such as Comparative Literature, Egyptology, History, History of Mathematics, Linguistics, Philosophy, Political Science, and Religious Studies. The Department is strongly represented on the Committee for the Study of Antiquity and in the Center for Old World Archaeology and Art.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Prerequisites. Students presenting one or two years of Latin for admission may elect Latin 11 or 12; those presenting three or four years may elect Latin 103, 104 or Latin 105, 106 or Latin 101. Students presenting one year of Greek may elect Greek 11 or 12; those presenting two or three years may elect Greek 105, 106, or 125, 126 or 111.

Students with no previous preparation in Latin or Greek should register for Latin 1 and Greek 1 or Greek A.

Courses: Programs of Concentration may be arranged with emphasis on the ancient languages and literatures, or Greek and Roman History, or on classical archaeology. There are four standard Concentration programs. All save "Greek and Latin" require the satisfactory completion of eight courses as described below. These programs are flexible, and students are encouraged to discuss their plans with the Concentration Advisor. Although the introductory courses in Greek and Latin may not usually be counted toward Concentration, exceptions may be granted.

¹ On leave of absence, 1983-84.

² On leave of absence, 1982-85.

³ On leave of absence, spring semester, 1983.

⁴ On leave of absence, 1984-85.

Classics: 1) one course in Greek or Latin on the 100-level or above; 2) Classics 121, 122 or 131, 132; 3) five other courses in Classics, including classical archaeology, Greek, Latin, or related areas to be approved by the Concentration Advisor.

Greek: 1) Four Greek courses on the 100-level or above, at least one of which is to be Greek 181 or 182; 2) Classics 121, 122 (Greek History); 3) Two additional courses in Classics, including classical archaeology, Greek, Latin, or related courses to be approved by the Concentration Advisor.

Latin: 1) Four Latin courses on the 100-level or above, at least one of which is to be Latin 181 or 182; 2) Classics 131, 132 (Roman History); 3) Two additional courses in Classics, including classical archaeology, Greek, Latin, or related areas to be approved by the Concentration Advisor.

Greek and Latin: 1) Four Latin courses on the 100-level or above, at least one of which is to be Latin 181 or 182; 2) Greek *ditto*; 3) Classics 121, 122 and Classics 131, 132.

Classics and Sanskrit: Four courses in Sanskrit on the 100-level or above, with the provision that two of the courses in Sanskrit may be included among the five additional courses in the Classics required of concentrators in the Classics, or as the two additional courses in the Classics required of concentrators in Greek and of concentrators in Latin, on the approval of the Concentration Advisor. Consult with Professor Pingree.

Honors. Students may earn Honors in each Concentration by presenting a satisfactory thesis, for the preparation of which they will ordinarily enroll in the relevant 191 courses; these courses may not be used to satisfy the standard requirements for Concentration.

Related Courses. Attention is called to certain courses in allied fields, such as Ancient Studies, Anthropology, Art, Comparative Literature, Egyptology, History, History of Mathematics, Linguistics, Modern Languages, Philosophy, Political Science, and Religious Studies which may on occasion be included in a concentration program in Classics.

GRADUATE PROGRAMS

Master of Arts. For admission to candidacy students must present satisfactory evidence of completion of a substantial number of courses in Greek and Latin in their undergraduate program. The graduate program will consist of a minimum of eight courses including at least two Seminars in Greek or Latin or Classics, completion of a thesis which shall be an original investigation of some literary, historical, archaeological or linguistic topic. Competence must be demonstrated in French or German.

Doctor of Philosophy. In the course of residence, the candidate is expected to complete a minimum of four seminars. Before the Preliminary Examination, which is requisite to commencement of a doctoral dissertation, the following requirements must be met:

1. A demonstration of competence in French or Italian and German, established by examination or an honor grade in French or German 2R. Candidates should be competent in at least one of these languages, preferably German, upon entering the degree program.
2. Latin Prose Composition (by examination or successful completion of Latin 115).
3. Greek Prose Composition (by examination or successful completion of Greek 115).
4. Archaeology (by examination or successful completion of Classics 157).
5. History (by examination or successful completion of Classics 121-2, or 131-2).
6. Sight Translation in Latin. Examinations given twice yearly.
7. Sight Translation in Greek. Examinations given twice yearly. Candidates should write these as soon as possible.

The Preliminary Examination will consist of two written examinations, viz. 1) a Greek or Latin author, 2) a second author or topic to be approved in advance by the Graduate Advisor (this topic or author should be Greek if a Latin author is chosen under No. 1, and

vice versa), and an oral examination in the history of Greek and Roman literature. After completion of all of the Prerequisites and the Preliminary Examination, and after research into a dissertation topic has begun, and within six months following successful completion of the oral examination, the candidate shall present *viva voce* the dissertation topic to the faculty of the Department for discussion and evaluation. A formal defense of the thesis will be required.

Doctor of Philosophy in Classical Archaeology. In the course of residence, the candidate in classical archaeology is expected to complete a minimum of four seminars and to pursue the archaeological reading list published by the Department. Before the Preliminary Examination, which is requisite to commencement of a doctoral dissertation, the following requirements must be met:

1. A demonstration of competence in French or Italian and German established by an examination or an honor grade in French or German 2R. Candidates should be competent in at least one of these languages, preferably German, upon entering the degree program.
2. A demonstration of competence in Latin and Greek established by an examination based on a set group of readings in the ancient authors and translation at sight.

The Preliminary Examination will consist of three written examinations, viz, 1) the archaeology of a major period, 2) a special field selected from Greek or Latin epigraphy, Greek or Roman numismatics, sculpture, architecture, ceramics, coroplastics or the topography and monuments of a major Bronze Age or classical site, 3) Greek or Roman history (successful completion of a course or seminar in Greek or Roman history may be substituted); 4) the fourth examination, normally conducted orally, is a general examination in classical and related prehistoric archaeology.

Students specializing in classical archaeology have the opportunity of participating in the field work of the Brown University Archaeological Expedition to the Mediterranean with the support of travel grants from funds made available to the University by the Ford Foundation for the period 1968 through 1973. In recent years the Expedition has excavated in Athens and at Satrium and Buccino in South Italy, and is currently working at La Muculufa in Sicily.

Doctor of Philosophy in Classics and Sanskrit. The requirements for the degree of Doctor of Philosophy in Classics and Sanskrit will be identical with those for that degree in the Classics with the following differences:

1. The candidate must complete satisfactorily (or give evidence of having completed satisfactorily equivalent courses elsewhere) four 100-level courses in Sanskrit.
2. The candidate must complete a minimum of five seminars, two of which shall be in Sanskrit.
3. In the Preliminary Examination, the second part shall be on an author or topic in Sanskrit to be approved in advance by the Graduate Advisor.
4. The dissertation topic shall be one that requires the significant use of material in Sanskrit as well as in Greek and/or Latin.

Related Activities. Graduate facilities at Brown are particularly rich in the fields of Greek and Latin literature, Greek and Roman history and epigraphy, and archaeology. Students may take related courses offered in Art, Comparative Literature, Egyptology, History, the History of Mathematics, Linguistics, Philosophy, and Religious Studies. In addition to normal fellowship support, the WILLIAM MICHAELIDES GRADUATE FELLOWSHIP IN GREEK STUDIES, established in 1979, is awarded annually to a student of outstanding achievement and promise whose major field is Greek.

Brown University is a supporting institution of both the American School of Classical Studies at Athens and the American Academy in Rome (see page 510). Periods of study

at one of these institutions are regularly undertaken by graduate students in the department. Attention is called also to opportunities for study at the American Numismatic Society in New York and various museums, including the Museum of the Rhode Island School of Design.

See also CENTER FOR OLD WORLD ARCHAEOLOGY AND ART (page 379).

I. PRIMARILY FOR UNDERGRADUATES CLASSICS

(No knowledge of Greek or Latin is required for these courses.)

1. *Great Periods in the Ancient History of Greece* Mr. WORKMAN.
A study of the political and cultural achievements of the Greek city-state.
2. *Great Periods in the Ancient History of Rome* Mr. WORKMAN.
A study of the political and cultural achievements of the Roman Republic and Empire.
3. *Foundations of Western Art in Antiquity* MSSRS. HOLLOWAY and WINKES.
Introduction to the fundamental forms and themes of Western Art derived from the Graeco-Roman world. Attention will be devoted to the mythological and religious motivation of Greek art; to the synthesis of eastern and western ideas under the Roman Empire; and to the transformation of the spiritual and esthetic values of antiquity during the Early Middle Ages. In addition to dealing with such larger concepts, the course will attempt to familiarize students with basic approaches to architecture and the figurative arts in terms of style, iconography, and historical context. Three lectures per week plus one section meeting. Recommended for freshmen as well as upperclassmen.
5. *Archaeological Field Work* Ms. JOUKOWSKY.
Focuses on the aims, scope, and tools of field archaeology, and the nature of archaeological evidence. Since the unearthing of materials from a past culture or civilization is the most significant aspect of archaeology, emphasis is placed on interdisciplinary field work techniques and the composition, function, and responsibilities of an excavation staff. For students who want to learn how archaeological excavation, as an observational science, works. Teams will excavate model sites in a laboratory. In preparation there will be lectures and demonstrations of tools and methods: surveying, recording, cataloging, photography and related disciplines. Exposure to conservation and restoration, materials analysis and computer applications in archaeology.
6. *Archaeological Field Work (Anthropology 160)* Ms. ROBERTONE.
42. *The Ancient Novel.* Mr. WORKMAN.
A study of the origin, purpose and themes of the Greek Romance and the Latin Novel. The relation of fiction to epic, drama, satire and history will be examined with special emphasis on Lucian, Chariton, Heliodoros, Petronius and Apuleius.
43. *Roman Art and Architecture (Art 43)* Mr. WINKES.
44. *Greek Art and Architecture (Art 42)* Ms. HOLLINSHEAD.
51. *Ancient Greek Religion (Religious Studies 51)* Mr. MOEHRING.
54. *City and Sanctuary in the Ancient World.* Mr. HOLLOWAY.
An examination of the physical dimension of the ancient city and the ancient sanctuary through archaeological evidence with special attention to aesthetic planning, urban planning, and management, and the concept of public monumental art as developed in the ancient world. Attention will be paid to ancient political theory. Detailed examination of the cities of Athens, Morgantina, and Rome and the sanctuaries of Olympia, Epidauros and Praeneste.

55. *The Mediterranean Bronze Age*

Mr. HOLLOWAY.

The Bronze Age of Crete and Greece studied in relation to foreign influence and internal development. The following topics receive particular attention: the coming of the Greeks, the decipherment of the Linear B script, the stratigraphy of the Palace of Knossos and the dissolution of the Mycenaean kingdoms. No Prerequisite.

58. *The Art and Architecture of Periklean Athens*

Mr. HOLLOWAY.

The art of Periklean Athens seen against the intellectual life of the period. Intensive study of monuments of sculpture, painting and architecture and their influence in the ancient world. No Prerequisite.

62. *The Greek Drama in English*

Mr. SEGAL.

A survey of the works and different conceptions of tragedy of Aeschylus, Sophocles, and Euripides. Some attention to ancient comedy. The main emphasis will be on Greek drama as a literary form in its historical and social context. Provision will be made for students of comparative literature who wish to study later influences.

90. *Myth and Identity*

Mr. SEGAL.

Using classical myth as a focus, a study of how mythic forms and symbols help to understand the self. Modern literature, art, and the film will also be considered. Faculty in other departments may participate for short periods. Fuller description available in Department of Classics. Enrollment limited to 30. Written permission required.

GREEK

1, 2. *Essentials of the Ancient Greek Language*

Mr. WYATT and STAFF.

A two-semester approach to Ancient Greek with special emphasis on developing facility in rapid reading of Greek literature. Selections from Attic Greek authors. No previous knowledge of Ancient Greek is required.

A. *Introduction to Ancient Greek*

The STAFF.

Intensive one-semester introduction to Greek. No previous knowledge of Greek required.

7, 8. *Modern Greek*

Mr. WYATT and STAFF.

Practice and reading in Modern Greek language and literature.

9. *Modern Greek*

Mr. WYATT and STAFF.

Practice and reading in Modern Greek language and literature.

11, 12. *Introduction to Greek Literature*

The STAFF.

An introduction to Greek literature through intensive reading of major authors in poetry and prose. Prerequisite: Greek 1 or its equivalent. Topic for 11: Plato (Mr. Boegehold, Staff); topic for 12: Homer (Mr. Wyatt).

LATIN

1. *Essentials of the Latin Language*

Ms. ELLIOTT and STAFF.

An intensive one-semester approach to Latin with special emphasis on developing facility in reading Latin literature. No previous knowledge of Latin is required.

5. *Rapid Review of Latin with Selections from Prose and Poetry*

Mr. WORKMAN.

Designed primarily for students who wish to review their Latin and who wish a rapid introduction to Latin reading.

11, 12. *Introduction to Latin Literature*

Mr. PUTNAM and STAFF (I); Mr. BOEGHOLD and Ms. SCAFURO (II).

An introduction to Latin literature through intensive reading of major authors in prose and poetry with careful attention to grammar and style. Prerequisite: Latin 1 or its equivalent. Topic for 11: a) the Foundation Legend of Rome in Livy, Book I, and Virgil, *Aeneid* 8; b) Tacitus' *Agricola* and selections from Silver Latin Poetry.

II. FOR UNDERGRADUATES AND GRADUATES

CLASSICS

111. *Love in Antiquity and the Middle Ages* Ms. ELLIOTT.
An examination of the classical and medieval attitudes towards love as reflected in literature (including consideration of such topics as attitudes towards women, marriage, sex, chastity). Most of the literature is Greek or Latin, but there will be some Old French and Old Provençal material as well. Students wishing to do the reading in Latin should enroll in Classics 111B.

111B. (See Classics 111).

113. *The Archaeology of Early Italy* Mr. HOLLOWAY.
The archaeology of the Italian peninsula to the Roman expansion and the study of its cultures as products of interacting influences in the setting of Mediterranean prehistory. Particular attention will be given to the problem of Etruscan origins and Greek colonization. No prerequisite.

114. *Archaic Greek Art and Archaeology* Mr. HOLLOWAY.

115. *Religions of the Hellenistic Age* (Religious Studies 115) Mr. MOEHRING.

116. *Ancient Painting* Mr. HOLLOWAY.
A study of selected topics from Greek painting, both vase painting and new discoveries of wall painting from Italy and Asia Minor, Etruscan tomb painting, Roman wall painting, the art of the Bronze Age, Aegean and paleolithic painting. The significance of graphic design to ancient art in general will be stressed. Prerequisite: one course in ancient art.

118. *The Archaeology of Anatolia and Iran* Ms. JOUKOWSKY.
An archaeological survey of the origins and development of the Anatolian and Iranian civilizations. Analysis of settlements, history, art, architecture and characteristics of specific archaeological sites and their artifacts ranging from prehistory to the Hellenistic period.

121, 122. *The History of Greece from Archaic Times to the Death of Alexander*
(History 135, 136) Mr. FORNARA.

A detailed examination of the history of the Greeks—political, economic and social—from Homer's time to the death of Alexander and the establishment of monarchy. The ancient sources of our information will be closely and critically studied (in translation).

129. *Ancient Medicine and Biology* (Biological and Medical Sciences)
Messrs. WYATT and ERIKSON.

A chapter in the history of medical thought. Study of ancient doctrines and beliefs from Homer to Galen, both in Greece and Rome. Special attention to the relation of ethical, and scientific thought to other aspects of ancient culture, primarily philosophical and religious. Those wishing to do reading in Greek should register for Greek 129.

131, 132. *Roman History to 337 A.D.* Mr. RAAFLAUB.

The history of the Roman state from its origins until the death of Constantine. This course will be concerned with the political history of Rome, but will also include social, economic, and cultural history, and the study of the development of institutions such as law and religion. Special attention will be paid to the nature of the evidence, and much of the required reading will be of original sources in translation.

134. *Influence of the Classics on English Literature* Mr. WORKMAN.
Through selected readings in English Literature and in Greek and Roman classics in translation and by lectures designed to explain the historical and literary significance of these works, this course is planned to introduce the student to the problem of literary influence and assimilation. No prerequisite.

136. *The Notion of Political Freedom in Greek and Roman Antiquity* Mr. RAAFLAUB.
The notion and ideal of political freedom came into existence for the first time in the history of mankind in the early 5th century B.C. in Greece. The development of this fundamental idea will be traced from its beginnings through antiquity on the basis of the interpretation of the main texts (in translation) and in close connection with the social and political history of Greece and Rome. (History 104).

143. *Topics in Classical Art and Architecture* (Art 143) Mr. WINKES.
Gems and Jewelry in the Greco-Roman world. Written permission required.

151. *Greco-Roman Historiography* (History 139) Mr. FORNARA.
Topics covered: the origin of "historical thought," pre-Herodotean historiography, Herodotus, Thucydides, Polybius. Study will be made of the Roman annalistic tradition, and its fusion with the Greek model, as exemplified by Sallust, Livy, Tacitus and Ammianus Marcellinus. The focus of the course will be on the development of the genre of historical writing rather more than on separate studies of each of the writers named above.

157. *Introduction to Research in Classical Archaeology and Art History* (Art 235)
Messrs. HOLLOWAY and WINKES.
Materials, chronology, bibliographical orientation and trends of scholarship. Topics will vary according to the needs of the participants. Students intending to pursue work in classical archaeology on the 200-level should consult the instructor concerning the advisability of enrolling in the course. Written permission required.

171. *Forms of Artful Discourse* (Comparative Literature 181A) Mr. COOK.

191. *Special Topics* The STAFF.

199. *Conference: Especially for Honors Students* The STAFF.

GREEK

105. *Euripides and Aristophanes* Mr. BOEGEHOLD.
Close literary study of three or four plays.

106. *Herodotus and Thucydides* Messrs. WYATT and BOEGEHOLD.
The semester is divided about equally between two great historians. Their prose styles and their views of the world and of history will be considered in detail.

107. *Biblical and Patristic Greek* Mr. MATHIESEN.
Selected readings in the Greek Old and New Testaments, the dogmatic writings of the Greek Fathers of the Church, and the Greek Orthodox liturgical texts. The course will stress accurate translation and explication of these texts; as students may require, it will also cover the lower criticism of these texts, the descriptive and historical linguistic study of their Greek, and/or their use as sources in liturgies and dogmatic theology. The selection of texts will be new each time the course is offered. The course may be repeated for credit. It will normally be offered in Semester I, but upon student demand and at the convenience of the instructor it may be offered also in Semester II. Prerequisite: Greek 1 or its equivalent; Greek 11, 12, are strongly recommended.

108. *Attic Orators* Mr. FORNARA.

110. *Advanced Homer: The Odyssey* Mr. FORNARA.

111. *Selections from Greek Authors* The STAFF.

114. *History of the Greek Language* Mr. WYATT.
A study of the history and structure of Greek from the very earliest times to the Koine. Brief consideration of Modern Greek.

115. *Greek Prose Composition* (formerly 215) Mr. BOEGEHOLD.
125. *Aeschylus and Sophocles* Mr. WYATT.
Study in Greek tragedy, with emphasis on the different approaches to the tragedies of Aeschylus and Sophocles.
126. *Plato and Aristotle* Mr. WORKMAN.
181. *Early Greek Literature* (formerly 201) Mr. SEGAL.
The course will survey early Greek literature. Works to be studied will include the *Iliad*, *Odyssey*, the Hesiodic poems, archaic lyric and elegiac poetry. Emphasis on literary interpretation, the interpretive problems inherent in the study of archaic poetry, and the poetics of oral poetry. Students are expected to read extensively in the original.
182. *Greek Literature of the Fifth Century* (formerly 204) Messrs. FORNARA and SEGAL.
A survey of main trends and tendencies. Emphasis on literary analysis. Rapid reading of the major texts.
191. *Special Topics* The STAFF.
199. *Conference: Especially for Honors Students* The STAFF.

LATIN

101. *The Latin Lyric* Mr. PUTNAM and Ms. BROWNING.
A survey of Latin lyric poetry from Catullus and Horace through the secular and religious poetry of the Middle Ages. The course will also discuss more generally the nature and theory of the lyric impulse in poetry.
102. *Latin Prose: Oratory* Ms. ELLIOTT.
A history of Roman oratory, concentrating on Cicero but surveying other famous orators through their fragments. Several speeches of Cicero and selected passages from his oratorical treatises will be read. Cicero's ideal "orator" will be examined in the light of the actual practice of oratory in the political arena.
103. *Roman Satire* Mr. WORKMAN.
Through readings in Horace, Juvenal, Persius and Seneca, the student is introduced to a form of editorializing distinctly Roman yet influential on later journalism. Criticism of society, the establishment, and fondly cherished traditions. Exploration of the satiric spirit, paranoia, bitterness and the penchant for reforming society.
104. *The Poetics of Vergil's Aeneid* Messrs. PUTNAM and SEGAL.
The nature and composition of Vergil's epic; evidence of the Vergilian creative process in the minor poems and the Appendix.
105. *Plautus and Roman Comedy* Mr. WORKMAN.
A study of the form, internal construction, and language of Roman comedy as evidence alike of the Roman sense of humor, the borrowing from Greek models, and the manners and morals of a vigorous and boisterous society.
106. *Sallust, Livy, Tacitus* Messrs. RAAFLAUB and WYATT.
A study of the development and themes of Roman historical writing through a close examination of its major authors. Sallust, *Catiline*; Livy, Books I and XXI (parts of each); Tacitus, *Annales* (major portions of several books).
- 111A. *Selections from Latin Authors*
- 1981-82: *Selections from Latin Prose Authors* Mr. LOENING.
- 1982-83: *Medieval Latin Historiography* Ms. ELLIOT.
Consideration of historical writing and historical writers in the medieval period.
- 1983-84: *Medieval Latin: Christian Myth and Legend* Ms. ELLIOTT.

Works will include selections from the pre-Vulgate translations of the bible, the *Gospel of Pseudo-Matthew*, the *Gospel of Nicodemus*, and the *Voyage of St. Brendan*.

111B. *Selections from Latin Authors*

1981-82: *Lucretius*

Mr. FORNARA.

1982-83: *The Time of Caesar's Civil War in the Mirror of Political Writings of the Late Roman Republic*

Mr. RAAFLAUB.

A selection of political and historical writings of several authors (e.g. Caesar, Cicero, Sallust, Suetonius, Augustus) and genres (Historiography, biography, oratory, political philosophy, letters, inscriptions) will be read which all deal with the fundamental experience of civil war or with the lives and careers of the leading personalities.

1983-84: *See Classics 111*

111C. *Selections in Latin Authors: Seneca—Philosopher and Tragedian*

Mr. SEGAL.

A reading of Seneca's tragedies as well as his philosophical works. The tragedies will be closely related to the ideas contained in the philosophical works.

114. *The Structure of Latin*

Mr. WYATT.

The Latin language. An investigation of the phonology, morphology, syntax and semantics of the Latin language in the age of Cicero. Earlier and later periods will also be treated briefly.

115. *Latin Prose Composition* (formerly Latin 215)

Mr. WYATT.

181. *Survey of Republican Literature* (formerly Latin 215)

Mr. PUTNAM.

182. *Survey of Latin Authors from Horace to Suetonius* (formerly Latin 202)

The STAFF.

191. *Special Topics*

The STAFF.

199. *Conference: Especially for Honors Students*

The STAFF.

III. PRIMARILY FOR GRADUATES

CLASSICS

201. *Seminar: Problems in Classical Archaeology* (Art 243)

Mr. HOLLOWAY.

Topics in recent years have included Topography and Monuments of Ancient Rome, Ancient Pottery, the Parthenon, Numismatics, Archaic Greek Sculpture. Topic for 1981-82: Readings in the criticism of ancient art, with emphasis on 20th century critics especially R. Bianchi-Bandinelli and Guido von Kaschnitz-Weinberg.

208. *Seminar: Ancient History: The Conflict of Orders* (1981-82)

Mr. RAAFLAUB.

GREEK

202. *Seminar: Aristophanes* (1981-82)

Mr. BOEGEHOLD.

203. *Seminar: Callimachus* (1981-82)

Ms. BROWNING.

Seminar: Ancient Greek Literary Criticism (1982-83)

Mr. SEGAL.

Survey of the major texts of Greek literary criticism from the beginnings to the Empire. Readings will include Aristophanes' *Frogs*, selections from Plato's *Ion*, *Phaedrus*, and *Republic*, parts of Aristotle's *Poetics* and *Rhetoric*, and selected treatises of Dionysius of Halicarnassus, Demetrius, Plutarch, and "Longinus." Students will be expected to read extensively in the original and to pursue specialized topics.

211. *Seminar: The Greek Anthology* (1983-84)

Mr. WORKMAN.

Seminar: Cicero, de natura deorum, Apuleius, de magia (Apology) (1981-82)

Mr. FORNARA.

212. *Seminar Greek Epigraphy* Mr. BOEGHOLD.
213. *Seminar: Images and Conceptualization in Pre-Classical and Classical Greece*
(1982-83) Mr. COOK.
291, 292. *Reading and Research* The STAFF.
Written permission required.

LATIN

203. *Seminar: Catullus* (1981-82) Mr. PUTNAM.
The Epistles of Horace (1982-83)
204. *Seminar: Ovid* (1981-82) Ms. ELLIOTT.
Seminar: Amatory Poetry of the Augustan Age (1982-83) Ms. ELLIOTT.
211. *Seminar: Cicero* Mr. FORNARA.
212. *Seminar: Reading Latin Manuscripts* Mr. TOOMER.
251. *Seminar: Tacitus* (1981-82) Mr. RAAFLAUB.
Seminar: Roman Imperialism in the Middle Republic (1983-84) Ms. SCAFURO.
291, 292. *Reading and Research* The STAFF.
Written permission required.

SANSKRIT

I. FOR UNDERGRADUATES AND GRADUATES

- 151, 152. *Sanskrit Grammar, and the Reading of Elementary Texts.*
153, 154. *Readings in Sanskrit Texts*
Each student will choose the genre of the text (or texts) to be read. Prerequisite: Sanskrit 152 or its equivalent.
191. *Special Topics* Mr. PINGREE.
199. *Conference: Especially for Honors Students* Mr. PINGREE.

II. PRIMARILY FOR GRADUATES

- 251, 252. *Advanced Sanskrit*
Author or topic to be agreed upon by instructor and student. Prerequisite: Sanskrit 154 or equivalent.
291, 292. *Reading and Research*
Written permission required.

See also related courses in Art, Philosophy, History of Mathematics, Religious Studies, Ancient World (Foundations 13, 14).

Institute for Cognitive and Neural Research

The Institute for Cognitive and Neural Research was created in May, 1981 and consists of affiliated faculty members interested in various aspects of cognitive and neural research. The disciplines represented include psychology, linguistics, neural science,

computer science, applied mathematics, engineering, philosophy and anthropology. The Institute is administered by a Director and a five member Executive Committee of which the Director is an *ex officio* member, and which also includes the Directors of the Center for Cognitive Science and of the Center for Neural Sciences.

The main purpose of the Institute is to encourage research in various aspects of cognition and its neural correlates, and to facilitate the exchange of opinions and the collaboration among its members who bring their different disciplinary insights to this common area of inquiry. Particular emphasis is put on fostering the interaction between the Center for Cognitive Science and the Center for Neural Sciences.

Although the Institute does not offer any courses or programs leading to a degree, it does sponsor lectures, seminars and conferences, most of which are open to members of the University community. Those interested in the activities of the Institute should contact the Director, Professor Henry Kucera, Box E, Brown University.

Cognitive Science

The Center for Cognitive Science was formed in July, 1977 as a reflection of existing cooperative activities among a number of faculty and in anticipation of the growth of this interdisciplinary science. The Center aims to support all those interested in the human mind and has members from a number of fields including Anthropology, Applied Mathematics, Computer Science, Engineering, Linguistics, Music, and Psychology. Since the Center is an evolving organization, members are involved to different degrees and new disciplines are welcomed—for example, we expect increased participation by members of the Philosophy Department because of the importance of epistemology to any study of the human mind. At present the core of the Center's activities concern speech perception, language learning and performance, models of memory including neural properties of memory, information processing models of psychological processes, computer simulation of cognitive and language behavior, and the role of culture in language and psychological processes.

The purpose of the Center is to encourage interdisciplinary research in cognitive science. In particular, the Center has assisted in obtaining support for students and faculty, supports a computer-based research facility (described below), established an undergraduate concentration in Cognitive Science, has proposed a graduate program for the M.A. and Ph.D. degrees, and has supported a number of visiting scholars.

The Center's major support has come from the Alfred P. Sloan Foundation in the form of two grants. (This support has been shared with the Center for Neural Science). The first, for two years, supported seminars and workshops in cognitive science on current issues in the field. The second, for three years, supports post-doctoral fellowships, faculty salaries, graduate students, computer facilities, and further seminar activity. The Center will participate in further efforts by Brown University to support research in this area through the formation of an Institute for Cognitive and Neural Research.

The Center's laboratory was established in January, 1980, from grants from the National Science Foundation, Digital Equipment Corporation, Alfred P. Sloan Foundation, and Brown University. It consists of a Digital Equipment Corporation VAX/780 computer connected to two special research peripherals: an LPA11-KK microprocessor for A/D and D/A processing and a Grinnell color-raster-scan graphics system. These devices are used for research on speech processing and visual information processing. The main system is used for research in cognitive simulation and artificial intelligence. The VAX is a part of the general university wide computer network.

A brochure describing the Center for Cognitive Science is available and can be obtained by writing Richard B. Millward, Director, Center for Cognitive Sciences, Box 1911, Brown University, Providence, R. I. 02912.

Comparative Literature

Professors AHEARN (Chairman), BARNOUW,¹ COOK, FIDO,¹ PUTNAM, SCHOLÉS,¹ SEGAL, SPILKA, TERRAS,² TRUEBLOOD, WEINSTEIN; Associate Professor BOSSY¹ Assistant Professors LEVY, NEWMAN; and members of cooperating departments.

The Department of Comparative Literature accepts qualified candidates for the degrees of Bachelor of Arts and Doctor of Philosophy. In addition to the offerings listed below, the candidate should consider such courses as may be pertinent to his particular interest in the departments of Classics, English, French Studies, German, Hispanic and Italian Studies, Linguistics, and Slavic Languages.

UNDERGRADUATE PROGRAMS

The undergraduate programs for concentration in Comparative Literature enable students to study literature from a vantage point that offers perspectives on several national literatures. The aim of the program is to encourage students to study a varied and illustrative range of literary topics rather than the total development of a single literary tradition. Concentrators in Comparative Literature should be willing to try different literary approaches and to examine literary and aesthetic problems with sustained curiosity. There are three concentration programs, as follows:

- I. *Concentration in English and one foreign literature.* Prerequisite: completion before Semester V of prerequisites for taking 100-level courses in a classical or modern foreign literature. Program: a total of at least eight advanced literature courses (generally 100-level courses), including Comparative Literature 121, selected from offerings of Comparative Literature, English, and the appropriate foreign literature department. Honors may be undertaken by taking ten advanced literature courses and completing an acceptable Honors thesis.
- II. *Concentration in English and two foreign literatures.* (Honors). Prerequisites: (1) completion before Semester V of prerequisites for taking 100-level courses in a classical or modern foreign literature; (2) completion before Semester VII of the same prerequisites for another such literature. Program: a total of at least ten advanced literature courses (generally 100-level courses), including Comparative Literature 121, selected from offerings of Comparative Literature, English and the appropriate foreign literature departments; completion of an acceptable Honors thesis (for which the student may register in Comparative Literature 198, which will count as one of the ten required courses).
- III. *Concentration In Literary Translation.* (English and one foreign literature.) (Honors.) Prerequisite: completion before Semester V of prerequisites for taking 100-level courses in a classical or modern foreign literature. Program: (1) four or five courses in English composition, translation, and linguistics, as follows: at least two courses from among English 4, 6, 10, 11, 101, 102; one course from among English 103, 104, Linguistics 22, 53, 121; Comparative Literature 171 (in addition,

¹ On leave of absence, 1983-84.

² On leave of absence, Semester II, 1983-84.

students are urged to take Comparative Literature 272); (2) at least five advanced literature courses (generally 100-level courses), including Comparative Literature 121, drawn from among the offerings of Comparative Literature, English, and the appropriate foreign literature departments; (3) completion of a senior translation project, equivalent to an Honors thesis (for which the student may register in Comparative Literature 198, which will count as one of the ten required courses).

It is extremely important to begin planning early for a concentration program in Comparative Literature. Interested students should consult with the Concentration Advisor during Semesters III and IV, or earlier. More detailed descriptions of the programs are available from the Concentration Advisor.

To insure sufficient range, courses should be: (1) selected to include each of the three major literary genres: poetry, drama, and narrative; (2) distributed within at least three distinct periods (for instance, the eighteenth century, Romantic-Modern, antiquity); (3) drawn from at least two literature departments other than Comparative Literature. Courses may be drawn as well from non-literary fields related to literature.

To insure sufficient focus, students should build a number of courses around a particular coherent aspect of literary study (e.g., period, genre, theme, relation of literature to another discipline). Students not taking Honors are urged (but not required) to complete a senior essay, which may be less extensive in scope and length than an Honors thesis but which should constitute an integration of some aspect of their study.

GRADUATE PROGRAM

The graduate program in Comparative Literature enables students to approach literature from a vantage point that transcends national and linguistic boundaries. Through study of an illustrative range of materials from several literatures, it aims at an understanding of individual authors, influences, literary movements, forms and genres in a comparative critical context. To pursue such work students must have a good linguistic competence, wide-ranging interests, and sustained curiosity concerning the nature of literature. The program aims at developing these skills and interests so that the candidate will have strong competence in at least one national literature and also be well prepared to teach in such areas as Comparative Literature, literary theory, and world literature.

DOCTOR OF PHILOSOPHY. For admission to the doctoral program students will present evidence of sound training in literature written in three European languages. They will pursue study of their principal literature in a cross-cultural context linking it with the other two diachronically or synchronically, in terms of literary currents, ideas or themes, and of phenomena of style, convention, attitude or sensibility. They may also adopt a more theoretical or methodological focus, with emphasis on poetics, stylistics or semiology.

Requirements for the Doctorate of Philosophy

1. *Language requirements.* The student will be expected to develop language skills sufficient for advanced work in at least the three literatures chosen. (The native language may be included, when appropriate.) Languages will be selected according to their appropriateness to the student's areas of concentration. Ordinarily two languages from the same group—Romance, Slavic, Germanic (exclusive of English), etc.—will not be selected. A knowledge of at least one ancient language (Latin, Greek, Hebrew, etc.) is strongly recommended and will be required in some fields (Latin, for example, in programs with a strong classical, medieval, or Renaissance

emphasis). Since the Department's major competence is in literary expression in European languages, other languages will not usually be appropriate, though exceptions may be made. For at least one of the foreign languages presented, a degree of competence close (in the case of a modern language) to native proficiency in speaking and writing will be expected. Language competence will be tested by course work or examination, the full requirement to be completed during the student's second year of study. A language which a student speaks as a native will not be tested.

2. *Course requirements.* The student will successfully complete 18 courses, spread over three years in the proportions respectively of 8, 6 and 4. Individual programs are worked out in consultation with an advisor so as to meet the following specifications:

- A substantial core of courses primarily in one national literature along with significant related work in at least two others. (Courses may be taken in national literature departments.)

- A spread of courses comprising work in all three major genres (poetry, drama, narrative) and in three distinct cultural epochs (medieval, Romantic, modern, and so forth).

- Some work in the area of literary theory, literary criticism, and literary translation.

- If pertinent, courses relating literature to other fields of inquiry or expression; for example, to linguistics, philosophy, psychology, music, the visual arts. Appropriate courses wholly within these fields may also be selected.

3. *Teaching.* Teaching experience, in comparative courses and where applicable in foreign language or English composition, is an integral part of the student's program. It is expected, circumstances permitting, that every graduate student will serve at least a term as a teaching assistant, and that most students successfully completing requirements will be funded in this way for several years.
4. *Major literature examination and comparative projects.* This combination of exercises is designed to allow students to develop competence in one national literature while at the same time fostering the approaches, skills and insights characteristic of the best comparative work. The following schedule will be used. During the third year of study, courses will be devised so that in Semester 1 students will take one regular course and one independent study course; in January they will take a written examination on their major literature; in Semester 2 a double-credit independent study course will prepare students to present two comparative projects, one written (due in March), one oral (to be presented in May). These projects will allow the student to demonstrate originality, scope and variety (e.g. they might be organized around genre or period lines, theoretical issues, thematic concerns). One of them will be developed thereafter into the doctoral thesis.
5. *The dissertation.* The doctoral thesis prospectus will be submitted by September 30 of the fourth year of study. Funding for the fifth year will be contingent on substantial demonstrated progress on the thesis by January of the fourth year. Students are encouraged to develop projects of reasonable contour and proportion; *magna opera* more proper to the mature scholar are discouraged.

The Master of Arts Degree

The Department does not admit terminal Master of Arts candidates and does not require a Master's degree as a prerequisite for the doctorate. A student may, if he or she wishes, take an M.A. by completing one year of full-time course work in residence (normally four courses each semester), satisfying two of the three language requirements for the Ph.D., and completing a Master's thesis consisting of an essay of 50 to 60 pages on a comparatist

subject. Upon advancement to doctoral candidacy, a student, upon request, will be awarded a Master of Arts degree.

I. PRIMARILY FOR UNDERGRADUATES

51. *Literary Creation and Critical Discourse* Ms. NEWMAN.
Topic for 1983-84: Introduction to Comedy.
61. *The Functions of Literature*
Topics for 1983-84:
A. The Greek Drama in English (Classics 62) Mr. SEGAL.
B. Introduction to Epic Poetry. Ms. NEWMAN.
71. *Literature and its History*
Topics for 1983-84:
A. Japanese Literature and Society. Ms. VISWANATHAN.
B. Modern Hebrew Literature in Translation (Judaic Studies 49 and 50)
C. Readings in Modern Scandinavian Literature. Mr. WEINSTEIN.
81. *Ideas, Myths, and Themes*
Topics for 1983-84:
A. Order and Chaos in Literature. Mr. WEINSTEIN.
B. Tales and Talemakers of the Non-Western World. Ms. LEVY.

II. FOR UNDERGRADUATES AND GRADUATES

121. *Introduction to the Theory of Literature* Mr. AHEARN.
141. *Studies in Drama*
Topics for 1983-84:
A. Renaissance Family Politics. Ms. NEWMAN.
B. From Memoirs to Confessions: History and Theory of Autobiography in XVIII-Century and Early XIX-Century Literature. (Registration at the University of Bologna.) Mr. FIDO.
142. *Studies in Narrative*
Topics for 1983-84:
A. Proust, Joyce, and Faulkner Mr. WEINSTEIN.
B. Romantic Fiction. Mr. TERRAS.
D. Japanese Fiction. Ms. VISWANATHAN.
E. Critical Approaches to Chinese Fiction. Ms. LEVY.
143. *Studies in Poetry*
Topics for 1983-84:
A. Critical Approaches to Chinese Poetry. Ms. LEVY.
B. Symbolist Poetry in a Comparative Context (French 113).
161. *Studies in Criticism*
171. *Introduction to Literary Translation* Mr. TRUEBLOOD.
181. *Studies in the Literature of Ideas*
Topics for 1983-84:
A. Forms of Artful Discourse. Mr. COOK.
B. The Paternalistic Thriller and Other Studies in the Fiction of Prejudice. Ms. LEVY.
C. Marx and the Poets. (University Course 146) Mr. AHEARN.
D. The City and the Arts. (University Course 163) Mr. WEINSTEIN.

198. *Senior Conference*

Special work or preparation of senior theses under the supervision of the staff. Open to honors students and to others.

III. PRIMARILY FOR GRADUATES

251. *Seminar in Influences and Relations*

252. *Seminar in Forms and Genres*

Mr. WEINSTEIN.

Topic for 1983-84: Proust, Joyce and Faulkner.

253. *Seminar in Themes and Modes*

254. *Seminar in Schools and Movements*

Topics for 1983-84:

A. The Childhood Theme in 19th-Century Fiction.

Mr. SPILKA.

B. English Literature in the Romantic Age (English 262)

Ms. SCHAFER.

265. *Theory of Literature*

Mr. AHEARN.

Topic for 1983-84: Basic elements of Critical Theory and Important Types of Modern Criticism.

272. *Theory and Practice of Literary Translation*

281. *Special studies in Comparative Literature*

282. *Special Topics in Comparative Literature*

283. *Special Problems in Comparative Literature*

Mr. COOK.

Topic for 1983-84: Narrative in fiction and historiography, representation in poetry and other forms, and classic modern theory from Freud and Heidegger to the present.

291. *Reading and Research*

Work with individual students in connection with special reading, problems of research, or preparation of theses.

Center for the Comparative Study of Development

The Center for the Comparative Study of Development, established in 1982-1983, consists of affiliated faculty members from different disciplines. It facilitates research, graduate training and undergraduate teaching on problems of socioeconomic development. The concentration program in Development Studies is housed in the Center. The Center sponsors a faculty seminar and occasional conferences.

The Director of the Center is Morris D. Morris, Henry R. Luce Professor in the Comparative Study of Development; its Associate Director is Peter B. Evans (Sociology). Other members of the Executive Committee are: Lina M. Fruzzetti (Anthropology and Afro-American Studies), Sidney Goldstein (Sociology and Population Studies and Training Center), Robert M. Marsh (Sociology), Robert C. Padden (History), Louis Putterman (Economics), Dietrich Rueschemeyer (Sociology), John D. Stephens (Sociology), and Van R. Whiting, Jr. (Political Science).

Computer Science

Professors VAN DAM (Chairman), SAVAGE, SEDGEWICK, WEGNER; Associate Professor CHARNIAK; Associate Professor (Research) DOEPPNER; Assistant Professors BAUDET, CHAZELLE, KANELAKIS, REISS, VITTER, ZDONIK.

Computer Science combines the intellectual challenge of a new discipline with the excitement of being part of an innovative and rapidly expanding technology. Computer Science has been an active area at Brown for twenty years and became a department in 1979. The Department now occupies the Edward W. Kassas House, a Victorian building centrally located on the Brown campus, and a newly constructed adjoining building, the Gould Laboratory, which contains the Department's innovative instructional computing environment. The Department is also sharing a third building with the newly created Institute for Research in Information and Scholarship (IRIS). A number of research computers and a network of personal computers with high-resolution graphics provide modern and powerful computing facilities for both faculty and students.

The Department of Computer Science offers standard Sc.B. and A.B. concentrations, an Sc.B. concentration in Applied Mathematics and Computer Science, a professional master's program, a regular master's program, and a Ph.D. program.

The undergraduate program is designed to combine educational breadth in the areas of software, hardware, and theoretical Computer Science with deeper understanding of specialized areas such as software system design, programming languages, machine architecture, the analysis of algorithms, the theory of computation, and artificial intelligence. Undergraduates usually take at least one semester of independent study, working either on a project of their own choice or as a member of a team on a faculty-sponsored research project.

The Department also provides a wealth of opportunities for graduate research in Computer Science. Graduate students at Brown pursue research in analysis of algorithms, applied theory of computation, artificial intelligence, combinatorial optimization, compilers, computational geometry, computer graphics, database systems, distributed computing, office automation, operating systems, parallel processing, programming languages, software systems, text processing and VLSI, in addition to a variety of application areas. The established coordination between the Department of Computer Science and other departments of the University provides an unusual opportunity for advanced research both in traditional "core" Computer Science and in areas interfacing between Computer Science and such fields as Applied Mathematics, Engineering, or Psychology.

UNDERGRADUATE PROGRAMS

Undergraduate concentrations in Computer Science encourage students to take both theoretical courses which develop logical and mathematical reasoning abilities and practical courses which provide experience in the construction, design, and implementation of real computing systems.

In addition, all computer science concentrators are required to take an approved English writing course. Computer programming is a methodical expression of complicated ideas. An appropriate writing course serves not only to sharpen this ability, but also to facilitate the description of programs to others, which is an integral part of the programming task. Each student is expected to meet with the departmental advisor who will direct the student to an appropriate course or waive the requirement when indicated.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE DEGREE

The standard Sc.B. concentration in Computer Science has the following specific course requirements: Mathematics 9, 10 or 17; two courses in Mathematics or Applied Mathematics beyond Mathematics 10; an approved two-course sequence in Physics, Chemistry, Biology, Engineering, or Geological Sciences; and thirteen approved courses in Computer Science or related areas, including Computer Science 11, 12, 21, 52, 141, 152, 153, 191, and Engineering 163, 164. Computer Science 191 and Engineering 163

are design courses which satisfy the general requirement for independent study, research, or design for the Sc.B. degree.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

The standard A.B. concentration in Computer Science requires: Mathematics 9, 10, or 17; Computer Science 11, 12, 21, 52; and three approved courses in Computer Science or related areas, including one of the following pairs of courses: Computer Science 152, 153; Engineering 163, 164; Computer Science 126 or 128, 191; or Computer Science 141 and Psychology 152.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE WITH CONCENTRATION IN APPLIED MATHEMATICS AND COMPUTER SCIENCE

Prerequisites: Mathematics 9, 10.

Requirements: Applied Mathematics 33, 34 or Mathematics 25, 26; Computer Science 11 or 4, 12, 21, 152, 153; Applied Mathematics 117 or 118, 116 or 121, 165; Computer Science 191 or Applied Mathematics 193 or 194; seven additional courses, approved by the concentration advisors, from the courses offered by Computer Science and Applied Mathematics. Of the unspecified courses, at least four shall be 100-level or higher level. Concentrators are reminded that many 100-level and higher-level Computer Science courses presume a background in discrete mathematics at the level of Computer Science 52. Students who have not acquired this background elsewhere are encouraged to consider Computer Science 52 when choosing courses to fulfill the quantity requirement of the concentration. Courses from other departments may be substituted for the unspecified Applied Mathematics and Computer Science courses if such courses stress the use of mathematical or computer models and if the advisors approve of the substitution.

GRADUATE PROGRAMS

Brown University offers three graduate degrees in Computer Science: a research-oriented Sc.M. to prepare students for further graduate study; a professionally-oriented Sc.M. for persons who wish to improve their professional competence in Computer Science; and a Ph.D. Specific requirements for these degrees are outlined below.

MASTER OF SCIENCE. Eight courses to be determined in conjunction with and approved by the Graduate Committee of the Department of Computer Science must be completed satisfactorily. Two course credits may be used for research leading to the Master's thesis.

A student must normally complete a satisfactory Master's thesis under the supervision of a member of the faculty, or else pass the Ph.D. comprehensive exam.

PROFESSIONAL MASTER OF SCIENCE. The following prerequisites must be satisfied:

1. demonstrated competence in the use of an assembly programming language and a procedural programming language; and,
2. one year of experience as a professional programmer or at least two one-semester courses in computer science beyond first courses in programming.

Eight courses to be determined in conjunction with and approved by the Department's Graduate Committee must be completed satisfactorily. These courses must meet the following requirements:

- A. Two of the eight courses must be advanced courses on programming, programming systems or computer architecture;
- B. Two must be advanced courses on the analysis of algorithms, theory of computation or mathematics relevant to computation;
- C. At least three of the eight courses must be at the 200 level.

The student must satisfactorily complete a substantial design or research project under the supervision of a member of the faculty; two course credits may be used for work on the design or research project.

DOCTOR OF PHILOSOPHY. As a first requirement, students expecting to earn a Ph.D. in Computer Science must complete satisfactorily a Comprehensive Examination. The Comprehensive Examination covers basic topics in Computer Science including computer architecture, programming languages, software systems, analysis of algorithms and theory of computation. Students are expected to demonstrate understanding of these topics at advanced undergraduate and/or beginning graduate level. This examination will normally be taken by the end of the student's third semester in residence.

After passing the Comprehensive Examination, the student must complete one major and two minor requirements, normally by the end of the fifth semester but no later than the eighth semester in residence.

The major requirement can be satisfied through either an in-depth oral examination or, subject to the approval of the Department's Graduate Committee, an alternative method such as a written examination, a research project, or a dissertation proposal.

The student must complete two minors, each consisting of the equivalent of one year of study at the graduate level. Each minor requirement can be met either by the satisfactory completion of two approved semester courses or by examination. At least one minor must be outside computer science.

Upon completion of the major and minor requirements, the student's progress will be reviewed by the Graduate Committee at a meeting open to the student and all faculty in the Department. If all requirements have been satisfactorily met, the Department will recommend to the Graduate School that the student be admitted formally to Candidacy for the Ph.D. in Computer Science.

The student must present a dissertation which embodies the results of original research and which gives evidence of high scholarship. The student's dissertation research will normally be done under the supervision of a member of the faculty of the Department of Computer Science. Exceptions to this rule are subject to the approval of the Graduate Committee. Two readers (appointed by the Graduate Committee upon the recommendation of the dissertation supervisor) and the dissertation supervisor will read the completed dissertation. If it is found to be satisfactory, the dissertation supervisor will approve the dissertation and the two readers will recommend in writing to the Graduate Council that the dissertation be accepted.

The Final Examination will normally consist of an expository talk, open to the public, followed by defense of the dissertation, conducted by the dissertation supervisor and readers, and open to the faculty of Brown University and persons specifically invited by the Graduate Committee. Members of the Department present at the examination will determine whether the candidate has satisfactorily completed this examination.

After the dissertation has been accepted by the Graduate School and the student has satisfactorily completed the Final Examination, the Department will recommend in writing to the Graduate Council that the degree be awarded.

I. PRIMARILY FOR UNDERGRADUATES

1. *Computers and Society*

Mr. SAVAGE.

Basic properties of computers and computer systems. Simple interactive programming exercises. Examples of computer use in commercial, scientific, military and personal applications. Future outlook: potential impact of computers on everyday life. This literacy course is intended to give a broad survey of basic issues for students in any field and does not aim for programming competence.

4. *Introduction to Scientific Computing*

Messrs. VITTER and ZDONIK.

An introduction to computer programming for scientific applications in a high-level language. Will emphasize structured problem-solving techniques and numerical applications of computer programming to several scientific disciplines. Intended primarily for students concentrating in the sciences and engineering who want to take a single course in computer science. Resource limitations may require enrollment restrictions.

11. *Computer Programming, Problem Solving and Applications* Mr. VAN DAM.

Introduction to computer programming in several high-level languages, analysis of problems for computer solution, applications of computers in various areas. Directed toward those students who want a broad introduction to the field, including those intending to be Computer Science majors. Resource limitations may require enrollment restrictions.

12. *Fundamentals of Programming* Mr. BAUDET.

Machine organization, assembly language programming. Introduction to data structures, algorithms, systems software, and programming languages. Intended for those who expect to be serious computer users. Prerequisite: 11 or 4.

21. *Algorithms and Data Structures* Mr. SEDGEWICK.

Fundamental methods for problem solving by computer. Representative algorithms (and their data structures) from a variety of application areas will be implemented in a high-level language. Examples include numerical algorithms, sorting and searching, geometric algorithms, graph algorithms, pattern matching, and encryption methods. Prerequisite: 11 or 4. Recommended: 12.

52. *Discrete Mathematics* Mr. CHAZELLE.

Development of basic concepts in areas of discrete mathematics relevant to computer science. Introduction to logic, set theory, algebraic structures, graph theory, and combinatorics. Prerequisite: 11 or 4.

II. FOR UNDERGRADUATES AND GRADUATES

126. *Introductory Compiler Construction* Mr. REISS.

Lexical analysis, syntactic analysis, code generation, code optimization, translator writing systems. Prerequisites: 12, 21 and 52.

128. *Database Management Systems* Messrs. KANELAKIS and ZDONIK.

Introduction to database structure, organization, and retrieval. Network, hierarchical, and relational models. Relational theory. Very large and distributed databases. Studies of actual systems. Prerequisites: 12, 21, and 52.

141. *Introduction to Artificial Intelligence* Mr. CHARNIAK.

How computers can be made to behave "intelligently." Particular topics include: the programming language LISP, natural language parsing, computer vision, search techniques, A.I. databases, story comprehension, medical diagnosis, problem solving, and learning. The emphasis will be on the writing of small versions of classic A.I. programs. Prerequisites: 12 and 52.

152. *Introduction to the Theory of Computation* Mr. KANELAKIS.

Introduces the student to a broad range of theoretical topics in computer science. Topics covered include finite-state machines and regular expressions. Turing machines, push-down automata and context-free languages, operations on automata and languages, computability, and computational complexity. Prerequisites: 21 and 52.

153. *Introduction to Analysis of Algorithms* Mr. VITTER.

Techniques for efficient implementation and precise analysis of computing algorithms. Combinatorial mathematics and asymptotic methods of analysis. Emphasis on obtaining exact closed-form expressions describing the time and space requirements for particular computer programs when it is possible to do so. Prerequisites: 21 and 52.

159. *Introduction to Computational Complexity*

Mr. SAVAGE.

An introductory treatment of theoretical topics related to finding the intrinsic difficulty of solving various problems by computer. Concrete models of computation. Upper and lower bounds for various algebraic and combinatorial problems. Problem classification, including NP-completeness. Prerequisites: 21 and 52.

169. *Systems Architecture*

Mr. DOEPPNER.

Operating systems facilities. Introduction to operating systems principles. Advanced systems programming. I/O programming. Distributed systems, computer networks. Emphasis on understanding the operation of actual systems—representative systems will be examined in detail. Prerequisite: Engineering 164.

191. *Software System Design*

Mr. REISS.

Design and construction of large software systems. Software engineering. Structured design. Documentation and maintenance of large systems. Will be centered around a project where students, working in teams, design and implement a significant applications or systems software package. Prerequisite: Engineering 164.

193, 194. *Senior Seminar*

Independent study in various branches of Computer Science, supervised by the Staff.

195, 196. *Special Topics in Computer Science*

III. PRIMARILY FOR GRADUATES

201. *Introduction to Computer Science Research*

MESSRS. VITTER and SAVAGE.

Departmental research projects and tools. Designed to introduce the incoming student to the department and its facilities, and to supplement an undergraduate Computer Science background. Prerequisite: 21 or equivalent.

222. *Operating Systems Principles*

Mr. DOEPPNER.

Advanced treatment of fundamental concepts in operating systems design. Scheduling, parallel processes, memory management, resource allocation and sharing, protection, system performance, computer networks. Examples of the application of the principles in actual systems. Formal models for validating the principles. Offered in alternate years. Prerequisite: 169 and some knowledge of probability.

224. *Computer Graphics*

Mr. VAN DAM.

Computer-operator interaction with such graphic information as line drawings, block diagrams, solid area bit maps, handwriting, and three-dimensional surfaces. Emphasis on the use of a high-resolution color raster display. Prerequisite: 191 or written permission.

225. *Advanced Topics in Compiler Construction*

Mr. REISS.

Advanced parsing concepts and techniques. Code optimization. Compiler models. Translator writing systems. Automatic compiler production. Automatic error recovery. Attribute grammars. Offered in alternate years. Prerequisite: 126.

227. *Topics in Database Management Systems*

Mr. ZDONIK.

In-depth treatment of issues concerning database management systems. Office information systems. Topics include database security, distributed databases, and the efficient implementation of relational database systems. Offered in alternate years. Prerequisite: 128.

232. *Seminar in Distributed Processing, Networking and Data Communications*
(Engineering 291C)

MESSRS BULTERMAN and VAN DAM.

Introduction to the basic techniques for interconnecting computers and peripherals for decentralized computing. Topics include: digital communications, communication protocols for geographic and local area networks, interprocess communication, and research

issues in distributed processing. Laboratory exercises may be included. Offered in alternate years. Prerequisite: Engineering 164.

234. *Software Engineering*

Mr. WEGNER.

System analysis and design, data abstraction, exception handling and reporting, implementation and testing strategies including: structured programming, program specification, verification and testing, development libraries, approaches to project management and documentation, advanced systems programming. Prerequisite: 191.

236. *VLSI Design*

Mr. BAUDET.

Emphasis on architecture and design of VLSI circuits. Topics include: CAD systems and automated design tools, VLSI algorithm design, computational models and complexity results for area-time tradeoffs of VLSI circuits. Prerequisite: 52, 153 or written permission.

242. *Artificial Intelligence*

Mr. CHARNIAK.

Advanced treatment of fundamental topics such as: knowledge representations, problem-solving languages, data dependencies, unusual control structures. These will be illustrated with examples drawn from: syntactic parsing of English, speech comprehension, automatic programming, plan and context recognition, medical diagnosis. Emphasis will be on programming A.I. theories, possibly including a team-effort final project. Prerequisite: 141.

253. *Analysis of Algorithms*

Mr. SAVAGE.

Advanced topics in the design, implementation and analysis of algorithms. Introduction to mathematical analysis of algorithms, complexity of computing, upper and lower bounds. NP-completeness and related topics. Prerequisite: one of 152, 153, 159.

254. *Mathematical Analysis of Algorithms*

Mr. SEDGEWICK.

Advanced methods for obtaining precise descriptions of the time and space requirements of particular computer programs. Advanced combinatorial mathematics, transform methods, approximation methods. Detailed analyses of well-known combinatorial algorithms. Offered in alternate years. Prerequisite: 253.

256. *Applied Theory of Computation*

Mr. SAVAGE.

A variety of advanced topics in the performance of algorithms on concrete models of machines, including: space-time tradeoffs for straight-line algorithms on uniprocessor machines, performance of algorithms for algebraic problems and others characterized by concentration properties, concrete complexity measures such as circuit complexity. Also included are algorithm design and analysis for VLSI. Offered in alternate years. Prerequisite: 253.

257. *Computational Geometry*

Mr. CHAZELLE.

This course will introduce the basic concepts of geometric computing, illustrating the importance of this new field for a variety of application areas (e.g., graphics, pattern recognition, statistical analysis, etc.) Algorithms will be presented for a large number of geometric problems, such as: convex hull and visibility; intersection, inclusion and point location; searching and decomposing geometric structures; closest-point problems, Voronoi construction and extremum problems; parallel implementations. An introductory course in the analysis of algorithms is required. Prerequisite: 21 or 253 or equivalent (with permission of instructor).

258. *Combinatorial Optimization: Algorithms and Complexity*

Mr. KANELAKIS.

A variety of efficient graph algorithms and complexity results for combinatorial optimization problems are presented in detail. Topics include: the complexity of linear programming, path, tree and flow problems in graphs, matching and matroid theory, integer programming, NP-complete problems and approximation algorithms. Offered in alternate years. Prerequisite: 253 or written permission.

272. *Parallel Computation*

Mr. DOEPPNER.

A study of recent work in parallel computation, focusing primarily on asynchronous parallelism. Topics include: axiomatic and denotational semantics for parallel programs, non-deterministic models of computation, first-order and second-order correctness, distributed computation, data-flow machines. Offered in alternate years. Prerequisites: 152, 153 and Engineering 164, or written permission.

273. *Programming Languages*

Mr. WEGNER.

The design, analysis, implementation, and comparative study of programming languages. Topics include: runtime storage management, garbage collection, block structure, data types and operations, parameter passing, macro processing, co-routines and multitasking. Languages covered include: LISP, ALGOL 60, ALGOL 68, C, SNOBOL, and ADA. Functional approach to semantics will be covered if time permits. Emphasis on concepts shared by many languages. Prerequisites: 21 and 52.

274. *Programming Language Theory*

Mr. WEGNER.

Theoretical models for the study of programming languages, including semantic models, logic and automatic theorem proving, program verification for sequential and parallel programs, program schemes and flowchart models, mathematical semantics, fixed points and recursive programs, lambda calculus models, language definition techniques. Offered in alternate years. Prerequisite: 152.

295, 296. *Special Topics in Computer Science*

297, 298. *Reading and Research*

Development Studies

For standard interdepartmental concentration program leading to a Bachelor of Arts degree, sec page 113.

I. FOR UNDERGRADUATES AND GRADUATES

198. *Senior Seminar in Development Studies*

Mr. EVANS.

An integrative seminar designed for concentrators working on senior projects. Others with comparable backgrounds may enroll with written permission of the instructor. Begins with a review of theoretical and methodological literature on development studies. Also features guest presentations on approaches to development research by development studies faculty. Written and oral presentation of student research projects will be the central focus of the latter part of the course.

RELATED COURSES

AFRO-AMERICAN STUDIES

15. *African History and Society I (Pre-Colonial and Colonial Africa 1450-1957)*

Mr. DZIDZIENYO.

16. *African History and Society, II (Independent Africa 1957-1980)*

Mr. DZIDZIENYO.

103. *Politics and Religion: Contemporary North African Societies*

Ms. FRUZZETTI.

121. *Afro-Brazilians and the Brazilian Polity*

Mr. DZIDZIENYO.

ANTHROPOLOGY

13. *Cultural Ecology and Change* Mr. HEATH.
 104. *Islamic Communities: Culture and Ideology in Asia and North Africa* Ms. FRUZZETTI.
 105. *Development and Change in Small Scale Societies* Mr. ANDERSON.
 112. *Peoples of Latin America* Mr. HEATH.
 115. *The Middle East in Anthropological Perspective* Mr. BEEMAN.
 117. *Peoples and Cultures of India* Ms. FRUZZETTI.
 135. *The Anthropology of Economic Life* The STAFF.
 137. *Impact of Colonialism* Ms. FRUZZETTI.

ECONOMICS

111. *The Price System and Resource Allocation* The STAFF.
 (This course may be counted as part of the major only by concentrators who also take at least one of the other listed economics courses.)
 121. *Money, National Income, and the Price Level* The STAFF.
 (This course may be counted as part of the major only by concentrators who also take at least one of the other listed economics courses.)
 125. *Economic History of the North Atlantic Economy: 1500 to the Present* Mr. MORRIS.
 151. *Economic Development* Mr. BELEZA.
 158. *Comparative Economic Systems* Mr. PUTTERMAN.

HISTORY

90. *Development and Modernization in a Colonial Society: Origins of the Third World in Brazil* Mr. PADDEN.
 118. *European Social History in the Eighteenth and Nineteenth Centuries* Mr. LITCHFIELD.
 121. *The Ethnohistory of European Expansion to the Americas* Mr. PADDEN.
 122. *The Expansion of Europe* Mr. PADDEN.
 127. *National Mexico* Mr. PADDEN.
 143, 144 *China in Revolution, 1800 to the Present* Mr. GREIDER.
 145. *Modern History of Inner Asia* Mr. WIDMER.
 147, 148. *History of Japan* Mr. MCCLAIN.
 149. *Modern Southeast Asia* Mr. WILLIAMS.
 155. *Slave Societies in the English Speaking Caribbean* Mr. JONES.

POLITICAL SCIENCE

121. *Latin American Politics* Mr. WHITING.
 126. *The Political Economy of Development in Latin America* Mr. WHITING.
 128. *Modernization and Political Development* Mr. KAU.
 129. *Chinese Politics and Government* Mr. KAU.
 130. *Comparative Politics of East Asia: Japan, China, and Korea* Mr. KAU.
 135. *Modern African Political Systems* Mr. STULTZ.

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| 145. <i>International Political Economy/North-South Relations</i> | Mr. WHITING. |
| 182K. <i>The State and Public Policy: Brazil and Mexico</i> | Mr. WHITING. |

SOCIOLOGY

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|---|---------------------------------|
| 15. <i>Economic Development and Social Change</i> | Mr. EVANS. |
| 20. <i>Population and Society</i> | Mr. GOLDSHEIDER and Ms. KOBRIN. |
| 120. <i>Population Growth and the Environment</i> | Ms. ANDERSON. |
| 130. <i>Urbanization in World Perspective</i> | Mr. MEYER. |
| 160. <i>Modernization: Comparative Analysis of Developing Countries</i> | Mr. MARSH. |
| 170. <i>Theories of Imperialism and Colonialism</i> | Mr. MORRIS. |
| 187B. <i>Principles of Demography</i> | Mr. GOLDSTEIN. |
| 187D. <i>Industrialization, Democracy, and Dictatorship</i> | Mr. RUESCHEMEYER. |
| 187J. <i>Social Structure and Social Change in Contemporary Brazil</i> | Mr. EVANS. |
| UC124. <i>The breakdown of Democratic Regimes: A Comparative Study of European and Latin American Cases</i> | Mr. STEPHENS. |

Dynamical Systems

The Lefschetz Center for Dynamical Systems was established by Solomon Lefschetz and J. P. LaSalle at Brown University in the Fall of 1964 to carry out a program of research and advanced study in the theory and applications of differential equations, dynamical systems and stochastic processes. Areas of application include theoretical mechanics, economics and biological modelling, control and communication theory, engineering systems, and operations research. Permanent members of the Center serve on Faculties of the Division of Applied Mathematics, the Division of Engineering, the Division of Biomedical Sciences, and the Department of Mathematics. In addition, members of the Center collaborate with scientists in the Department of Economics.

The Center attracts distinguished visiting scientists and promising young scientists from the United States and abroad.

The *Journal of Differential Equations*, published by Academic Press, Inc., is edited within the Center as is the *SIAM Journal on Control and Optimization*. Members of the Center also serve on the editorial board of numerous other journals including: *Journal of Mathematical Analysis and Applications*, *Journal of Nonlinear Analysis, Theory, Methods, and Applications*, *Journal of Mathematical Biology*, *Stochastics*, *Indiana Journal of Mathematics*, *Archive for Rational Mechanics and Analysis*, *Journal of Thermal Stresses*, and *Mathematics and Mechanics*.

Members of the Center have been supported in their research efforts by the Air Force Office of Scientific Research, the United States Army Research Office, the Office of Naval Research, the National Science Foundation and NASA.

The Center was dedicated to the memory of Solomon Lefschetz in August, 1974.

East Asia Language and Area Center

The Center is a multi-disciplinary enterprise designed to support the study of East Asia within the departments of History, Linguistics, Political Science, Religious Studies, Sociology and in Art. Faculty members at Brown, one at the Rhode Island School of Design,

and the Curator of the Chinese collection comprise the professional staff. The Center does not administer degree programs or offer Center courses. In addition to assistance to departments in staffing and curricular planning, the Center invites visiting scholars to an annual series of colloquia. The Charles Sidney Gardner Collection of Chinese materials and the Western language works on Asia are in adjacent areas of the John D. Rockefeller, Jr. Library and are unique resources.

For further information, consult the East Asia Language and Area Center or see, elsewhere in this catalogue, listings of programs and courses offered by the departments affiliated with the Center.

Economics

Professors BECKMANN, BORTS, GROSSMAN, HENDERSON, POOLE, RYDER, SATO, STEIN; Associate Professors FELDMAN, PUTTERMAN; Assistant Professors BERGMAN, COTHREN, HARAF, LEE, MUURINEN, ROB, ROBERDS, RUNKLE, VOHRA, YASUHARA; Visiting Assistant Professors D'AUTUME, DE LECEA, DINOPOULOS, SUSLOW.

UNDERGRADUATE PROGRAMS

The main objective of the undergraduate programs is to develop understanding of why economies perform the way they do—specifically, to explain how society uses scarce resources and distributes the resulting product. The undergraduate courses emphasize both the development of the tools of theoretical and empirical economic analysis and the application of these tools to the study of specific economic phenomena. The economics concentration program does not require mathematics, but some economics courses have mathematical prerequisites and several interdepartmental concentrations involve combinations of courses in economics and mathematics.

Economics Concentration Program: Economics 111 or 113, 121, 122, and at least five other one-hundred level economics courses.

Interdepartmental programs emphasizing development of theoretical and empirical analysis:

Applied Mathematics-Economics: see page 109.

Engineering and Economics: see page 115.

Mathematical Economics: see page 121.

Operations Research-Economics: see page 122.

Interdepartmental programs emphasizing applications of economic analysis:

International Relations: see page 119.

Development Studies: see page 113.

Organizational Behavior: see page 122.

Urban Studies: see page 123.

GRADUATE PROGRAM

The graduate program emphasizes training in economic theory and in the mathematical and statistical tools of economic research. The main objective is to develop skill and judgement in the analysis of economic problems. The program includes advanced courses in economic theory and econometrics, as well as courses that focus on applications of theoretical and empirical analysis.

The primary objective of the program is preparation for the Ph.D degree. The Ph.D. requires two years of course work, followed by supervised research and writing of a doctoral dissertation. The first year involves core courses in microeconomic theory (205, 206) and macroeconomics (207, 208) and courses in quantitative methods (260, 279, 280). Students take written core examinations at the end of the first year. The second year involves six courses in advanced fields of specialization. Many students elect to take additional courses in economics and related subjects, especially mathematics. Work on the dissertation usually takes two additional years, but some students finish sooner. Students working on dissertations participate actively in workshops. After a faculty committee has approved the dissertation, the student takes a final oral examination on the subject of the dissertation. There is no foreign language requirement.

The Department does not have a formal M.A. program. Students can earn the M.A. on the way to the Ph.D. or can receive the M.A. if they choose not to complete the Ph.D. program, but have passed eight courses and the core examination.

I. PRIMARILY FOR UNDERGRADUATES

1. *Elements of Economics*

Messrs. RYDER and RUNKLE.

Economic theory, policy, and institutions examined on an elementary level, with emphasis on their application to current social problems.

71. *Financial Accounting*

Messrs. EPSTEIN and FORSYTHE.

Basic accounting theory and practice. Accounting procedures for various forms of business organizations.

II. FOR UNDERGRADUATES AND GRADUATES

111. *The Price System and Resource Allocation*

Messrs. BERGMAN and VOHRA, and STAFF.

Tools for use in microeconomic analysis, with some public policy applications. Theory of consumer demand, theories of the firm, market behavior, welfare economics, and general equilibrium.

113. *Microeconomics*

Messrs. FELDMAN, ROB, and SATO.

A survey of topics in microeconomics, including theories of the consumer and firm, competitive equilibrium, factor-markets, imperfect competition, investment and capital theory, uncertainty, and welfare economics. May not be taken in addition to 111. Prerequisite: Mathematics 9 or equivalent.

117. *Welfare Economics*

Messrs. FELDMAN and ROB.

A survey of theories of economic optimality. Topics covered include efficiency and competition, externalities, social welfare functions, the Arrow impossibility theorem, theories of the second best, and compensation criteria. Prerequisite: 111 or 113.

121. *Money, National Income, and the Price Level*

Messrs. COTHREN and YASUHARA, and STAFF.

Macro-economic concepts and problems. Theory of national income and price level. The dynamics of inflation. Prerequisite: 111 or 113.

122. *Monetary and Fiscal Policy*

Messrs. HARAF and LEE, and STAFF.

Empirical analysis of consumption, investment, and money demand. Commercial banking, central banking, and the supply of money. Assessment of the performance, potential effectiveness, and limitations of macroeconomic policy. Prerequisite: 121.

125. *Economic History of the North Atlantic Economy: 1500 to The Present*

Mr. MORRIS.

Analysis of the preconditions and consequences of industrialization, examining the significant similarities and differences of British, Continental, and United States development patterns. Prerequisite: 111 or 113.

128. *The History and Philosophical Context of Economic Thought*

Mr. PUTTERMAN.

Evolution and variety of economic thought from Adam Smith to the present. Alternative views on the proper focus of "economics." Methodology and epistemology of economics as a social science. Relations to Western social and political philosophy and ideas on property, justice, and liberty. Prerequisite: 111, 113 or written permission.

132. *Labor Economics*

Mr. LEE.

The supply and demand for labor services; human capital theory; unemployment; effects of unions on wages and unemployment; the distribution of income; the economics of discrimination. Prerequisite: 111 or 113.

134. *Energy and Resource Economics*

Mr. ROBERDS.

Analysis of the extraction of renewable and nonrenewable resources, applied to energy markets and to fishery and forest management. Prerequisite: 111 or 113.

135. *Environmental Economics*

The problem of achieving an efficient allocation of resources when externalities are present. Examination and comparison of policy instruments such as taxes, standards, subsidies and assignment of property rights. Application to the study of environmental quality and common property resources. Prerequisite: 111 or 113.

136. *Health Economics*

Ms. MUURINEN.

Analysis of market behavior, institutions, and public policy in the provision of health services. Prerequisite: 111 or 113.

141. *Urban Economics*

Mr. HENDERSON.

Analysis of the growth of metropolitan areas with special emphasis on the spatial distribution of population and employment within such areas. Urban problems and associated policy issues: congestion, pollution, poverty, housing, governmental structure, and the fiscal crisis of local government. Prerequisite: 111 or 113.

142. *Topics in Urban Economic Policy* (Urban Studies 142)

Mr. HENDERSON.

Analysis of public policy relating to the urban economy: housing, poverty, environment, revenue sharing and taxation. Emphasis on examination of relevant data. Prerequisite: 111 or 113.

143. *Fiscal Federalism*

Mr. DE LECEA.

The interaction between the public sector and regional economic development. Prerequisite: 111 or 113.

145. *The Economics of Regulation*

Mr. BORTS.

The theory and practice of regulation. Emphasis on the regulation of natural monopolies like electrical utilities. Prerequisite: 111 or 113.

146. *Industrial Organization*

Ms. SUSLOW.

The structure and performance of industries. Standards for economic efficiency. Particular attention to antitrust policy, the patent system, and technological change. Prerequisite: 111 or 113.

147. *Capital Markets*

Mr. BERGMAN.

The function and operation of capital markets; the determinants of the prices of stocks, bonds, options, and futures; the relations between risk, return, and investment management; the capital asset pricing model, normative portfolio management, and market effi-

ciency. Prerequisite: 111 or 113. Applied Mathematics 165 and Mathematics 9, 10 also recommended.

148. *Public Finance*

Mr. VOHRA.

An analysis of the role of government in the allocation of resources. Topics covered include a review of welfare economics, problems of social change, the evaluation of public expenditures and taxation. Prerequisite: 111 or 113.

149. *Corporate Finance*

Mr. YASUHARA.

Models of corporate financial management including the net present value rule of corporate finance under certainty and the capital asset pricing model valuation of risky assets. The efficient market hypotheses, capital budgeting, capital structure and dividend policies, agency costs of debt issues, corporate capital structure, and the effect of inflation on corporate finance. Prerequisite: 111 or 113. Applied Mathematics 165 and Mathematics 9, 10 also recommended.

151. *Economic Development*

Mr. DINOPOULOS.

A study of economic growth and emphasis on the roles which agriculture, industry, and foreign trade play in economic development. Government policy making including social discount rates, investment criteria, choice of techniques and financing methods. Prerequisite: 121.

154. *International Trade*.

Mr. DINOPOULOS.

The determinants of the pattern of international trade and comparative advantage, tariffs and other trade restrictions, the gains from trade, trade and growth, the costs and benefits of international borrowing and lending, and the multinational corporation. Prerequisite: 111 or 113.

155. *International Finance*

Mr. BORTS.

The balance of payments; identification and measurement of surpluses and deficits; international monetary standards; the role of gold and paper money; government policies; free versus fixed exchange rates; international capital movements; war and inflation; the International Monetary Fund. Prerequisite: 121.

156. *Monetary History of the United States*

Mr. STEIN.

Use of aggregative economic theory to explain the major monetary disturbances that have occurred during the past century. Prerequisite: 121.

158. *Comparative Economic Systems*

MESSRS. DE LECEA and PUTTERMAN.

Recent histories, institutional structures, and performance of industrialized economies. Prerequisites: 111 or 113 and one other 100-level economics course.

161. *Managerial Economics*

Mr. BECKMANN.

Analysis for making policy decisions within a firm. Goals of the firm, analytical methods for optimizing under constraints. Production decisions, pricing strategies, and investment plans. Advertising, diversification, and research and development. Effect of non-market constraints, governmental and self-imposed. Treatment of risk and uncertainty. Prerequisites: 111 or 113 and Mathematics 7 or 9.

163. *Econometrics I*

Mr. COTHREN and STAFF.

An examination of the mathematical and statistical procedures required for the testing of economic hypotheses. Prerequisite: Applied Mathematics 165.

164. *Econometrics II*

Mr. COTHREN.

165. *Rank in Organizations*

Mr. BECKMANN.

Problems of hierarchical forms of organization typical of business, educational, and military organizations. Particular attention to information, personnel allocation, span of control, career patterns, salary structures, efficiency of operation, and the implications for the economic theory of the firm. Prerequisites: 111 or 113 and Mathematics 7 or 9.

170. *Economics of Technological Change*

Mr. SATO.

Study of technological change as a socio-economic process illuminating the history of industrial society. Analysis of factors in the rate and direction of technological change and diffusion. Estimation of productivity change in exogenous and endogenous models of technical change. Study of the impact of technical change on production technology. Prerequisites: 111 or 113 and Mathematics 7, 9 or equivalent.

175. *Location Theory*

Mr. BECKMANN.

Examines the spatial side of economic activities: Interaction at a distance; market and supply areas; spatial price policy; relocation, entry and exit; facility location; localized and dispersed industries; agricultural and urban land use; central places; spatial equilibrium. Prerequisite: 111 or 113.

181. *Advanced Economic Theory and Applications*

Mr. D'AUTUME.

Topics in the capital theory and aggregative economic growth and fluctuations. Prerequisites: 121 and Mathematics 7 or 9.

186. *Mathematical Economics*

Mr. FELDMAN.

A study of the principal mathematical techniques in economic analysis. Theory of cost and production, consumer demand, introduction to linear programming. Prerequisites: 121 and Mathematics 29 and 52 or Applied Mathematics 33, 34.

II. PRIMARILY FOR GRADUATES**205. *Theory of Price I***

Mr. SATO.

A systematic examination of the foundations of contemporary microeconomic analysis. Consumer theory, the Slutsky equation, revealed preference, utility under risk, theory of the firm, activity analysis, production functions, costs, market structures, monopoly and duopoly.

206. *The Theory of Price II*

Mr. FELDMAN.

General equilibrium theory, efficiency, cost-benefit analysis. Collective choice rules, Arrow's Theorem.

207. *Employment and Inflation I*

Messrs. COTHREN and RUNKLE.

Analysis of fluctuations in economic aggregates, including inflation, unemployment and rates of return on capital and financial assets. Study of macroeconomic models incorporating non-market-clearing, incomplete information, rational expectations, and risk-shifting arrangements.

208. *Employment and Inflation II*

Messrs. HARAF and LEE.

Problems in the formulation and estimation of stochastic macroeconomic models. Emphasis on expectations and information, monetary and fiscal policy, and theories of consumption and investment.

210. *Aggregative Economic Growth*

Mr. STEIN.

Monetary and fiscal policies in a growing economy with an endogenous capital stock. Keynesian, Monetarist and Neoclassical models of the dynamics of unemployment and inflation.

212. *Monetary Economics*

Mr. POOLE.

Term structure of interest rates, inflation expectations, portfolio theory, indexation, money supply, money demand.

213. *Advanced Topics in Macroeconomics*

Mr. GROSSMAN.

Recent developments in the analysis of macroeconomic fluctuations: equilibrium vs. non-market-clearing models, rational expectations, positive analysis of monetary policy, real vs. monetary models, consumption behavior, econometric strategies.

215. *Speculative Markets* Mr. STEIN.
Analysis of futures markets in commodities, foreign exchange, and financial instruments. Hedging and speculative behavior, dynamics of spot and futures prices, stochastic properties and informational content of futures prices, evaluation of market performance in terms of social welfare criteria.
216. *Risk, Uncertainty, and Information* Mr. ROB.
Theory of resource allocation under incomplete information.
217. *Welfare Economics* Mr. FELDMAN.
General equilibrium, the core, non-tatonnement process, theorems of welfare economics. Externalities, public goods, social choice theory, strategic behavior.
219. *Public Finance* Mr. VOHRA.
Role of government in the allocation of resources; criteria for public expenditure; incidence and economic effects of taxation; sources of demand for public goods; impact of government on the private sector.
220. *Public Finance in the Urban Sector* Mr. HENDERSON.
The theory of local public finance: multiple jurisdiction models, community development models, externalities, fiscal federalism, impact of the property tax, and models of capitalization.
232. *Labor Economics*
Theory and empirical analysis of labor markets; job search theories; dynamics of labor demand; job matching, equilibrium theories of unemployment.
236. *Health Economics* Ms. MUURINEN.
241. *Urban Economics* Mr. HENDERSON.
Models of location and pricing in a spatial context; the internal structure of cities; systems of cities and city size, urban development and economic growth, housing economics and land markets; and transportation economics.
244. *Continuous Time Models in Financial Economics* Mr. BERGMAN.
Option pricing model, intertemporal consumption-investment optimization, demand for risky securities, theory of the term structure of interest rates. An introduction to stochastic calculus.
247. *Industrial Organization and Market Structure*
Theoretical and empirical descriptions of markets; applications to welfare analysis; innovations, research and development, and the patent system; implications for government regulation of business.
249. *Corporate Finance and Financial Markets* Mr. YASUHARA.
Utility theory under uncertainty; state-preference model of financial markets; the capital-asset-pricing model, the market model, and the arbitrage-pricing model of financial markets; corporate investment decisions under uncertainty; corporate capital structure; agency-cost theory of financial contracting; life-cycle consumption and portfolio decisions under uncertainty.
251. *Economic Development* Mr. PUTTERMAN.
Growth within the framework of the developing economies; the role of the agricultural, industrial and international sectors; government policy planning and investment criteria.
257. *Theory of International Finance* Mr. BORTS.
The balance of payments and its adjustment under different currency standards, exchange rate determination; capital movements.

258. *Theory of International Trade*

Mr. DINOPOULOS.

International specialization under trade, determination of prices and wages; welfare aspects of trade; tariffs and quotas.

260. *Econometric Methods*

Mr. HARAF and ROBERDS.

Applications of mathematical statistics in economics. The nature of economic observations, cross-section and time series analysis, the analysis of variance and regression analysis, problems of estimation.

263. *Econometric Theory I*

Mr. ROBERDS.

Review of OLS and GLS techniques using matrix notation. Introduction to large-sample econometrics, emphasizing both instrumental variables and maximum likelihood techniques.

264. *Econometric Theory II*

Mr. ROBERDS.

Further study of large sample econometrics, including "generalized methods of moments" and "forward-filtered least squares" estimators. Topics in time series, including estimation of rational expectations models.

266. *Macroeconometrics*

Mr. RUNKLE.

Application of econometric methods to analysis of macroeconomic data and testing of macroeconomic models.

279, 280. *Mathematics for Economics*

Messrs. BECKMANN, ROB, and RYDER.

Techniques of mathematical analysis useful in economic theory and econometrics. Linear algebra, constrained maximization, difference and differential equations, calculus of variations.

281. *Technical Change*

Mr. SATO.

Theory and estimation of production functions. Classification of technical change. Models of endogenous technical change. Applications of Lie Group methods: conservation laws, estimation of productivity growth, invariance properties of dynamic systems, index numbers.

283. *Economic Growth and Fluctuations*

Messrs. RYDER and D'AUTUME.

Capital theory, dynamic optimization, disequilibrium economics, and related topics.

295. *Microeconomics Workshop*

Mr. STEIN.

296. *Macroeconomics Workshop*

Mr. GROSSMAN.

Education

Professors ARCHAMBAULT (Chairman), ESCHENBACHER; Assistant Professors ANDERSON, DAILEY, O'BRIEN.

The Education Department offers two programs for undergraduate students: the concentration in Educational Studies and the Undergraduate Teaching Education Program. At the graduate level the Department offers the Master of Arts in Teaching program, which prepares liberal arts college graduates to teach in secondary schools. In addition, the Department offers a variety of courses in the foundations of education to meet the general needs and interests of students at the University.

UNDERGRADUATE PROGRAM

CONCENTRATION. The program of Concentration in Educational Studies is designed to provide the concentrator with a broad knowledge of education through the study of the foundations of the field: history, philosophy, psychology, and sociology of education; to provide a deeper knowledge of educational theory by intensive study in one discipline, and to develop analytic and interpretive skills in a disciplined investigation of educational issues. Each concentrator, therefore, is required to specialize in one of the four foundations areas.

Ten courses to be elected in the following categories:

- a. Eight courses in Education elected from offerings in the history, philosophy, psychology and sociology of education.
 - (1) Of these, at least one course must be elected, from regular Departmental offerings, in each of the above areas.¹
 - (2) Two additional courses in the one selected area of specialization. Of these one must be a seminar, an independent study course, or an upper level course approved for this purpose by the advisor. With the approval of the Department, permission may be granted to elect one of these courses from the offerings of a department other than Education.
 - (3) One additional course, drawn from the regular offerings of the Department, in a foundation area outside the specialized area of concentration.
 - (4) A culminating independent study course in the area of specialization, supervised by a member of the Education Department, normally the specialist in the field chosen for concentration. One of the requirements of the course is a final research paper, that paper to be read by the supervisor and one additional member of the Department chosen by the supervisor.
- b. Two extra-Departmental courses in the discipline selected for specialization or in a closely related field.

Preparation for Teaching. Preparation for public secondary school teaching requires: (1) a background of broad general education, (2) specialization in one or more subjects in which the teaching is to be done, and (3) study in the field of education. It is possible for students to complete full licensing requirements for public school teaching on the undergraduate level, provided they plan their course program with the approval of the Education Department at Brown, preferably prior to registration for the sophomore year. Minimum undergraduate preparation in the field of education includes: Education 105; 106; 107, 108; and appropriate electives chosen in consultation with Education Department Staff.

State Certification. In most states certificates are required of all teachers in schools supported in whole or in part by public money. To secure certificates college graduates must have credit for subjects covered by courses in educational foundations, Education 106, 105, and a number of other courses, including practice teaching. Due credit toward certificates is given for separate courses. Those who seek to meet the requirements for the various states should consult the Department. All teacher education programs offered by the University have been approved by the Interstate Certification Compact.

GRADUATE PROGRAMS

The courses offered for graduate students are intended to serve as a basic professional preparation for prospective teachers. The efforts of the Department are directed toward providing courses of study for candidates for the degree of Master of Arts in Teaching (described on page 363).

¹ The Psychology of Teaching (Education 105) will not be accepted for credit toward the concentration, except when the concentrator is enrolled in the Undergraduate Teacher Education Program.

A detailed description of the requirements for the Master of Arts in Teaching degree, and of procedures for applying for candidacy are available from the Office of the Graduate School.

I. FOR UNDERGRADUATES AND GRADUATES

102. *History of Education*

Mr. ESCHENBACHER.

A study of the historical background of modern education, elementary, secondary, and higher; the relation of education to other historical developments; emphasis on the modern period and the evolution of present-day American educational institutions.

103. *The Literature of Educational Reform*

Mr. ESCHENBACHER.

A study of the principal literature seeking change in American educational agencies from 1850. The emphasis is on the twentieth century, particularly stressing contemporary reform movements as a reflection of broader social change. A discussion-lecture course. A research paper, a final examination, and occasional short papers are required.

104. *Comparative Education*

Mr. ESCHENBACHER.

A comparison of national systems of education, with an emphasis on contemporary developments. The educational systems of the United States, England, and the Soviet Union will be considered.

105. *The Psychology of Teaching*

Mr. SHAW.

Develops theoretical analysis through small group classroom activities and observational activities in local high schools. The foci include a study of adolescent behavior and principles of classroom instruction. Required of and restricted to students seeking secondary school teaching certification through the Undergraduate Teacher Education Program. Ordinarily elected in Semester II of the junior year.

106. *Methods of Teaching*

Restricted to students seeking a secondary school teaching certificate through the Undergraduate Teacher Education Program. Prerequisite: Education 105. Ordinarily elected in Semester I of the senior year. Written permission required.

Sections:

1. English.

Mr. ANDERSON.

2. Social Studies.

Ms. O'BRIEN.

3. Mathematics.

The STAFF.

4. Science.

The STAFF.

5. Foreign Languages and Classics.

The STAFF.

107. *Practice Teaching*

Provides not less than 180 clock-hours of practice teaching and observation, equivalent to 6 semester hours of credit in institutions operating on a semester hour basis, and fulfills the supervised student teaching requirement for secondary certification in most states. Prerequisite: Education 106. Ordinarily open to seniors only. Written permission required.

Sections:

1. English.

Mr. ANDERSON.

2. Social Studies.

Ms. O'BRIEN.

3. Mathematics.

The STAFF.

4. Sciences.

The STAFF.

5. Foreign Languages and Classics

The STAFF.

108. *Analysis of Teaching*

A critical analysis of the activity of teaching, required to be elected concurrently by those students taking Education 107, Practice Teaching. The course emphasizes the analysis of teaching experience from several theoretical perspectives. Cannot be elected independently of Education 107. Written permission required.

Sections:

- | | |
|------------------------------------|---------------|
| 1. English. | Mr. ANDERSON. |
| 2. Social Studies. | Ms. O'BRIEN. |
| 3. Mathematics. | The STAFF. |
| 4. Sciences. | The STAFF. |
| 5. Foreign Languages and Classics. | The STAFF. |

109. *Education and Psychology* Mr. SHAW.

The course will examine the relationships between educational research and current issues in educational practice. Students are required to tutor a student or a group of students in a local school.

121. *The Sociology of Learning* (Sociology 121) Ms. DAILEY.

A sociological analysis of schools as institutions with socially defined roles, purposes, and behaviors. Considered also are the relationships among the social organizations of schools, socioeconomic status of students, innovation, normative academic climate, and achievement.

156. *Philosophy of Education* (Philosophy 156, Foundations F98) Mr. ARCHAMBAULT.

A critical examination of the major conceptions of education from Plato to Dewey. Special attention will be given to the philosophical principles underlying these conceptions.

157. *Philosophical Analysis of Educational Concepts* (Philosophy 157)

Mr. ARCHAMBAULT.

Analysis of certain concepts central to educational theory, including ways of knowing, modes of valuing, and methods of analysis. Specific problems include the definition and description of aims, the relation between means and ends, subject matter, moral education, and curriculum.

161. *The Sociology of Education* (Sociology 161) Ms. DAILEY.

A sociological analysis of the relationship between educational institutions and the social stratification of American society. Will focus on race and sex differences in educational and occupational attainment.

163. *Education and Equality of Opportunity* (Sociology 163) Ms. DAILEY.

A critical assessment of the relationship between schooling and equality of opportunity. Various interpretations can be placed upon the positive association between years of schooling and occupational status. In one interpretation, schools are seen as providing the means through which equality of opportunity may occur. In a second interpretation, schools are seen as preserving existing inequalities and legitimizing the present stratification system. Students will review the school effects literature from the 1966 Coleman report to the present and explore the policy implications of proposed reforms.

165. *Political Socialization and Education* (Sociology 165) Ms. DAILEY.

Students will critically review the political socialization literature and analyze the processes behind the positive association between educational attainment and politicization. The relative influences of parental socioeconomic status, school-based variables (e.g. curricular track, academic performance, extra-curricular activities, and years of schooling), and occupational plans on political attitudes, values and behaviors will be assessed. Race, sex, and class differences in political outcomes will be explored in relationship to school socialization patterns.

173. *History of Higher Education in the United States*

Mr. ESCHENBACHER.

An examination of the development of American Higher education as an expression of social change in the United States; topics include the European background and the Colonial experience, the Revolution and the early national period, the classical college, the land-grant college movement, the rise of the university, and contemporary problems.

III. PRIMARILY FOR GRADUATES

205. *The Psychology of Teaching*

Mr. SHAW.

Develops a theory of instruction through class discussions and activities in the Brown Summer High School. Required of students in the Master of Arts in Teaching program; available to undergraduates by special permission only. Offered in the summer only.

206. *Methods of Teaching*

Develops a theoretical understanding of the rationale for and approaches to the teaching of a specific discipline. Required of and restricted to students in the Master of Arts in Teaching program. Offered in the summer only.

Sections.

1. English.

Mr. ANDERSON.

2. Social Studies.

Ms. O'BRIEN.

207. *Practice Teaching Apprenticeship*

Apprentices teach and observe for the equivalent of three periods per day for the semester under the direction of appointed supervising teachers in the schools and University supervisors. The apprenticeship provides for at least 180 clock hours of practice teaching, equivalent to 6 semester hours of credit, and fulfills requirements for practice teaching of most state boards of education. This course also includes conferences with supervising teachers in the schools and consultations and group meetings with University supervisors. Offered for students in the Master of Arts in Teaching program.

Sections:

1. English.

Mr. ANDERSON.

2. Social Studies.

Ms. O'BRIEN.

210. *Practice Teaching Internship*

The STAFF.

Interns are expected to assume responsibility for equivalent of a full-time teacher's duties for a school semester under the direction of appointed supervising teachers in the schools and University supervisors. The internship provides for at least 360 clock hours of practice teaching, equivalent to 12 semester hours of credit, and fulfills requirements for practice teaching of most state boards of education. This course also includes conferences with supervising teachers in the schools and consultations and group meetings with University supervisors. Offered for students in the Master of Arts Teaching program.

216. *Problems in Education, Thesis Course*217, 218. *Case Studies in Education*

The STAFF.

For students prepared for the investigation of major problems in education: critical evaluation of current contributions in this field.

Egyptology

Professor LESKO (Chairman); Assistant Professor CRUZ-URIBE

The Department is concerned with the study of the language, history, religion, and culture of Ancient Egypt from the earliest period of human life in the Nile valley up to the Islamic conquest.

UNDERGRADUATE PROGRAM

The Department has a number of courses open to undergraduates, and a concentration in the field of Egyptology for the Bachelor of Arts degree is available through the Program in Ancient Studies.

GRADUATE PROGRAM

A competent reading knowledge of both German and French is recommended before admission as a graduate student and an examination in German must be taken by graduate students in their first year. Graduate programs leading to the M.A. and Ph.D. degrees are not rigidly formulated; they are arranged with regard to each student's needs, interests, and previous training.

I. FOR UNDERGRADUATES AND GRADUATES

131, 132. *Middle Egyptian*

An Introduction to Egyptian Hieroglyphs and the Classical Stage of the ancient Egyptian language.

131A. *Selections from Middle Egyptian Hieratic Texts*

Prerequisite: 131, 132.

132A. *Selections from Middle Egyptian Hieratic Texts*

Prerequisite: 131, 132.

143, 144. *History of Egypt*

143A. *Ancient Egyptian Literature*

143B. *Egyptian Religious Literature*

II. PRIMARILY FOR GRADUATES

241. *Late Egyptian Grammar*

Prerequisite: 131, 132.

281. *Old Egyptian Grammar*

Prerequisite: 131, 132.

Energy Studies

EXECUTIVE COMMITTEE

C. ELBAUM, *Professor of Physics*; M. GLICKSMAN, *Provost, ex officio*; B. HAZELTINE, *Professor of Engineering*; J. KESTIN, *Professor of Engineering & Center Director*; J. J. LOFERSKI, *Associate Dean, Professor of Engineering*; P. F. MAEDER, *Professor of Engineering*; W. RISEN, *Professor of Chemistry*; G. SEIDEL, *Professor of Physics*; A. WOLD, *Professor of Chemistry*

The Center for Energy Studies was created in October 1976; it consists of affiliated faculty members from several departments who represent different disciplines and form its Executive Committee. The Center does not have its own faculty, but it has instituted two degree programs, one of which leads to the Sc.B. degree and the other, to the A.B. degree. In addition, the Center promotes specialized and interdisciplinary research in the broad field of energy, as well as the creation of departmental energy concentrations; the first such departmental program has been created in the Division of Engineering.

The Center organizes lectures and seminars on energy-related topics for faculty, students and the community at large, and maintains contact with the news media to promote public understanding of energy-related problems. The lectures are co-sponsored by the Rhode Island Energy Coordinating Council and Providence College.

The largest research programs operated by the Center include solar energy and geothermal energy conversion.

Engineering

Professors ASARO, AVERY, CASWELL, CLARKE, CLIFTON, COOPER, DAFERMOS, DOBINS, DUFFY, FREUND, GLICKSMAN, GURLAND, HAZELTINE, HELLER, KARLSSON, KORNHAUSER, LIU, LOFERSKI, MAEDER, MASON, MORSE, NEEDLEMAN, NURMIKKO, PEARSON, RICHARDSON, RICHMAN, SIBULKIN, SILVERMAN, TAUC, WEINER, WOLOVICH; Professors (Research) FINDLEY, KESTIN, KOLSKY, SYMONDS; Visiting Professor STUART; Adjunct Professor WHITE; Associate Professors CALO, DANIELS, SHIH; Assistant Professors AREF, BULTERMAN, JAMES, LAWANDY, LEHNER, PINSKY, ROSENBERG, SURESH, SUUBERG; Lecturer PATTERSON; Senior Research Engineers: Messrs. COMETTA (Executive Officer), CRISMAN, HAWLEY, HERMANN, KERSHAW; Research Engineers: Messrs. BULL, KIRST.

The Brown University Engineering Curriculum emphasizes an in-depth understanding of the fundamentals of physical science, mathematics, and engineering science which underlie technical work in all fields of engineering. The Curriculum consists of a common five semester program, called the common core program, required of all Sc.B. candidates in Engineering, and upper level programs in the areas of engineering specialization. The common first year of the core program includes instruction in physical sciences, chemistry, mathematics and computation. The remainder of the common core program includes courses in materials science, electronics and digital systems, mechanics of deformable bodies, thermodynamics, electricity and magnetism, optics, and applied mathematics. The emphasis on fundamentals provides preparation for dealing with the rapid pace of technological change and with the interdisciplinary demands of modern engineering design and analysis. In addition, a broad exposure to the engineering sciences prior to selection of an area of specialization enables a student to make a well-informed choice of the branch of engineering in which he or she wishes to specialize. Degree programs accredited by the Accreditation Board for Engineering and Technology are offered in Biomedical, Civil, Electrical, Materials, and Mechanical Engineering. A program in Chemical Engineering is also now being offered.

The Division of Engineering offers courses of graduate study leading to the degrees of Master of Science and Doctor of Philosophy. These programs are available in the general fields of electrical sciences; fluid mechanics, thermodynamics, and chemical processes; materials science; and the mechanics of solids and structures. In addition, there are joint programs with the Division of Applied Mathematics and the Division of Biomedical Sci-

ences. Interdepartmental programs are easily arranged with the departments of Chemistry, Geology, and Physics. Well equipped laboratories are available for both research and instruction in each of the above fields. The Prince Engineering Laboratory houses many of the experimental facilities, including subsonic wind tunnels, a stratified flow wind tunnel, a small supersonic wind tunnel, shock tube facilities, equipment for hot wire anemometry, and Doppler laser velocimetry equipment; a radiation laboratory containing a Van de Graaff accelerator, a fluid-thermodynamics laboratory, a chemical engineering laboratory, and part of the laboratories of Applied Mechanics. The latter include facilities for studies of stress wave propagation and impact phenomena, general stress analysis, creep of metals and plastics, fatigue and fracture of solids, and soil mechanics. Facilities for work in materials science include laboratories for materials preparation, x-ray diffraction, transmission and scanning electron microscopy, field ion microscopy, optical and infrared spectroscopy, and electron microprobe analysis. There is also a microelectronics facility, and laboratories for quantum electronics, microwave and millimeter wave propagation, and antiferromagnetic resonance. The computer engineering laboratory is dedicated to undergraduate and graduate research on advanced computer architectures, computer vision, automatic speech recognition, digital control systems, computer graphics, and digital signal processing. The Division of Engineering maintains two VAX11/780 digital computers, one dedicated to research in computational mechanics, and the other to research in computer engineering and digital systems. Library facilities are provided by the Sciences Library which contains an outstanding collection of books and periodicals in mathematics, physics, engineering, geology, biology and chemistry.

The Barus and Holley Building houses both the Division of Engineering and the Department of Physics. The building contains additional engineering laboratories as well as offices for professors and graduate students.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE DEGREE

Candidates for the Sc.B. degree are expected to complete successfully the eight courses Engineering 3, 4, 10, 41, 51, 52, 72, and either 31 or 81. Also, they must complete successfully the five courses Chemistry 3 (or 7), Mathematics 17, 18 and Applied Mathematics 33A, 34A (or comparable courses in Mathematics). For students entering without one year of preparation in calculus at the secondary school level, Mathematics 9, 10 is recommended instead of Mathematics 17, 18. In addition, they must complete successfully a minimum of four courses in the humanities and/or social sciences.

The concentration is completed by passing a coherent set of eight courses in one of the specialized areas of Engineering. One of these eight courses must be an advanced science course. Also, one of the eight courses must be selected from among the group of courses devoted exclusively to engineering design and identified by the word "design" in the course title. At least five of the eight upper level courses required to complete the concentration must be 100-level Engineering courses. The program of each student must be approved by the Engineering Concentration Committee which issues more detailed guidelines and program suggestions.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

Candidates for the degree of Bachelor of Arts with concentration in Engineering should complete at least eight Engineering courses, including Engineering 3, 4 and 10 plus two 100-level courses, one of them a design course. The sequential nature of Engineering courses requires that the remaining Engineering courses be chosen to prepare the student for the 100-level courses selected. The program should be developed through consultation with an Engineering faculty advisor and it will be subject to approval by the Engineer-

ing Concentration Committee. The program should also include a course in basic chemistry (e.g., Chemistry 3 or 7) and mathematical preparation equivalent to Applied Mathematics 33A and 34A.

PROGRAM FOR COMBINED DEGREES OF BACHELOR OF SCIENCE, CONCENTRATION IN ENGINEERING, AND BACHELOR OF ARTS.

Students who wish to combine the study of mathematics, physical science and engineering with study in the humanities, arts or social sciences can arrange a five-year program leading to an Sc.B. in Engineering and an A.B. in a nontechnical field. Such a program must meet all requirements for an Sc.B. degree with concentration in Engineering, as well as all requirements for an A.B. degree with concentration in the second, nontechnical field. Normally, the first year courses in such a program would include Engineering 3 and 4 (or 10), and Mathematics 17, 18 (or 9, 10). The other courses usually taken by Sc.B. in Engineering students, Chemistry 3 (or 7) and Engineering 10 (or 4), would be postponed until the second year of study. The program should be developed through consultation with an Engineering faculty advisor to be certain that proper attention is paid to the sequential nature of the Engineering curriculum in postponing various courses in order to spread the customarily four-year Sc.B. in Engineering program over a five-year period.

INTERDEPARTMENTAL CONCENTRATION PROGRAM IN ENGINEERING AND ECONOMICS LEADING TO THE BACHELOR OF ARTS DEGREE.

This program is offered jointly with the Department of Economics, and it is intended for students who want to prepare for positions in management and administration. The first year should be identical to the first year of the Sc.B. in Engineering program. Toward the end of the freshmen year, the student should design the Engineering part of the program to include at least eight Engineering courses. Included among these eight courses would be Engineering 3, 4 and 10 plus two 100-level Engineering courses, one of them a design course. The program should be developed through consultation with an Engineering faculty advisor and is subject to review by the Engineering Concentration Committee. Economics 111 or 113, 121 and 122 are required and a minimum of three additional courses should be selected from among the 100-level Economics courses. The Economics portion of the program should be prepared with the help of an Economics faculty advisor. The remaining Engineering courses must be chosen to satisfy prerequisites for the 100-level courses which are selected. The program should include a course in basic chemistry (e.g., Chemistry 3 or 7) and mathematical preparation equivalent to Applied Mathematics 33A and 34A. Engineering 90 is recommended for this option, in addition to the above required courses.

HONORS.

At the time of graduation, the University grants a degree with Honors to any student whose work in his or her field of concentration has been superior and who has prepared an Honors Thesis of distinction based on independent work. The designation "Honors" is included on the transcript and diploma. Students who have a strong academic record and who wish to be candidates for Honors in Engineering should consult with the Honors supervisor in the Division of Engineering during their junior year. Admission into the Engineering Honors Program will be decided on the basis of a student's academic record and a one-page project proposal. The proposal will be developed in conjunction with an Engineering Faculty member who is willing to supervise the experimental or analytical project. A written thesis and an oral examination based on the work are required near the end of the senior year. Course credit for work done as an Honors project can be received by concurrently registering for Engineering 195 and/or 196.

INTEGRATED PROGRAM FOR THE DEGREES OF BACHELOR OF SCIENCE (WITH A CONCENTRATION IN ENGINEERING) AND MASTER OF SCIENCE.

Undergraduates in Engineering with high academic standing may enter an integrated program leading to the award of a Master of Science degree at the end of the academic year following receipt of the Bachelor of Science degree. In the integrated program, the students devote part of their senior year to independent study and research which will culminate in a thesis for the Master of Science degree. They will also normally include in their senior year, courses designated as "Primarily for Graduates," in addition to advanced undergraduate courses. During the fifth year, the student in the integrated program can achieve an unusually strong academic program for the Master of Science degree. Work toward the doctorate, for those so inclined and qualified, would be facilitated for those in the program.

The Master of Science in Biomedical Engineering, sponsored jointly by the Division of Engineering and the Division of Biology and Medicine, is an example of such an integrated program but has special requirements as noted below.

GRADUATE PROGRAMS

MASTER OF SCIENCE. All candidates for the Master of Science degree in Engineering must complete eight courses, a thesis, and one academic year of full time residency on campus. The thesis must be sponsored or co-sponsored by a member of the Faculty of the Division of Engineering. Two of the required courses are Applied Mathematics 205, 206 (Mathematical Methods of Applied Science) or their equivalent and no more than two 100-level courses may be used to fulfill the Sc.M. course requirements. Normally, students will be required to complete at least two courses in the Division of Engineering other than Engineering 297, 298 (Special Projects: Reading, Research and Design). Engineering 297, 298 are acceptable but not required for the Sc.M. degree.

Candidates for the Master of Science degree in the integrated program for the Bachelor of Science degree in Engineering and the Master of Science degree in Bioengineering must complete the requirements for the Sc.B. degree in Engineering with concentration in Bioengineering, or have completed an equivalent program elsewhere. The requirements for the Sc.M. degree are (a) satisfactory completion of at least 5 advanced level or graduate courses, (b) 8 course credits, not more than 3 of which are obtained for thesis research, and (c) an acceptable thesis sponsored or co-sponsored by a member of the Faculty of the Division of Engineering.

DOCTOR OF PHILOSOPHY. There are no formal course requirements for the Ph.D. degree. The student with the approval of his or her advisor will devise an appropriate program of study in a major and two minor areas. For a student entering with a Bachelor's degree this will normally result in a program of 12 to 16 courses (not including thesis research). Such a program of study must reflect both the breadth and depth in subject matter commensurate with the objectives of a Doctoral program.

A student is required to pass the Preliminary Examination to establish Candidacy for the Ph.D. degree and is also required to complete a thesis and present an oral defense of the research work. The dissertation must embody the results of original research and significant creative thought and give evidence of high scholarship. A student must register for the equivalent of three years (two years when entering with an Sc.M.) of full time study.

A student's progress is reviewed early in the program of studies. This Progress Review includes an oral examination which usually will be of two hours duration. The recommendation as to whether or not a student will be allowed to continue will be based on an evaluation of the research, achievements in formal course work, and performance in the Progress Review. Since students enter the graduate program with a great diversity of backgrounds, this Review should establish whether or not deficiencies still exist in a stu-

dent's preparation and he or she will be so advised. The subsequent program can then be planned to correct such deficiencies prior to the taking of the Preliminary Examination. Thus, the Progress Review is designed to evaluate the student's progress in his or her field of study and is of a diagnostic nature. A student entering in the fall semester will appear before a Review Committee no later than December 15th of the following year while the progress of a student entering in the spring semester will be reviewed before March 15 of the third semester in residence.

The Preliminary Examination follows the completion of a major portion of the course work, and should be taken by the end of the sixth semester in residence for a student entering with a Bachelor's degree and the fourth semester for a student entering with a Master's degree. The Examination is designed to test the student's knowledge of the major field of study as well as the associated minor subjects. He or she is expected to have a sound grasp not only of the fundamentals of the field but also of the general concepts and techniques in the major area of study. The examination will presume that the student has the knowledge equivalent to one year of advanced study in two minor subjects. Upon passing the Preliminary Examination a student is officially certified by the Faculty of the Division of Engineering as a Candidate for the degree of Doctor of Philosophy in Engineering.

The maximum number of courses that may be transferred is eight and the maximum residence equivalence granted is one year. Students entering from abroad with advanced degrees should establish Sc.M. equivalency at the end of their first year in residence. Forms for this purpose are available from the Registrar's Office.

SPECIAL PROGRAMS. Students may petition the Graduate Committee of the Division if they wish to follow special advanced programs of study. In such a case the petition must have the sponsorship of three faculty members, at least one of whom shall be from the Division of Engineering. When a significant amount of work is taken in another Division or Department, one faculty member from each Division or Department must act as a sponsor. If one of the original sponsors leaves the university, another sponsor will be appointed by the Graduate Representative after consultation with the student and the remaining Advisors.

I. PRIMARILY FOR UNDERGRADUATES

3. *Introduction to Mechanics and Electricity*

The use of vectors in the formulation and solution of physical problems: applications to geometry and kinematics. Principles of statics and mechanical equilibrium. Force systems and applications to the analysis of machines and structures. Concept of potential energy and the principle of virtual work. Pressure in a fluid; hydrostatics. Centroids and center of gravity. The fundamental laws of linear electric circuits; study of switching networks; applications in the design of digital logic circuits using Boolean algebra. Flip flops, registers, sequential and clocked circuits. Analog to digital and digital to analog conversion. Lectures, recitations, and laboratory. Corequisite: Mathematics 17 (or 9).

4. *Dynamics and Vibrations*

Study of the kinematics and dynamics of particles and rigid bodies. Principles of motion of mechanical systems. Concepts of inertia, work, kinetic energy, linear momentum, angular momentum, and impact. Applications to engineering systems, satellite orbits, harmonic vibrations of one and two degree of freedom systems. Lectures, recitations, and laboratory. Prerequisite: 3. Corequisite: Mathematics 18 (or 10).

6. *Introduction to Electronic Circuits and Applications*

Elementary circuit theory. Semiconductor physics. Transistor and vacuum tube characteristics. Graphical analysis of transistor and vacuum tube circuits. Amplifier design,

relaxation oscillators. Feedback principles, multivibrators and digital circuits, amplitude and frequency modulation. Applications to communications, instrumentation and control problems. Lectures and laboratory. Not taken by candidates for the Sc.B. degree with concentration in Engineering.

9. *Management of Industrial and Non-Profit Organizations*

The objective of this course is to give an exposure to the concepts and techniques of management. Topics include marketing, strategy, finance, operations, organizational structure, and human relations. Guest lecturers will describe aspects of actual organizations. Lectures and discussions.

10. *Fundamentals of Engineering Computation*

Introduction to computers and computer programming in a high level language. Design of computer programs, programming techniques, program documentation. Editing, compiling, and executing programs on the Brown computing system. Use of the computer as a problem-solving tool in engineering oriented problems. Implementation of algorithms. Data base management, flow-of-control techniques. Introduction to other programming languages, computer architecture, and special purpose computing packages. Lectures and laboratory. Corequisites: 4, Mathematics 18 (or 10).

13. *Advanced Engineering Laboratory*

Advanced experiments in the areas of electric circuits, electronics, thermodynamics, fluid mechanics, mechanics of solids and structures and materials science. Permission required.

16. *Engineering Design*

Engineering design projects will be executed under the supervision of a faculty member. The projects can be in any of the areas of engineering. Lectures, seminars and individual consultations. Prerequisite: 12 or permission of the instructor.

23. *Surveying*

Theory and practice of plane surveying; use of the tape, level, transit, stadia, and plane table; triangulation and topography. Lectures, field work, and drafting. Recommended for students interested in civil engineering. Hours arranged. Time required, about 10 hours. No course credit.

26. *Mechanical Technology*

Machine shop practice and welding techniques by individual arrangement. The student will learn to fabricate some simple metal objects. Especially recommended for students interested in mechanical engineering and materials engineering. Hours arranged. Time required, about 10 hours. No course credit.

31. *Mechanics of Solids and Structures*

An introduction to the study of the mechanical behavior of materials, and of the analysis of stress and deformation in engineering structures and continuous media. The principal topics are concepts of stress and strain; the elastic, plastic, and time-dependent response of materials in tension and compression; principles of structural analysis and application to simple bar structures, pure bending of beams, beam theory, instability and buckling, torsion of shafts; general three-dimensional states of stress. Mohr's circle; field theory formulation for continuous media, stress concentrations. Lectures, recitations, and laboratory. Prerequisites: 3, 10; Applied Mathematics 34A.

41. *Materials Science*

Relationship between the structure of matter and its physical engineering properties. Topics include atomic structure, the Schrödinger equations, chemical bonding in molecules, crystals, and networks; the electrical and magnetic properties of materials; crystallography and the determination of crystal structure by diffraction; noncrystalline materials such as

glasses and plastics; nature and effect of defects in crystals; mechanical behavior of crystalline matter from the atomistic viewpoint; deformation of materials into useful shapes; cold worked structure and annealing; thermodynamics and phase diagrams of one- and two-component systems, and phase transformations; the relation of microstructure to properties; diffusion and mass transport processes; corrosion, electrochemistry and oxidation. Lectures, recitations, and laboratory. Prerequisites: 3, 4; Chemistry 3 (or 7). Corequisite: Applied Mathematics 33A.

51. *Electricity and Magnetism*

Fundamental laws of electricity and magnetism, and their role in engineering applications. Concepts of charge, current, potential, electric field, magnetic field. Resistance, capacitance and inductance. Electric and magnetic properties of materials. Electromagnetic wave propagation. Lectures, recitation and laboratory. Prerequisites: 3, 4, 10. Corequisite: Applied Mathematics 33A (or equivalent).

52. *Electrical and Optical Systems*

Light; physical and ray optics. Linear circuits and systems described by ordinary differential equations. Transient and sinusoidal steady state response. Application of Fourier analysis and Laplace transforms to circuits. Basic transistor circuits and operational amplifiers. Lectures, recitations and laboratory. Prerequisites: 3, 4, 10. Corequisite: Applied Mathematics 34A (or equivalent).

72. *Thermodynamics*

An introduction to macroscopic thermodynamics and some of its applications. The basic concepts related to equilibrium, and the zeroth, first and second laws for both closed and open systems are presented. The breadth of application of thermodynamics is illustrated by examples, such as analysis of engines, turbines, and other engineering cycles, phase equilibrium and separation processes, chemical reactions, surface phenomena, the behavior of magnetic and dielectric materials. Lectures, recitations and laboratory. Prerequisites: 3, 4, 10. Corequisite: Applied Mathematics 34A.

81. *Fluid Mechanics*

Properties of fluids, dimensional analysis, and model testing. Equation of fluid statics and forces on submerged surfaces. Kinematics of fluid flow in an Eulerian description. Conservation of mass and the continuity equation. Frictionless incompressible flows, Euler's equations, Bernoulli's equation. Euler's momentum theorem and applications to the measurement of thrust, lift, and drag. Steady flow energy equation with applications to pipe flow. Velocity potential and stream function; elementary solutions to Laplace's equation. Vorticity and circulation and their role in lift and drag. Navier-Stokes equation with applications to simple viscous flows. Laminar boundary layers, turbulent flows and boundary layers, flow separation. Steady one-dimensional flow of a compressible fluid; speed of sound, flow with area change, normal shocks. Lectures, laboratory. Prerequisites: 3, 4, 10; Applied Mathematics 34A.

90. *Managerial Decision Making*

Ways of making effective decisions in managerial situations, especially situations with a significant technological component; techniques useful in analyzing such situations; the context of decision making such as manufacturing, transportation, health care, education, etc.; decision analysis; tradeoffs; types of processes; planning and scheduling; technological forecasting; influence on people; management of research and development; financial investment analysis; influence of the government: guest lectures, plant visits, computer simulation; lectures and discussions. Prerequisite: 9 or Mathematics 10.

93. *Technology and Society Course Series*

intended primarily for students in the liberal arts; no scientific or mathematical background is required. See also Engineering 6 and 131.

93B. *Electrical Communication*

The problem of human communication is treated from the engineering point of view and an introduction given to modern communication theory, including such concepts as the definition of information, coding, modulation, noise, and channel capacity. The historical development of communications systems and devices from the telegraph to satellites is evaluated in this light. No mathematical preparation beyond the high school level is required.

93C. *Electrical Energy*

Over the past few decades, the electrical energy consumed in the U.S. has been increasing at such a rate that it doubles in less than a decade. In response to the anticipated demand, electrical utilities are planning and building an ever increasing number of generating stations. These stations are powered either by fossil fuels or by nuclear fuels. The detrimental effects of each of these currently available types of generating stations have become more and more evident. In this course, we shall examine questions like the following: How is the electrical energy used? Could the same final goal be achieved more efficiently by using the fuel differently (e.g., home heating electrically or by fossil fuels)? At current consumption rates, how long will known supplies of fossil fuels and nuclear fuels last? How does a fossil fuel plant (nuclear fuel) work? How can deleterious environmental effects (like thermal pollution, atmospheric pollution) be controlled? How safe are reactors? What is a breeder reactor? What are the prospects for energy from the fusion process? To what extent can solar energy be harnessed?

93D. *An Introduction to Structural Analysis and Design*

This course is designed primarily for students who are not Sc.B. candidates and who are interested in architecture and more generally in the principles of structural design at an introductory level. The course will combine a survey of methods and techniques used in the design and construction of steel and reinforced concrete buildings with a careful formulation of the fundamental mechanical problem. Prerequisite: Mathematics 9, 10 or equivalent.

93E. *Yacht Design*

An introduction to the methods of engineering and scientific analysis by looking in detail at a complex and highly optimized system. No prior technical background is assumed; however, the student should have a good empirical knowledge in the phenomenology of sailing. Topics to be covered will include: (1) The aerodynamics of sails—lift and drag forces, Bernoulli's equation, induced friction and form drag, heeling and driving coefficients, angle of attack, sail camber and aspect ratio, relation of sail cut, battens and tensions to aerodynamic forces. (2) Hull design—the yacht hull as an aerofoil-leeway; side force and drag. Stability and centers of resistance, buoyance and gravity. Resistance-friction, turbulence and wave-induced and heeling drag. Hull speed limits—wetted surface, waterline, length and stability. Tank towing, Froude and Reynolds number, separation of frictional and wave resistance on models. A design project will develop complete lines of a sail boat and calculated data (displacement centers of buoyancy, effort, gravity, prismatic coefficient, wetted surface, sail area, and lateral plane).

93F. *Theory and Design of Sound Reproduction Systems*

This course will deal with the basic engineering considerations involved in the electronic, mechanical, and acoustical aspects of high fidelity audio systems. Amplifier, tuner, loud-speaker, and enclosure design will be discussed along with techniques for measurement of audio component performance. No prerequisites except high school algebra and trigonometry. This course is not taken by candidates for the ScB. degree, concentration in Engineering.

93G. *Immediate Technology*

Is small beautiful? Do developing countries need full scale modern industry or something else—an intermediate technology? These questions will be pursued. Some examples of intermediate technologies are hand-made windmills, or earth dams, or solar ovens, or tri-cycle carriages, or fish ponds and each of these will be discussed. The technologies have been acclaimed, because they are labor intensive, capital saving, use local materials and are simple enough to be understood. After an overview of what has been done with intermediate technology, the course will proceed in two directions simultaneously. On the one hand, each student will design a device or a project, including the economics of its construction. (If feasible, a working model will be constructed.) On the other hand, we will discuss the implications of intermediate technology, both for developing countries and our own society. Seminars, field trips, optional laboratory.

94. *Technology and Society Course Series*

Intended primarily for students in the liberal arts: no scientific or mathematical background is required. See also Engineering 6 and 194D.

94E. *Product Liability: the Engineer, the Lawyer, and the Consumer*

The true nature of strict products liability in tort, negligence and design and/or manufacture, and breach of warranty and how they apply to both the manufacturer and the consumer. The role of the engineer in both the design and manufacture of a product as well as in the analysis of failures and the determination of the presence of defects in design and/or manufacture as proximate causes of failure. The role of the engineer will be examined when acting as an expert for the defendant and also when acting for the plaintiff. The fundamentals of engineering as they apply to each real case studied, but also the nature of the laws of strict liability in tort, negligence, breach of warranty, *res ipsa loquitur*, privity of contract, etc. Students gain first-hand experience in the roles of the judge, the jury, and the attorneys in such cases by visiting actual trials. The aim is to give an understanding of this important problem from both sides—that of the consumer and that of the manufacturer.

94F. *The History of Materials: Technology and Culture*

The utilization and processing of materials is one of the basic activities of man. It has been the means by which he has exerted his control over nature, expressed his artistic sense, and left the artifacts by which ancient history has been reconstructed. In general, society and culture must rest on a technology, and the understanding of that technology, of its demands, and of its conceptual picture of the world is basic to any understanding of the society, its art and its culture. The course will examine the use and processing of materials in the prehistoric and ancient world. The central theme will be the technological evaluation of archaeological evidence; however, the course will draw on and relate to the arts, history, geology, chemistry, metallurgy, and ceramics. An important aspect of the course will be a group project which will draw on both scholarly and laboratory research. Source documents, archaeological evidence, and examination of artifacts will be utilized to define an ancient process. The process will then be reconstructed in the laboratory, and the means and degree of technological control over the process will be investigated. All of this information will then be drawn together to examine the influence of the technology of the culture, its aesthetics, and its conceptualization of the physical world. The course does not presume an extensive background in both the humanities and physical sciences; rather, it seeks to draw on people, materials and techniques from both disciplines. Enrollment limited; open to all students with the permission of the instructor. Two class meetings plus a two-hour lab. per week.

II. FOR UNDERGRADUATES AND GRADUATES

110. *Chemical Engineering Thermodynamics*

The role of thermodynamics in chemical processes. Applications of the first law and conservation of mass to chemical process design and analysis. Thermodynamic properties of pure fluids and mixtures. Estimation of properties from limited data. Phase equilibrium. Chemical Equilibrium. Prerequisite: 72.

111. *Transport Processes*

Diffusivity and the mechanisms of mass transport in binary and multicomponent mixtures. Heat and mass transfer in turbulent flow. Coupled heat and mass transfer. Transport phenomena in packed beds. Applications to separation processes and chemical process equipment. Prerequisite: 110 and 171.

112. *Chemical Reactor Design*

Chemical kinetics, mechanisms, and the reaction rate expression in homogeneous and heterogeneous systems. Basic concepts in homogeneous reactor design and ideal reactor models. Optimization. Temperature and energy effects in chemical reactors. Non-ideal chemical reactor design. Introduction to heterogeneous chemical reactor design. Corequisite: 111.

114. *Chemical Process Design*

Chemical process synthesis, flow charting, and evaluation of alternatives. Process equipment sizing as determined by rate phenomena, economics, and thermodynamic limitations. Introduction to optimization theory and chemical process control. Applications of these principles to case studies. Prerequisite: 112.

121. *Biomechanics*

Foundations. Diffusion and convection. Material properties of bone and muscle. Cardiac mechanics. Circulation: steady and unsteady flow, compliant tubes. Macro- and microrheology of blood. Thrombosis and hemostasis. Respiration and ventilation. Convective transport of solutes swimming. Thermal response and control. Locomotion and flight. Prerequisite: Applied Mathematics 34 or equivalent. Lectures and laboratory.

122. *Neuroengineering*

Analysis of perception and motor control from an engineering point of view. Emphasizing responses of individual neurons, we use differential equations, probability theory, computer analogies, systems analysis and other quantitative tools to understand pattern recognition and control of movement. Examples are studied from visual physiology—contrast, wavelength, stereopsis, saccades, smooth tracking and vestibular reflexes. Term project required. Prerequisites: Applied Mathematics 33. Engineering 52 or written permission.

130. *Structural Analysis*

A unified study of truss, beam, frame, plate, and shell structures. Emphasis on principle of virtual work and numerical methods of elastic structural analysis by matrix stiffness and flexibility methods. Includes calculation of deflections and reactions in beam structures, beam vibrations, and column buckling. Theorems of plastic limit analysis. Plate bending. Membrane stresses and local bending effects in axially symmetric shells. Lectures plus supplementary sessions on computer methods and, occasionally, laboratory experiments. Prerequisite: 31.

131. *Planning and Design of Systems*

The application of tools of operations research to optimization and decision-making using discrete deterministic models. Theory and computational methods of linear programming. Applications to transportation and assignment problems, network analysis and design, critical-path scheduling. Additional topics chosen from dynamic programming,

nonlinear programming, and optimal structural design. Particularly suitable for juniors and seniors in Engineering, Applied Mathematics, and Economics. No prerequisites.

134. *Water Supply and Wastewater Treatment*

An introduction to the unit operations and unit processes of water supply and waste-water treatment. Topics in the distribution and collection of waters; statistical estimates of extreme flow rates and storage requirements, hydraulics of closed and open channels, pipeline networks. Topics in two-phase flow; groundwater flow into wells, sedimentation, and filtrations. Topics in treatment plant design; mixing, residence time distributions, aeration, chlorination, bacteriological and chemical treatment processes. Prerequisite: 81.

136. *Soil Mechanics and Principles of Foundation Engineering*

Classification and identification of geological materials; mechanical and physical properties and methods of testing. Elements of the analysis of stress and strain in rock and soil masses; theories of failure, theory of seepage. Problems of building foundations; consolidation and settlement; stability of earth slopes and embankments. Includes geotechnical laboratory. Prerequisite: 31.

137. *Advanced Engineering Mechanics*

A unified study of the dynamics of particles, rigid bodies, and deformable continua. Topics include generalized coordinates and Lagrange's equations; variational principles; stability of equilibrium; vibrations of discrete systems and of elastic continua, and wave propagation. The concepts are applied to harmonic and non-linear oscillatory motion; orbital mechanics; gyroscopic phenomena; shock and impact, and the stability and vibrations of elastic structures. Prerequisite: 4, 31, Applied Mathematics 34A, or equivalent.

138. *Design of Civil Engineering Structures*

The design and detailing of rolled and built-up steel members; riveted and welded connections. The selection and design of concrete mixes, and the design and detailing of reinforced and prestressed concrete elements. Elastic and plastic design of continuous beams, arches, and plane frames. Emphasis will be placed on modern numerical methods of solving complex structural problems. Limit design methods. A critical analysis of current specification. Prerequisite: 130.

141. *Physical Chemistry of Solids*

Application of physical chemistry and solid state chemistry to the structure and properties of engineering solids as used in solid state devices, ceramics and metallurgy. Topics included are: Equilibrium and free energy of heterogeneous systems, thermodynamics of solutions, chemical kinetics, diffusion, catalysis and corrosion, solid state transformations. Case studies will be taken from industrial practice. Prerequisites: 41, 72.

143. *Experimental Methods of Materials Science*

Theory and practice of modern techniques of structure analysis and materials preparation, such as: quantitative metallography, x-ray diffraction, electron microscopy and diffraction, thermal analysis, calorimetry, crystal growth and purification, and in general the preparation of well characterized materials. Laboratory. Prerequisite: 41.

144. *Design and Application of Engineering Solids*

Application of structure-property relations for mechanical, optical, electrical, and magnetic functions of metals, ceramics, semiconductors, ferrites, and others. Solution of industrial materials problems, particularly processing and failure analysis. A wide range of materials is examined from both the fundamental and practical viewpoints, with emphasis on their use and selection for industrial purposes. The emphasis on particular topics may vary from year to year, but the philosophy of the course is directed toward the use and control of phenomena in materials applications. Lectures plus laboratory. Prerequisite: 41.

146. *Fundamentals of Materials Processing*

Application of the principles of materials science and engineering to various broad categories of materials processing. These consist of such general topics as solidification, crystal growth, sintering, mechanical forming, machining, synthesis of composite materials and strengthening by thermal treatment. Other topics are chosen on the basis of the group's interests, such as joining of materials, purification and refining, and diffusion doping of semiconductor materials. The basic phenomena of transport processes, plastic deformation, viscous flow, fracture, interfacial reactions, transformation kinetics, and residual stress will be discussed in connection with their applications to engineering practice. The general approach will be that of a problem-centered course, the aim of which is to give the student a basic understanding of the production processes of the materials components of devices and structures. Prerequisite: 31, 41, 72 or equivalent.

156. *Radiation and Guided Waves*

Maxwell's equations, scalar and vector potentials, the retarded potential solution, waves in free space and material media. Application to problems of transmission lines, waveguide propagation and radiation. Microwave devices, networks, cavities and antennas are treated, with concurrent experimental study in the laboratory. Lectures plus laboratory. Prerequisite: 52.

157. *Linear System Analysis*

Analysis of discrete and continuous electrical signals and systems in both time and frequency domains. Modulation, sampling, spectral analysis, analog and digital filtering. Fourier, Laplace and z-transforms, and the state-space approach. Prerequisite: 52.

158. *Digital Communication Systems*

Sampling theorem. Entropy measure of signal content. Pulse code modulation. Probability theory. Stochastic processes and their use in modeling physical phenomena arising in communication systems. Power spectra, autocorrelation functions, and the propagation of stochastic processes through linear systems. Digital communications over noisy channels. Coding principles. Capacity of a communication channel to transmit information. Communication networks. Prerequisite: 157.

159. *Introduction to Semiconductor Devices*

An introduction to the physics of fundamental electronic processes that underlie the operation of semiconductor devices. Electronic properties of semiconductors and effects at interfaces such as p-n junctions. Schottky barriers and MOS structures are discussed. On this basis a variety of semiconductor devices are analyzed. Prerequisite: 41 and 52.

162. *Analysis and Design of Electronic Circuits*

This course introduces the analysis and design of analog electronic circuits. It begins with the elementary device physics and circuit characteristics of semiconductor diodes, BJT's (bipolar junction transistors) and FET's (field effect transistors). Subsequent material treats the analysis and design of practical circuits using discrete semiconductor devices, the constraints on and techniques for linear integrated circuit (IC's) design, and the use of linear IC's as circuit building blocks. Graphical methods and equivalent linear models are used extensively. Practice with computer analysis programs is required as part of the course. Weekly laboratory sessions which emphasize rigid specification design are an integral part of the course. Topics include: description and analysis of oscilloscopes, device characteristics, single transistor amplifier configurations, parameter and temperature stabilization and/or compensation, multistage amplifiers; power amplifiers; direct coupled amplifiers; computer aided circuit analyses; linear IC design techniques; operational amplifiers; simple active filters; rectification and regulation. Prerequisite: 51, 52, or equivalent.

163. *Digital Electronics Systems Design*

Truth tables. Logic families. Counters. Memory. Timing. Analog switches. A-D conversion. Binary arithmetic. CPU organization. Microprocessors. Microprogramming. Machine intelligence. Each student is issued a kit of 25 integrated circuit chips and he or she is evaluated by his or her performance on a series of lab challenges, including successive approximation A-D converter, and 4-bit multiplier. Permission required.

164. *Design of Computing Systems*

A design method for advanced digital systems is presented and demonstrated through the in-class design of a general purpose computer. Topics include: review of combinational and sequential digital circuit design. Central processor: registers, counters decoders, and similar circuits; arithmetic methods and hardware; bussing schemes and microprogramming. Memory: random and semi-random access, read-only, associative, scratch pad, multiport, addressing schemes, paging. Input/output system: I/O devices, channel controllers, I/O bussing. System coordination; control and interaction of parallel units; interrupt systems. Advance machine concepts. Prerequisite: 163 or written permission.

166. *Automatic Control Systems*

Analysis and design of linear continuous and discrete feedback control systems involving both frequency and time domain methods. Sampled data systems. Root loci, Bode plots, and the Nyquist stability criterion. Sensitivity and error correction in feedback systems. Compensation design techniques. Introduction to nonlinear systems analysis, including the describing function and phase plane techniques. Engineering 157 is recommended.

167. *Energy Conversion*

The first half of the course is devoted to electromechanical energy conversion. The transformation of electric and magnetic energy into mechanical energy is analyzed for both incremental transducers and rotating machines. Various kinds of DC-generators and motors, synchronous machines, especially generators and induction motors are considered. The second half of the course is concerned with conversion of thermal, nuclear, and solar energy into electricity by means other than electromechanical. These include solar energy conversion via the photovoltaic effect, thermoelectric and thermionic conversions and fuel cells. A brief treatment of nuclear reactors is included.

168. *Design of Semiconductor Devices*

Contemporary practice in the design and fabrication of discrete and integrated solid state devices. The realization of basic analog and digital circuit functions in semiconductor silicon is a central theme in a coordinated lecture and laboratory sequence. Topics include microcircuit photolithography; layout and design scaling rules for integrated circuits; and a comprehensive introduction to techniques in semiconductor and thin film process as they apply to large-scale-integrated circuit manufacture. Circuit design examples drawn from silicon and gallium-arsenide IC families, charge-coupled devices, integrated optical devices and structures, and solar cell technology. Topical lectures on design issues and process considerations for circuits of complexity beyond large-scale-integration. Prerequisite: 159 or permission of instructor.

169. *Laser Applications and Modern Optics*

Principles and application of contemporary coherent optical techniques and devices. Topics include interferometric measurements, aspects of modern spectroscopy, holography, detection and modulation of light, optical waveguides and fibers together with other examples from integrated optics and optical communication methods. The course is appropriate also for students outside Engineering with some background in electromagnetic theory and materials science. Lectures and laboratory. Prerequisites: 52 or Physics 47, Engineering 41 or a more advanced materials course (e.g., Engineering 159).

170. Applied Thermodynamics

The principles of thermodynamics are applied to the study of compressible fluid flow. Kinematics and dynamics of turbine and compressor stages are expounded and impulse and reaction stages are characterized. The elementary study introduced in Engineering 72 is expanded to cover in greater depth applications to: compressors, gas turbines, jet engines, rocket engines, steam plants, refrigerators and internal combustion engines. Thermodynamic equilibrium is studied in greater depth and the extremum principles which govern it are introduced. These are applied to chemical and phase equilibria in homogeneous phases, including the law of mass action, fugacity and activity. The Third Law is introduced. Special attention is paid to combustion processes, the calculation of adiabatic flame temperatures and the tabulation of properties for the calculation of chemical and phase equilibria. The concept of relaxation time is introduced. Metastable states are examined. The application to engines is reviewed and chemical processes occurring in them are discussed in greater detail. Prerequisite: 72.

171. Heat and Mass Transfer

Heat Conduction: The general unsteady heat conduction equation with generation; solutions for steady state conduction with and without heat sources; analytic solutions in two and three dimensions for steady and unsteady conduction; numerical solutions for complex geometry or boundary conditions including programming for digital computation. Radiant Heat Transfer: Kirchhoff's Law and the perfect emitter, radiation intensity and surface emissive power, real surface radiation; view factors for black and gray surfaces. Convective Heat Transfer: laminar and turbulent flow heat transfer to a flat plate. Reynolds' Analogy; forced convection inside and outside tubes, natural convection; heat transfer with phase change; heat exchanger designs. Mass Transfer: Reynolds' extended analogy; mass transfer correlations. Lectures plus lab. Prerequisite: 81.

172. Design of Engines and Turbines

Criteria in engine design: efficiency, specific work, speed, power surge capability, pollution. Historical review. Engine cycles. Gas, multiphase engines, 3, 4, and n-process cycles. Cycle refinement by intercooling, reheating, heat exchange, supercharging: effects on efficiency and specific work. Practical realization of engine cycles. Configurational, kinematic, dynamic, fluid-dynamic and materials aspects, with examples from reciprocating and turbine engines. Fluid dynamics in engines: compressibility; unsteady and pulsatile flows; turbulence; lubrication and bearings. Stoichiometry and thermodynamics of combustion. NO_x production. Diffusion flames, detonation. Flames on drops, flameholders, role of A/F ratios. Fuels: chemical and physical characteristics. Fuel supply systems: carburation, fuel injection. Ignition. Integration of engine design. Practical constraints in materials, fabrication of components, assembly, adjustments, maintenance. Legal considerations: patents; performance specifications, pollution control. Lectures, laboratory and design projects with oral and written reports. Prerequisites: 72 and 81.

175. Advanced Mechanics of Solids

Continuum mechanics of solids and its application to the mechanical response of machine and structural elements. Elasticity, plasticity and failure criteria. Elastic stress analysis in torsion, plane stress and plane strain, stress concentrations. Principle of virtual work and variational theorems. Finite-element method of numerical stress analysis and its computational implementation. Thermoelastic effects. Crack problems and fracture mechanics. Inelastic material response, plastic yield criteria and flow rules. Theorems of plastic limit analysis. Lectures plus supplementary session for computational exercises and, occasionally, laboratory experiments. Prerequisite: 31.

176. Machine Design (including Vibrations and Automatic Control)

Design of mechanical devices utilizing techniques developed in Engineering 175 is the primary theme of part of this course. Additional subjects include material failure criteria, vibration of multimass systems, and control systems. Prerequisite: 175, plus 137 and 130, which may be taken concurrently.

177. Design of Thermal Power Plants

The analytic methods used to design and operate thermal power plants are discussed beginning with sources of thermal energy, and the parameters needed to characterize the management of a large power plant, including those required for computer simulation. A critical description is given of engine types, and methods of sizing them are studied. Types of heat-rejection installations are defined, and the impact of existing regulations on their design is outlined. The design characteristics of plant components, such as boilers, nuclear reactors, steam turbines, gas turbines, diesel engines, condensers and cooling towers are studied followed by a discussion of materials of construction and the problems raised by their selection. Power plant design project with oral and written reports. Prerequisites: 170 and 186 or permission of the instructor.

186. Advanced Fluid Mechanics

To give students who want to emphasize Mechanical Engineering a deeper and more thorough grounding in principles and basic applications. Topics include review of the conservation principles; inviscid flow; viscous flow, including lubrication theory; laminar boundary layers; introduction to turbulent flow; wave motions and wave drag. Lectures, assignments, computational projects, laboratory. Prerequisites: 72 and 81.

188. The Atmospheric Environment

Static stability of the atmosphere; adiabatic lapse rates, potential temperature and density. The conservation equations of a fluid in a rotating coordinate system. The geostrophic, hydrostatic, and horizontal flow approximations. Vorticity conservation and advection. Atmospheric radiative processes; the influence of atmospheric aerosols and carbon dioxide. Smoke stack plume rise; rational prediction formulae, influence of atmospheric stability. Air pollutants; chemical and physical properties, irritation and toxicity levels, common sources. Dispersion of air pollutants; the dispersion equation, turbulent dispersion in the atmospheric boundary layer, approximate solutions for the dispersion problem. Prerequisites: 72, 81, or equivalents.

193. Special Topics in Engineering

193B. Combustion Fundamentals

Survey of combustion phenomena. Chemical reactions in gases: heat of reaction, adiabatic flame temperature; reaction kinetics. Thermal and branching-chain explosion theory. The well-stirred reactor. Gas phase diffusion flames; combustion aerodynamics. Premixed gases: laminar flame propagation, flammability limits, minimum ignition energy. Flame holders and gas turbine combustors. Prerequisite: 73 and 81.

194. Special Topics in Engineering

194D. Transportation Systems Analysis

Designed to provide a formulation of some important models for traffic flow in transportation systems. Topics include: Graphical representation of all urban transportation network, flow-dependent and flow-independent travel time, travel cost, determination of travel demands associated with origin-destination pairs of zones, distribution of travelers among the available transportation modes, optimal resource allocation in transportation networks, toll policies, etc. The role of computer algorithms is emphasized, focussing on the models which appear to warrant long-term interest. The course is designed for students in Engineering, Applied Mathematics, and the Social Sciences with interest in the field of transportation. Engineering 131 is recommended. This course is available under the Technology and Society series.

195. 196. *Independent Studies in Engineering*

III. PRIMARILY FOR GRADUATES

Attention is also directed to courses in Applied Mathematics, Chemistry, Mathematics and Physics.

203. *Advanced Dynamics*

Kinematics and dynamics of systems of particles and rigid bodies. Euler's dynamical equations. Lagrange's equations and their integration. Variational principles. Hamilton's principle. Hamilton's equations of motion. Applications are emphasized throughout the course; these may include: orbital mechanics, mechanisms, gyroscopic phenomena, stability of equilibrium, theory of small vibrations. Additional topics include: Canonical transformations and Hamilton-Jacobi theory, wave propagation phenomena, and special relativity.

204. *Mechanics of Structures*

Variational methods and their application in continuum mechanics. Derivation of approximate theories of structures (beams, plates, and shells) by variational methods. Theory of linear elastic vibrations. Elastic stability theory, including the effects of nonconservative forces. Approximation methods based on variational principles (i.e., Ritz and Galerkin methods, including an introduction to the finite element method). Additional topics include: the theory of nonlinear vibrations, random vibrations. Liapunov stability theory, impact loading of structures, aspects of wave propagation theory.

221. *Foundations of Continuum Mechanics* (Applied Mathematics 233)

An introduction to the mathematical foundations of continuum mechanics. Vectors and tensors, properties and basic operations. Kinematics of deformation. Conservation laws, Thermodynamics. Stress. Constitutive equations. Elastic, viscous, and viscoelastic response. Linearization. Simple problems in finite and linear elasticity, and in Navier-Stokes flows. Creep and relaxation in linear viscoelasticity.

222. *Mechanics of Solids*

A unified introduction to the engineering mechanics of elastic, plastic, and time-dependent solid materials and structures, with emphasis on physical aspects of the subject. Stress and equilibrium. Kinematics of deformation, strain, and compatibility. Tensor representation and principal values. Principle of virtual work. Formulation of stress-strain relations in elasticity, plasticity, and viscoelasticity. Uniqueness. Extremum and minimum principles, including energy methods. Representative boundary value problems chosen from bending and torsion of rods, plane strain, plane stress, and plate bending. Introduction to relevant experimental techniques.

224. *Linear Elasticity* (Applied Mathematics 234)

General theorems in linear elasticity. Basic singular solutions. Boussinesq-Papkovich and Galerkin representations. Curvilinear coordinates. Cavity, inclusion, crack, and contact problems. States of plane strain, plane stress, and axial symmetry. Complex variable techniques. Torsion. Thermoelasticity.

225. *Viscoelasticity* (Applied Mathematics 239)

Creep. Stress relaxation. Sinusoidal oscillations. Boltzmann's principle of linear superposition. Memory functions. Relaxation and retardation spectra. Time and temperature dependence. Second order transitions. Experimental determination of linear viscoelastic properties. Relation between molecular structure and macroscopic properties. Volume viscosity. Non-linear behavior.

226. *Stress Waves in Solids* (Applied Mathematics 238)

Elastic wave propagation theory with an introduction to waves in viscoelastic and plastic media. Waves in unbounded media, half spaces, layered media, plates, rods and beams. Solutions to transient problems. Relation of theory to experiment. Stress waves and fracture.

227. *Advanced Elasticity* (Applied Mathematics 235)

Large elastic deformations. Controllable deformations of incompressible materials. Initial stress problems. Elastic stability. Additional topics may include membrane theory, fiber-reinforced materials, second-order elasticity. •

228. *Topics in Continuum Mechanics* (Applied Mathematics 236)

Devoted to one or more advanced topics in continuum mechanics not covered in detail by the regular courses. Examples are: non-linear viscoelastic constitutive equations, strain gradient and micropolar theories of elasticity, coupled mechanical and thermal or electromagnetic phenomena, continuum thermodynamics.

229. *Plasticity* (Applied Mathematics 237)

Theory of the inelastic behavior of materials with negligible time effects. Experimental background for metals and fundamental postulates for plastic stress-strain relations. Variational principles for incremental elastic-plastic problems, uniqueness. Upper and lower bound theorems of limit analysis and shakedown. Slip line theory. Representative problems in structural analysis, metal forming, indentation, strain and stress concentrations at notches, and ductile failure. Additional topics may include soils, and creep and rate sensitive effects in metals.

232. *Experimental Mechanics*

The design and evaluation of experiments in solid mechanics. Consideration of methods for experimental stress analysis, and for the mechanical testing of materials. Topics covered include photoelasticity, creep and relaxation tests, high-speed testing, stress wave propagation, fatigue, and fracture. Techniques, instrumentation, and recording systems for the static and dynamic measurement of mechanical parameters such as forces, displacements, velocities, accelerations, and strains.

233. *Advanced Theory of Structures*

A unified study of truss, beam, plate, and shell structures, with emphasis on static elastic and plastic behavior and structural stability. Geometrical relations. Generalized stresses and equations of equilibrium. Generalized strains and strain rates. Elastic stress-strain relations and representative solutions. Large geometry changes and buckling, imperfection sensitivity. Plastic stress-strain rate relations and limit analysis. Optimal design procedures.

234. *Computational Methods in Structural Mechanics*

Fundamentals of the finite element method of structural analysis. Nodal points, element design, and consistent formulation for assumed functions. Principle of virtual work, formulation of element stiffness and master stiffness matrices. Relation to variational and minimum principles. Linear elastic analysis for static problems; direct and iterative procedures. Non-linear static analysis with piecewise linearization; elastic-plastic behavior, large geometry changes. Time dependent behavior. Dynamic analysis, consistent mass matrix. Eigenvalue problems. Plate and shell structures, hybrid structures. Optimal design procedures, computer aided design, non-linear programming, constrained and unconstrained minimization.

235. *Structural Dynamics*

Response of engineering structures to dynamic loading, including impact, blast, and seismic loading. Elastic, plastic, and viscous behavior of one- and two-dimensional structures are studied by appropriate mechanical approaches, including approximate analytical

methods, numerical techniques, and bound theorems. Experimental and theoretical results are critically examined together.

237. *Topics in Solid and Structural Mechanics*

Devoted to one or more advanced topics in solid and structural mechanics not covered in detail by the regular courses, such as: numerical methods in solid mechanics, theory of optimal design, shell structures and instability, or other topics of interest to the staff or visitors.

238. *Fracture Mechanics*

The mechanics of brittle and ductile fracture in structural materials. Elastic stress fields near cracks, theories of brittle fracture, elastic fracture mechanics. Techniques of stress analysis. Elastic-plastic analysis of crack extension. Plastic instability. Dislocation mechanisms, cleavage, ductile fracture by void growth. Transitional behavior, rate sensitivity, running cracks. Fatigue toughness testing and structural design considerations.

240. *Microscopic Aspects of Inelasticity*

This course attempts to provide insight into the inelastic behavior of solids by the analysis first of idealized atomistic models of single dislocations followed by the study of continuum models with continuous distributions of dislocations. Atomistic models of dislocations: Peierls stress calculations, athermal motion of dislocations, thermally activated motion of defects. Continuous distributions of dislocations: differential geometry preliminaries, use of directors and oriented media, static and dynamic theories.

241. *Materials Science I: Structure and Thermodynamics of Solids*

An introduction to the molecular, crystalline, and microscopic structure of solids. A. Application of quantum mechanics to atomic bonding in molecules, crystals, and non-crystalline materials. Introduction to crystallography and to the molecular structure of non-crystalline solids. Imperfections in crystals. Electronic structure of crystals. Physical properties, including mechanical, electrical, magnetic, and optical behavior of crystals. B. Application of classical thermodynamics to chemical and phase equilibria. Phase diagrams and heterogeneous microstructures in polycrystals and alloys. Thermodynamic properties of solid solutions. Thermodynamic properties of defects and surfaces; the theory of capillarity.

242. *Materials Science II: Control of Microstructure and Properties of Engineering Solids*

A survey of the interrelation of materials processing, microstructure, and resulting physical properties of solids. A. Development of microstructures. Application of statistical mechanics and rate theory to kinetic processes in solids; theory of solid state diffusion, nucleation and growth during phase transformations, precipitation and spinodal reactions, order-disorder transformations, and martensitic reactions. Growth and purification of crystals. Recovery, recrystallization, and grain growth. B. Microstructural design. Electrical and mechanical properties of polycrystalline and multi-phase aggregates. Control of microstructure by processing. Application to the microstructure and technology of components of electronic devices, semi-conductors, junctions, and microelectronics. Application to strengthening mechanisms and mechanical properties, precipitation hardening, heat treatment of steels, thermo-mechanical processing, and sintering. Properties of amorphous solids and metallic glasses. Properties of composite structures.

243. *Topics in the Mechanical Behavior of Materials: Crystalline and Polymeric Solids*

This course is intended to provide insight into the mechanical behavior of both crystalline and polymeric solids by consideration of appropriate atomistic models. It will begin with a self-contained presentation of the relevant portions of classical equilibrium statistical mechanics and their relation to classical macroscopic thermodynamics. These concepts will be applied first to crystalline materials including the following topics: concept of

stress in lattice systems, harmonic and quasi-harmonic approximations, thermoelastic stress-strain relations, temperature-dependence of elastic moduli, Cauchy relations. They will then be applied to polymeric solids including the following topics: chemical nature of polymers, role of entropy in mechanical behavior, statistical treatment of various idealizations of long-chain molecules (freely-jointed, fixed valence angle, hindered rotation), network theory of rubber elasticity.

244. *Strength of Solids*

Mechanical behavior of solids as interpreted through atomistic mechanisms. Theory of dislocations in continuous and crystalline media. Characteristics of dislocations and their influence on mechanical behavior in various crystal structures. Intrinsic and extrinsic stacking faults, extended dislocations, point defects, nodes and networks, disclinations, crystal boundaries. Applications of dislocation theory to single and polycrystal plasticity, work-hardening, stress-corrosion, creep, fatigue, hardening mechanisms, effects of grain size, crack nucleation and propagation processes in fracture, and dislocation dynamics. Laboratory projects selected from: yield point phenomenon, computer simulation of stress strain curves, atomic models of dislocations, measurements of stacking fault energy, direct observations of dislocation arrangements and reactions, etch pitting and dislocation decoration, surface reactions.

245. *Advanced Crystallography and Modern Diffraction and Imaging Techniques in Materials Science*

The course begins with a review of elementary x-ray diffraction principles including: the physics and engineering of x-ray production, detection, and absorption, polarization, refraction, scattering from crystals and liquids. Ewald sphere, reciprocal space, and film and diffractometer methods. Advanced topics are selected from: Fourier analysis of peak profiles and convolution, particle size and strain broadening, stacking faults in FCC, HCP, and BCC metals, order-disorder transformations, temperature diffuse and short-range order scattering. The dynamical theory of x-ray diffraction is extensively developed in the electromagnetic (Laue-James) formalism. Applications to x-ray topography and principles of scanning electron microscopy and applications to semiconductor device characterization are included. Laboratory projects covering lecture material are included.

246. *Failure Analysis and Analytical Metallography*

This is a lecture and laboratory course devoted to the analysis of failure of materials and the analytical metallography techniques for determining their causes. Analytical techniques such as optical metallography, x-ray diffraction, transmission and scanning electron microscopy, and electron microprobe analysis will be used to determine the nature of the materials being studied and their thermal and mechanical history. Examination of fractures at both the macroscopic and microscopic levels will be combined with an understanding of the continuum and atomistic mechanisms of deformation and fracture, the effect of thermal treatment on the dislocation arrays and microstructure, and the chemical reactions due to environment in order to develop the proper technique for determining the cause of failures and the means by which they could be precluded. The case study method will be utilized and the pertinent background materials will be presented so that students with a background in either materials science or solid mechanics would be qualified to participate in this course.

247. *Structure and Properties of Non-Metallic and Non-Crystalline Materials*

A study of the kinetics and mechanisms of formation of amorphous and semi-crystalline media, physical properties of amorphous metals, polymers, glasses and ceramic materials. This course may be offered in conjunction with an undergraduate course of the same title, but will require an extension of depth and scope from students taking this course for graduate credit.

248. *Environmental Effects in Material Behavior*

This special topics course is devoted to discussions of the effects of environments on the mechanical, chemical, and electrical behavior of solids. The course deals with environmentally influenced mechanical behavior including studies of metallic corrosion and passivation, stress corrosion cracking, and hydrogen assisted fractures. Consideration of specific topics that are related to these phenomena lead to detailed discussions of surface and interfacial thermodynamics and kinetics including absorption, along with analyses of the micromechanics of plasticity and fracture. Particular attention is paid to the role of microstructure and chemistry in influencing the material behavior. Some knowledge of fracture mechanics is presumed.

249. *Special Topics in Materials Science***250. *Special Topics in Materials Science*****250C. *Photovoltaic Solar Cells***

Semiconductor photovoltaic cells intended for direct conversion of sunlight into electricity. Topics to be discussed: properties of semiconductors (resistivity, minority carrier lifetime, surface recombination velocity; interface states and interface recombination; energy gap, optical absorption and reflection and electron affinities). Three hours lecture per week. Prerequisite: a senior or graduate level course on semiconductors.

252. *Pattern Recognition and Computer Vision*

This course deals with procedures for representing classes of patterns in forms which permit effective recognition by computer. There will be an emphasis on computer vision. The following material will be covered: Elementary statistical decision theory in Euclidean n -space as a framework within which to view recognition procedures such as correlation, template matching, and the use of decision regions. Linguistics and other structural models for representing complicated pattern data. Applications such as the detection of a priori known or unknown signal waveforms buried in noise, medical image recognition, robot vision, and spoken word recognition. Among other topics arising in this treatment are data clustering; sequential estimation and recognition; edge and highly variable boundary determination in noisy images treated optimally as a statistical estimation problem; texture recognition; image segmentation and labeling; supervised and non-supervised learning; relationships among the complexities of a recognition problem, the amount of learning data required, and the resulting recognition error. Prerequisite: a one-semester advanced undergraduate level course in probability theory or statistics.

253. *Digital Signal and Image Processing*

The principles and practice of digital signal processing, sampling, DFT, FFT, WFT, FIR filters, multirate filtering, computer filter design, infinite impulse response filters, spectral analysis, LPC analysis, hardware, computer laboratory. Prerequisite: Engineering 157 or written permission.

254. *Introduction to Stochastic Control Theory*

This course deals with introductory, but fundamental, methods and problems in stochastic control theory and its applications: Markov chains in finite and countable state spaces; Markov chain models of control systems; dynamic programming; state variabilization of typical control problems; fixed and free time control problems; discounted and average cost per period problems; computational methods; optimal stopping; linear filtering and control; stochastic stability; introduction to diffusion models of continuous control processes. Prerequisite: An undergraduate course (or equivalent) in probability theory.

255. *Linear Systems Theory*

Modeling physical systems by transfer matrices as well as state-space and differential operator equations. Applications of linear algebra and polynomial matrix theory. Equiva-

lence of alternative system representations and state transition matrix determination. Controllability and observability properties of linear systems and reduction to canonical forms. Minimal realization theory. System invertibility and functional reproducibility. Introduction to quadratic optimization and asymptotic state estimation. State feedback and dynamic feedforward compensation of linear systems for stability, arbitrary pole placement, decoupling, and exact model matching.

257. *Applied Stochastic Processes*

This course focuses on the study of stochastic processes in a number of applications. Analysis of continuous and discrete time Gaussian random processes. Applications to Kalman filtering, the detection of signals in the presence of noise, and two dimensional filtering. Application of queuing theory to the analysis of communication networks. Prerequisite: Applied Mathematics 263 or equivalent.

258. *Control System Analysis and Synthesis*

Formulation of optimal control problems through the calculus of variations, linear functionals in L_p function spaces, and the Pontryagin maximum principle. Applications to the linear optimal regulator problem, time optimal control problems and minimum fuel problems. Relationships between modern optimal control theory and the classical Hamilton-Jacobi theory in the calculus of variations. Examples of the use of modern control theory in various industrial and aerospace applications.

260. *Electronic Processes In Semiconductors*

The course is directed towards a detailed understanding of electronic processes primarily in semiconductors with tetrahedral bonding (Si, Ge, $Al_{III}B_{IV}$, $Al_{III}B_{IV}$, $Al_{III}B_{IV}C_{IV}$, $Al_{III}B_{IV}V_{IV}$ compounds). Experimental studies and methods as well as materials aspects are stressed throughout the course. Topics include phonon spectra, band structure, impurity states, electron and hole distributions, optical properties, electron plasma, scattering processes, excess and hot carriers, semiconductor-metal transitions, one-and two-dimensional electron gas, and amorphous semiconductors. Prerequisite: Physics 241 or equivalent.

261. *Physics of Solid State Devices*

A unified study of the physics of solid state devices and their principles of operation. Topics include junction devices such as Schottky barrier and heterojunctions; interface devices such as MOS, JFET and MOSFET's; CCD's, surface acoustic devices, and storage elements in semiconductor memories luminescence and optoelectronic devices including LED's semiconductor lasers and solar cells; high-field effects and devices such as tunneling, Gunn oscillators, Impatt diodes, and switching and memory effects in amorphous semiconductors. Prerequisite: Engineering 260 or equivalent.

262. *Solid State Quantum and Optoelectronics*

The course incorporates the study of interaction of radiation with matter with emphasis on lasers, nonlinear optics, and semiconductor quantum electronics. The topics include basic laser theory and common systems. Q-switching and mode-locking. electro- and acousto-optic interactions, harmonic generation and parametric processes, self-focussing and phase modulation, stimulated Raman and Brillouin scattering, ultrashort pulse generation, self-induced transparency, nonlinear processes of conduction electrons in semiconductors, linear and nonlinear aspects of bulk and surface polaritons. Prerequisites: Engineering 260 or equivalent.

263. *Electromagnetic Theory, I*

The Maxwell field equations, scalar and vector potentials, boundary conditions, electromagnetic momentum, and the Maxwell stress tensor. Magnetic and dielectric materials and anisotropic media. Power and energy relations, the Poynting theorem, and plane, cylindrical, and spherical waves. Retarded potential solutions, Green's functions, and variational principles.

264. *Electromagnetic Theory, II*

Application of the fundamental laws of electrodynamics to problems in the radiation, scattering, and propagation of electromagnetic waves. Techniques for solving boundary value problems; transmission lines, waveguides, resonant cavities, antennas and microwave circuits.

266. *Advanced Electromagnetic Theory*

A guided wave analysis of propagation and diffraction in cylindrical and other geometries. Ample use is made of Green's functions, eigenfunctions, integral equations, and variational techniques. A rigorous transmission line formulation of field problems is developed and applied to diffraction in wave-guides and free space.

273. *Advanced Thermodynamics I* (Chemistry 201)

Fundamental principles of macroscopic equilibrium thermodynamic stability; Gibbs relations and chemical thermodynamics; applications to various systems, including fluids, solids, magnetic and dielectric materials. Fundamental principles of macroscopic nonequilibrium thermodynamics (irreversible processes). Entropy production; Curie's principle; Onsager-Casimir reciprocal relations; applications to transport and relaxation phenomena in continuous systems. Offered every year. Taught alternately by the Engineering and the Chemistry departments.

274. *Advanced Thermodynamics II* (Chemistry 202)

Introduction to the statistical mechanics of equilibrium phenomena for classical and quantum-mechanical systems. Ensemble-theory; fluctuations; statistical interpretation of the laws of thermodynamics; applications to ideal gases, chemical equilibrium, simple crystals, magnetic and dielectric materials, radiation, condensation phenomena. Offered every year. Taught alternately by the Engineering and Chemistry departments.

276. *Heat Transfer*

Convection. Laminar flow: boundary layer equations and similarity solutions; solution techniques for arbitrary wall temperature distribution; development of flow in tubes. Turbulent flow: semi-empirical methods of solution for turbulent shear layers. Natural convection. Separated flow. Condensation and evaporation. Fundamentals of heat and mass transfer for chemically reacting flows. Radiation. Basic concepts: black body radiation; emissivity, absorptivity, reflectivity. Radiative properties of solids. Enclosures with non-participating medium; shape factors. Equation of radiative transfer. Radiative properties of gases. Beam length methods.

281. *Fluid Mechanics I*

Formulation of differential and integral conservation laws, including discontinuities, for homogeneous fluids. Constitutive equations for the compressible, heat conducting, linear viscous fluid. Role of thermodynamic equations of state and process. Boundary conditions. Molecular basis for the continuum description. Kinematics of vorticity, and its production, convection, and diffusion. Vorticity theorems of inviscid flow. Incompressible potential flow theory: flow over bodies and lifting surfaces. Dimensional analysis and scaling. Introduction to averaging concepts used in fluid mechanics. Examples from viscous flows to illustrate the above concepts: exact solutions, approximate methods for low and high Reynolds-number limits such as Stokes-Oseen flow, lubrication theory, and boundary-layer theory.

282. *Fluid Mechanics II*

Introduction to concepts basic to current fluid mechanics research: hydrodynamic stability, the concept of average in fluid mechanics, introduction to turbulence and to multi-phase flow, wave motion, topics in inviscid and compressible flow.

289. *Advanced Lecture or Reading Courses*

The following courses are offered whenever a sufficient number of students express interest.

289A. *Hydrodynamic Stability*

Introduction: Tollmein-Schlichting waves, Rayleigh-Taylor instability, Benard-Rayleigh problems, Marangoni effects, Taylor instability. Fundamental equations. Basic flows; plane Poiseuille and Couette flows, boundary layers, rotating cylinder flow, unsteady flows and Stokes layers. The canonical mathematical problem: the Sturm-Liouville problem. Kelvin-Helmholtz instability: gravity-capillary waves, Rayleigh-Taylor instability, Helmholtz instability; continuous distribution; nonlinear inviscid two-dimensional solutions for shear layers. Linearized stability theory for parallel flows, the Orr Sommerfeld equation, Squire's theorem, Gaster's transformation, energy relation; the inviscid, Rayleigh problems, Rayleigh-Fjortoft theorems; influence of viscosity: critical and Stokes layers, Reynolds stress distribution; the Blasius case and comparisons with observations. Finite amplitude effects, steady and time dependent solutions; plane Poiseuille flow and subcritical instabilities, the Malkus-Veronis results, Taylor vortices.

289C. *Dynamics of Rotating and Stratified Flow*

Introduction to geophysical fluid dynamics, the Rossby number, density stratification and the equations of motion in a rotating coordinate frame, vorticity production by nonhomogeneity and rotation, potential vorticity, the thermal wind, Taylor-Proudman Theorem, geostrophic motion. Topics in the quasigeostrophic motion of a stratified fluid on a sphere, scaling, the Ekman layer, geostrophic energy equation and available potential energy, Rossby waves, wave-zonal flow interactions, topographic waves, layer models; baroclinic instabilities, Eady and Charney models; nonlinear theory.

289D. *Physical Gas Dynamics: Energy Emphasis*

Reacting mixtures of perfect gases; relevant quantum statistical mechanics; equilibrium gas properties. Equilibrium and frozen flows. Rate equations for population of internal states and species: statistics and chemical kinetics. Flow with nonequilibrium internal modes and chemical reactions. Nonequilibrium flows in acoustic approximation; flows in ducts; the method of characteristics; shock waves. Flow with nonequilibrium electronic excitation and ionization as found in fusion power schemes. Two-phase non-equilibrium flow of water vapor and liquid with condensation kinetics as found in nuclear power plants. Combustion flows occurring in internal combustion engines. Prerequisite: Engineering 281 and 282 or approximate equivalent.

289E. *Mechanics of Nonlinear Fluids*

Kinematics, strain and motion in deforming media. Review of balance principles in continuum mechanics. Connection between stress and motion: constitutive relations. Material indifference principle. The general nonlinear Stokesian fluid. Simple fluids with memory. Viscometric flows and motions with constant stretch history. Asymptotic forms for simple fluid constitutive relations. Applications of the general theory. Waves in dissipative materials.

289F. *Turbulent Flows*

Review of relevant results from linear stability theory. Aspects of nonlinear stability theory. Discussion of experiments on instability and transition. Few-mode models of transition to turbulence. Statistical theory of homogeneous, isotropic turbulence: statistical equilibria. Cascades. Kolmogorov's theory. Analogs for two-dimensional flow. Similarity theory of free turbulent shear flows: Reynolds' equations. Jets, wakes, mixing layers. The turbulent flows: experimental results and theoretical models.

289G. *Chemical Reaction Engineering*

Elements of chemical rate processes; steady-state and transient behavior of continuous-flow chemical reactors; uniqueness, multiplicity, and stability in chemical reactor systems and individual catalyst particles; heterogeneous chemical reactor analysis focusing packed beds (continuum and discrete models) and fluidized beds (deterministic and stochastic Models).

291, 292. *Special Topics in Engineering*

297, 298. *Special Projects: Reading, Research, and Design*

Work with individual students in connection with reading, problems of research, or preparation for work on theses. Offered every year.

As part of the Program of the Center for Fluid Dynamics at Brown University, special attention is called to related courses in the Division of Applied Mathematics, the Physics Department, the Geological Sciences Department, and the Chemistry Department.

English

Professors BLISTEIN, DAVIS, HARPER, HAWKES,¹ HENKLE (Chairman), HIRSCH, KIRK, KRAUSE, LANDOW, MONTEIRO, NICHOLS, ROSENBERG, SABOL, ST. ARMAND, SCHEVILL,² SHOLES,¹ SHAFFER,³ SHERIDAN, SHROEDER, SPILKA, WALDROP,¹ WILMETH, WOODS; Associate Professors BECKHAM,¹ BLASING,² EMIGH, ROSENFELD, RUSSOM, SILVERMAN; Assistant Professors ALLEN, CALDWELL, DOANE, FOLEY, HARING-SMITH,⁴ RABB,⁴ STEINBACH, WRIGHT; Adjunct Professor BLOOM;³ Visiting Professors BROWNE,⁵ COOVER, LEVINE,³ SONTAG;³ Adjunct Instructors CAPONEGRO, SHORT.

UNDERGRADUATE PROGRAMS

The English Department offers the following concentration choices for undergraduates. Detailed information about each one is available from the Department.

1. *English and American Literature*. English 16 ("Critical Analysis of English and American Poetry") or an equivalent course in poetic analysis is prerequisite. In addition to English 16, eight courses must be satisfactorily completed according to one of the six general models provided for regular concentrators—e.g. a historical, a generic (fiction, poetry, or drama), an American literature or English and American literature model. The detailed requirements of each of the models are available from the Department.
2. *Honors in English and American Literature*. English 16 or an equivalent course in poetic analysis is prerequisite. In addition to English 16, ten courses must be satisfactorily completed. Of those ten, six Honors seminars are recommended. However, a minimum of four seminars may be possible for candidates with strong qualifications. A thesis is required.
3. *Special Concentration in English and American Literature*. English 16 or an equivalent

¹ On Sabbatical Leave or Leave of Absence in Semesters I and II, 1983-84

² On Sabbatical Leave or Leave of Absence in Semester I, 1983-84

³ Not in Residence Semester I, 1983-84

⁴ On Sabbatical leave of Absence Semester II, 1983-84

⁵ Not in Residence Semester II, 1983-84

lent course in poetic analysis is prerequisite. Also required are either eight courses in English and American literature *or* ten courses, seven of them in English and American literature, the remaining three in a related subject or field. Proposals for special concentration require Departmental review and approval.

4. *Creative Writing*. English 16 or an equivalent course in poetic analysis is prerequisite. Also required are eight additional courses, four of these to be courses in creative writing and four to be courses in literature; of the four literature courses, one must be in literature before 1688 and one in literature between 1688 and 1900. Admission to the program requires as a prerequisite one semester of an intermediate writing course (English 10, 11, 13, or an equivalent version of English 39). Students wishing to enter the program should take one or more intermediate writing courses before applying for the advanced writing courses listed above.

GRADUATE PROGRAMS

The Department accepts candidates for the degrees of Doctor of Philosophy and Master of Arts. A Master's degree in English is ordinarily prerequisite to the Ph.D.; however, after the first semester or first year of graduate study at Brown, some candidates are encouraged by the Department to proceed directly to the doctorate. GRE scores no more than three years old, both Verbal Aptitude and Advanced in Literature, are required for admission to either program.

MASTER OF ARTS. The Department of English offers a Master of Arts degree in English and American literature. This degree is often sought as a terminal degree by students planning careers in secondary education, publishing, etc. Ph.D. students, approved as such by the department, may proceed directly with doctoral work without taking the Masters degree, though many such students choose to take the intermediate degree in course.

The Master of Arts degree may be earned in two ways. The program with thesis calls for eight semester courses, one of which may be a thesis research course (297 or 298). These courses should build upon and extend the student's undergraduate preparation in the field, and should reflect some specialized interest. The program may be entirely in English, or may include one related course in another department, e.g., history, philosophy, a foreign literature. The Master's thesis, which normally grows out of research in an advanced seminar, is to be a lucid and responsible piece of scholarship or criticism, manifesting the student's mastery of the research skills and tools pertaining to his fields; it normally ranges between 50-100 pages. A full-time student in this program can normally complete the work for the A.M. within one calendar year.

The Master of Arts program without thesis calls for ten semester courses (requiring a third semester's residence), one of which may be a reading/research course (297 or 298). One of the two additional courses in the third semester shall be an advanced seminar in the area of the student's special interest and calling for a sustained scholarly product. The other shall be a Teaching Workshop (293A) centering upon the theory of language and composition, which affords the student some experience in teaching and tutoring students. This program is geared especially for students who wish to teach in Junior Colleges and Community Colleges.

Course Requirements for the A.M. in Either Program:

1. One semester course in literary theory or criticism, normally English 224, unless the student is qualified to take a more advanced course. Choice may be made among the following:

224	<i>Methods of Literary Criticism</i>
225A, 226A	<i>Studies in Literary Theory</i>
235A	<i>Language and Symbolic Structures</i>

 (Others as appropriate)
2. A three-to-four week non-credit workshop in Methodology of Literary Scholarship.

beginning during orientation week.

Recommended Courses:

1. One semester course emphasizing philological or linguistics training, chosen from among the following:

231	<i>Structure and Development of the English Language</i>
233	<i>Introduction to Old English Language and Literature</i>
241	<i>Middle English</i>
243	<i>Chaucer</i>
Ling. 102	<i>Introduction to the Techniques, Terminology and Theory of Linguistic Analysis</i> (especially recommended for M.A. candidates in the ten-course program).
2. One semester course in English Literature before 1700, in addition to the one-semester philology requirement.

Language Requirement for Either Program:

A candidate for the M.A. should show competence in one modern foreign language. Normally this is demonstrated by passing a departmental examination.

MASTER OF ARTS IN WRITING. The acceptance of candidates for the Master of Arts degree in Writing is determined by three members of the staff of the Writing Program. Candidates take eight courses, four of which are in writing. The other four courses supplement the major objective of completing a substantial manuscript in fiction, poetry, drama, or film writing, which is submitted as a thesis. All students are advised to take one or two courses in studio or performing arts: music, drama, painting, sculpture, or the like. Poets, in particular, are advised to take one or two semester courses in translation. In the last semester of residence the candidate prepares and delivers a public reading from his or her work. Normally, work for the degree is done during a two year period, though on rare occasions it may be completed in a shorter time.

DOCTOR OF PHILOSOPHY. Specializations in the doctoral program are possible in any period of English or American Literature, in English philology, in literary theory and criticism, and in genre studies. Interdepartmental specialization, e.g., in cooperation with Linguistics or Comparative Literature, is also possible. *Courses.* A full time doctoral candidate will register for eight courses during the first year of residence. He or she will normally take *three formal courses per semester*, for the most part at the 200-level, though a limited number of 100-level courses in areas where basic coverage is needed may be elected. For the fourth course the student will customarily register for 221 in the first semester, and for an independent reading/research course in the second semester (which may be associated with one of the courses being taken to permit greater depth in a particular area of interest). After the first year, the student will take at least six additional courses and advanced seminars (200 and 200A level) in areas relating to his or her specialization.

Course Requirements

1. English 221. *Methods of literary study.* *Strongly recommended* for Ph.D. candidates in the first semester of study. A three-hour seminar on problems of literary history and scholarly method.
2. One semester course in literary theory or criticism, required during the first year of study. This requirement is usually met by English 224, though qualified students may take an advanced course if they so desire. Choice may be made among the following:

224	<i>Methods of Literary Criticism</i>
225A, 226A	<i>Studies in Literary Theory</i>
235A	<i>Language and Symbolic Structures</i>
(Others as appropriate)	
3. One semester course emphasizing philological or linguistic training, from among

the following:

The Structure and Development of the English Language

Old English Language and Literature

Middle English

Chaucer

Introduction to the Techniques, Terminology, and Theory of Linguistic Analysis

(Others as appropriate)

4. One semester course in English Literature before 1700, in addition to the one semester philology requirement.
5. A three-to-four week non-credit workshop in Methodology of Literary Scholarship, beginning during orientation week.

Students specializing in Medieval Literature should have a reading knowledge of Old English, Middle English (which should of course include Chaucer), Latin, and either Old French, Old Norse, or Middle High German. This reading knowledge can be attained either by taking a course (two semesters) in these subjects and passing satisfactorily, or by passing an examination (with the assistance of a dictionary) set by the Department of English in these subjects. Specialists in English philology should meet the requirements for specialization in Medieval Literature, and should in addition do work in linguistics.

Foreign Languages. The foreign language requirement may be met in two ways. The student may show competence in two languages by passing departmental examinations. Alternatively, he or she may pass an ETS or department examination in *one* language, and in addition take a one-semester graduate course in a language relating to the area of specialization from the offerings in literature of the University's departments of classical or modern foreign languages or (in some cases) Comparative Literature. The course may be, or may not be, in the same language offered for ETS or departmental examination. The intention is to permit the candidate to determine, with the advice of the department, the language or languages most useful in the proposed area of specialization.

Preliminary Examination. The preliminary examination tests the competence the candidate has attained, through course work and independent study, in two disciplines, central to English studies, literary history and literary criticism. There are two parts.

PART I. An oral (or written) examination over a list of works presented by the candidate and approved by his or her committee. The list should display the candidate's familiarity with major authors, periods, and movements of one national literature, either English or American, and a reasonable acquaintance with some of the important figures of the other; some European writers may be included if the candidate wishes. The list, averaging seventy-five to one-hundred titles, should be broadly representative of periods, genres, and kinds of literature, though it should also reflect the candidate's primary concentration and interests. Whole works should be presented, not selections, and wherever possible volumes of lyric poetry rather than individual titles. This examination should normally be taken at the end of the second year, or at the beginning of the fifth semester.

PART II. A three-to-four hour written examination in the candidate's area of specialization. The student may offer specialization in a particular historical field, in a genre, or in a topic or area otherwise defined (e.g., an interdisciplinary field); the definition of the area of specialization to be approved by the candidate's committee. This examination will normally be taken at the end of the fifth semester.

Dissertation. The doctoral dissertation must be a lucid and substantial work of scholarship or criticism.

The program of doctoral study is one which a student with full support can complete in four years; an able student doing some work as a Teaching Assistant should still complete the program in five years. The program supposes that the first two years will be devoted to course work, seminars, and fulfilling the requirements in foreign languages, that both parts of the preliminary examination will be taken and passed by the end of the fifth semester, and that the second semester of the third year, and the fourth year, will be given over to the writing of the dissertation. Students who have fully demonstrated their ability in the first year of graduate study are permitted to proceed directly with doctoral work without taking an M.A. degree.

I. PRIMARILY FOR UNDERGRADUATES¹

1. <i>The Process of Writing</i>	Mr. ALLEN and STAFF.
Functional writing. First semester open to freshmen; second semester open to all students.	
2. <i>Scholarly and Critical Writing</i>	Mr. FOLEY and STAFF.
An introduction to writing from research.	
3. <i>Technical and Scientific Writing</i>	The STAFF.
4. <i>Personal and Reflective Writing</i>	The STAFF.
5. <i>Beginning Fiction Writing</i>	The STAFF.
6. <i>Beginning Play Writing.</i> (Theatre Arts 6.)	Mr. BASS.
7. <i>Beginning Poetry Writing</i>	The STAFF.
8. <i>Beginning Journalistic Writing</i>	The STAFF.
10. <i>Intermediate Fiction Writing</i>	Ms. STEINBACH and STAFF.
11. <i>Intermediate Poetry Writing</i>	Ms. WRIGHT and STAFF.
12. <i>Intermediate Play Writing</i>	Mr. BROWNE.
13. <i>Intermediate Journalistic Writing</i>	The STAFF.
14. <i>Persuasive and Argumentative Writing</i>	Mr. FOLEY and STAFF.
15. <i>Critical Analysis of English and American Fiction</i>	Ms. RABB and STAFF.
16. <i>Critical Analysis of English and American Poetry</i>	Mr. HIRSCH and STAFF.
17. <i>Critical Analysis of English and American Drama</i>	Mr. KRAUSE and STAFF.
20. <i>Advanced Fiction Writing</i>	Mr. COOVER and Ms. STEINBACH.
21. <i>Advanced Poetry Writing</i>	Ms. WRIGHT.
22. <i>Advanced Play Writing</i>	Mr. SCHEVILL.
23. <i>Advanced Journalistic Writing</i>	Mr. HENKLE.
24. <i>Special Topics in Writing</i>	
Section 1. Reading, writing, and traveling.	Mr. FOLEY.
Section 2. Writing as reaction.	Mr. HIRSCH.

¹ Here, and in the following sections, those courses which are listed with an indication of the identity of the Instructor or Instructors are scheduled in 1983-84.

25. *Individual Study in Writing*
Tutorial instruction. The STAFF.
29. *Seminar in the Teaching of Writing* Ms. HARING-SMITH.
An exploration of the theory and practice of teaching writing.
31. *Survey of English Literature, I* Mr. SABOL.
A survey course in English prose and poetry from the beginnings to 1660.
32. *Survey of English Literature, II* Mr. LANDOW.
A survey course in English prose and poetry from 1660 to modern times.
33. *English Poetry to 1600*
34. *Selected Modern Writers, English and American* Ms. ROSENFELD.
35. *English Poetry of the Seventeenth Century* Mr. SHROEDER.
(Exclusive of Milton.)
39. *Special Topics in Literature*
(Enrollment limited to freshmen and sophomores.)
- Section A. The Literature of Fantasy* Mr. LANDOW.
- Section B. Dramatic comedy.* Mr. KRAUSE.
- Section C. Literature of the Renaissance.* Mr. DAVIS.
41. *American Literature* Ms. CALDWELL.
Major American writers of prose and poetry from the Puritans to Whitman.
42. *American Literature* Ms. CALDWELL.
Major American writers of prose and poetry from Twain to Hemingway.
43. *Black Literature*
44. *Black Novelists*
47. *The Augustan Age* Ms. RABB.
48. *The Age of Johnson*
49. *Romantic Literature* Ms. HARING-SMITH.
The Romantic imagination.
50. *Romantic Literature, Special Topic*
54. *Comedy and Laughter*
56. *The Nature of Tragedy*
61. *Victorian Poetry*
- S71. *Undergraduate Seminar* Mr. ST. ARMAND.
"Innocents Abroad." The interaction of American artists and European culture.
- S72. *Undergraduate Seminar* Mr. BLISTEIN.
An introduction to Shakespeare studies.
- S73. *Undergraduate Seminar* Mr. NICHOLS.
Peoples of American in literature: a multi-ethnic approach.
- S74. *Undergraduate Seminar* Ms. CALDWELL.
Transatlantic voices. The relationship of England and America as seen in both literatures.
- S75. *Undergraduate Seminar* Mr. SHROEDER.
Reading and interpreting Shakespeare.
- S76. *Undergraduate Seminar* Ms. WOODS.
Approaching 1984. Freedom and tyranny in the English literary tradition.

- S77. *Undergraduate Seminar* Mr. MONTEIRO.
American folklore. A generic approach.
- S78. *Undergraduate Seminar* Mr. HARPER.
Chant of Saints. A gathering of Afro-American literature, art and scholarship.
- S79. *Undergraduate Seminar* Mr. McINTOSH.
Satire. Lucian, Horace, Juvenal, Pope, Swift, Twain, *et al.*
- S91. *Senior Seminar* Ms. CALDWELL.
"Being Here." The impact on early American literature of the experience of the new world.
- S92. *Senior Seminar* Mr. ST. ARMAND.
American regionalism. A survey of American literature from a "local color" perspective.

II. FOR UNDERGRADUATES AND GRADUATES

- 101, 102. *Workshop in Creative Writing*
Mss. SONTAG, STEINBACH, and WRIGHT; Messrs. BASS, BROWNE, COOVER, and HARPER.
Students will be expected to complete extended imaginative works or series of works.
103. *The Structure and History of the English Language.* Mr. RUSSOM.
A survey of the major historical developments affecting English from its Indo-European origins to the present.
104. *The Structure and History of the English Language*
105. *Chaucer, the Canterbury Tales* Ms. KIRK.
106. *Chaucer*
- 115, 116. *Principles of Literary Criticism*
117. *Survey of English Poetry, 1200-1660* Mr. FOLEY.
118. *Survey of English Poetry, 1660-1940* Ms. WOODS.
122. *Development of the American Theatre* (Theatre Arts 122.)
- 123, 124. *History of the European Theatre* Mr. WILMETH.
(Theatre Arts 123, 124.)
- 125, 126. *Shakespeare, Selected Plays* Mr. SABOL.
In 1983-84, the plays studies will be *A Midsummer Night's Dream*, *Henry V*, *Hamlet*, *Troilus and Cressida*, *King Lear*, and *The Tempest*.
130. *Milton, Poetry and Prose* Ms. NEWMAN.
133. *English Fiction of the Eighteenth Century* Mr. BLOOM.
The 18th-century English novel.
134. *Nineteenth-Century British Fiction* Ms. ROSENFELD.
136. *Seventeenth-Century Prose* Mr. DAVIS.
A reading of the major authors.
137. *Nineteenth-Century Prose*
(Exclusive of fiction.)
140. *American Literature to 1830*
141. *American Prose Fiction* Mr. NICHOLS.
To the Civil War.

142. <i>American Prose Fiction</i> Since the Civil War.	Mr. NICHOLS.
143. <i>American Poetry</i> From the time of the Puritans to the Civil War.	
144. <i>American Poetry.</i> From the Civil War to the present.	Ms. BLASING.
146. <i>Special Topics in Literature</i> Dickens and Conrad.	Mr. HENKLE.
147. <i>Special Topics in Literature</i> The politics of Renaissance poetry.	Mr. FOLEY.
148. <i>Special Topics in Literature</i> The New Journalism.	Mr. LANDOW.
149. <i>Special Topics in Literature</i> Rhetorical figures: biography in the English Renaissance.	Mr. ALLEN.
150. <i>Special Topics in Literature</i> I Etcetera: autobiography and fiction.	Ms. SONTAG.
171. <i>Twentieth-Century Poetry, English and American, to World War II</i>	Mr. SCHEVILL.
172. <i>Twentieth-Century Novel, English and American, to World War II</i>	Mr. SPILKA.
173. <i>Shakespeare, Histories and Comedies</i>	Mr. SHROEDER.
174. <i>Shakespeare, Tragedies and Romances</i>	Mr. SHROEDER.
181. <i>English Drama from the Beginnings to 1600</i>	
182. <i>English Drama, 1580 to 1642</i>	Mr. SABOL.
186. <i>English and American Drama, Seventeenth and Eighteenth Centuries</i>	Mr. KRAUSE.
187. <i>Twentieth-Century English and American Drama, to World War II</i>	Mr. KRAUSE.
191. <i>Senior Honors Conference</i>	Mr. LANDOW and STAFF.
192. <i>American and British Poetry since World War II</i>	
193. <i>American and British Fiction since World War II</i>	
194. <i>American and Continental Drama and Theatre since World War II</i>	
198. <i>Reading and Research.</i>	The STAFF.

HONORS COURSES

H1, H2, <i>Shakespeare, the Complete Works</i> Semester I: Comedies, histories, and poems. Semester II: Tragedies, problem plays, and dramatic romances.	Mr. BLISTEIN.
H3. <i>The Seventeenth Century</i>	
H4. <i>Milton</i>	
H5, H6. <i>The Eighteenth Century</i>	
H7. <i>The Romantic Movement, Earlier Years</i>	Ms. SHAFFER
H8. <i>The Romantic Movement, Later Years</i>	
H9. <i>Victorian Literature</i>	
H10. <i>Victorian Literature, Special Topic</i>	

H11. <i>American Literature</i>	Mr. MONTEIRO.
H12. <i>American Literature</i>	
H13. <i>Modern British Literature</i>	
H14. <i>Modern American Literature</i>	Ms. ROSENFELD.
H15. <i>Special Topic</i> Poetic form.	Ms. WOODS.
H16. <i>Special Topic</i> Theatre of absurdity and revolt.	Mr. KRAUSE.
H29. <i>The Middle Ages</i>	Mr. ALLEN.
H30. <i>The Renaissance</i>	

III. PRIMARILY FOR GRADUATES.

210 <i>Seminar in Dramatic Theory</i> (Theatre Arts 210.)	Mr. EMIGH.
221. <i>Methodology of Literary Scholarship</i>	
224. <i>Methods of Literary Criticism</i>	Mr. SPILKA.
225, 226. <i>The History of Literary Criticism</i>	
225A. <i>Studies in Literary Theory</i>	
226A. <i>Studies in Literary Theory</i>	Mr. HIRSCH.
231, 232. <i>History of the English Language</i>	
233. <i>Old English Language and Literature</i>	Mr. RUSSOM.
234. <i>Old English Language and Literature</i> The poetry of Cynewulf.	Mr. RUSSOM.
235A. <i>Language and Symbolic Structures</i>	
241. <i>Middle English Language and Literature</i>	
242. <i>Middle English Language and Literature</i> The Gawain poet.	Mr. RUSSOM.
243. <i>Chaucer, The Canterbury Tales</i>	Ms. KIRK.
244. <i>The Early Chaucer</i>	
245. <i>Sixteenth-Century Literature</i> A study of the changing modes of poetry during the reign of Elizabeth I.	Mr. DAVIS.
246. <i>Sixteenth-Century Literature</i>	
245A. <i>Studies in the Literature of the Renaissance</i>	
246A. <i>Studies in the Literature of the Renaissance</i> Sir Philip Sidney, texts and contexts.	Mr. DAVIS.
249. <i>Shakespeare, Comedies, Histories, and Poems</i>	Mr. BLISTEIN.
250. <i>Shakespeare, Tragedies and Romances</i>	
249A. <i>Studies in Elizabethan Drama</i>	
251. <i>Seventeenth-Century Literature</i>	
252. <i>Seventeenth-Century Literature</i>	Ms. WOODS.
251, 252. <i>Studies in Seventeenth-Century Literature</i>	

255. <i>Eighteenth-Century Literature</i> Studies in poetic themes and forms, with particular attention to the poetry of Dryden, Swift, Pope, and Johnson.	Mr. BLOOM.
256. <i>Eighteenth-Century Literature</i>	
259. <i>Eighteenth-Century Fiction</i>	
260. <i>Eighteenth-Century Fiction</i> Prose fiction from Dryden to Austen.	Ms. RABB.
261. <i>English Literature of the Romantic Age</i>	
262. <i>English Literature of the Romantic Age</i> The short poem in the Romantic period.	Ms. SHAFFER.
263. <i>English Literature of the Victorian Age</i> Fantasy and realism in Victorian fiction.	Mr. LANDOW.
264. <i>English Literature of the Victorian Age</i>	
265, 266. <i>Nineteenth-Century Fiction</i>	
267. <i>Modern Fiction</i>	Ms. ROSENFELD.
268. <i>Modern Fiction</i> Five British authors.	Mr. SPILKA.
267A, 268A. <i>Studies in Modern British Literature</i>	
273. <i>Major American Literary Figures</i> Herman Melville (through <i>Moby Dick</i>).	Mr. HIRSCH.
274. <i>Major American Literary Figures</i> Herman Melville (after <i>Moby Dick</i>).	Mr. ST. ARMAND.
273A. <i>Studies in American Literature</i> New England Idealism: Emerson, Thoreau, Parker and Dickinson.	Mr. NICHOLS.
274A. <i>Studies in American Literature</i>	Mr. MONTEIRO.
275. <i>Modern American Literary Figures.</i>	
275A. <i>Problems in American Literature</i> Nature and nature writing.	Mr. ST. ARMAND.
276A. <i>Problems in American Literature</i>	
286. <i>Special Topics</i>	
287. <i>Special Topics</i> The metaphor of love in the middle ages.	Ms. KIRK.
288. <i>Special Topics</i> The spy novel.	Mr. ROSENBERG.
289. <i>Special Topics</i> Postmodern American poetry.	Ms. BLASING.
287A. <i>Special Topics</i> Feminist theories of representation in literature and film.	Ms. DOANE.
293A. <i>Laboratory in Teaching Writing</i>	Mr. ALLEN.
294A. <i>Teaching Workshop in Literature</i>	
297, 298. <i>Reading, Independent Study, Research.</i>	The STAFF.
297A, 298A. <i>Doctoral Research in English and American Literature</i>	The STAFF.

Environmental Studies

A concern for the issues and problems of the natural and human environment on the part of students and faculty at Brown led to the formation of the Center for Environmental Studies in May 1978. The Center acts as a resource and communication center for members of the Brown and the Rhode Island communities and assists students in securing academic internships and volunteer positions with governmental agencies and public interest groups.

The standard environmental studies concentration provides the guidance necessary to design a program which has depth in a single area of knowledge and exposure to at least two related areas. A student may elect a policy focus or a science focus and all students will take basic courses in environmental studies, course work in values or ethics, and an independent research course(s) leading to the preparation of a thesis. A policy focus requires some course work in the sciences and the science focus involves some policy related study, to insure that all students have a basic understanding of the broad scope of environmental problem-solving.

An environmental studies concentration is a particularly appropriate addition to the liberal arts curriculum. Virtually every substantial environmental problem requires for its solution an understanding of both the natural and human environment as well as some appreciation of societal value structures. Therefore, an environmental studies concentration necessarily encompasses work in the physical, biological and social sciences as well as some exposure to ethics and values, all of which must be related in ways which make the disciplinary skills and information available for problem-solving.

The Executive Committee of the Center for Environmental Studies is composed of faculty members and students from various environmentally related fields. The faculty members are Professor Douglas Anderson (Anthropology), Associate Professor Annette Coleman (Biology), Professor Richard Gould (Anthropology), Professor George Seidel (Physics), Assistant Professor Johanna Schmitt (Biology), Associate Professor Jon Waage (Biology), Professor Harold Ward (Chemistry), Associate Professor Tom Webb (Geology). The 82-83 student members are Ilana Locker, David Mendes, Maria Rea and Dan Swartz.

For information concerning Environmental Studies contact Harold Ward, Director, Center for Environmental Studies, Box 1943, Urban Environmental Laboratory, 135 Angell Street.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

The program requires a minimum of fifteen courses for a concentration, including Environmental Studies 11, 191, 192, 195 or 196. Economics 111 or 113, one course in Biomedical Sciences (11, 12, 42, 51, 52, or 61) and one course in values or ethics. The remaining eight courses are selected from the sciences or policy related courses.

Science Focus: Six science courses in addition to a Biomedical Science course and thesis research; two policy related courses, one of which lies outside the field of economics.

Policy Focus: Six policy courses in addition to Economics 111 or 113 and thesis research; two science courses, one of which should be in the physical sciences.

Thesis Requirement: Each student must register for ES 195 and/or 196 and must submit a thesis proposal to the CES concentration committee no later than two weeks prior to the start of the semester in which the thesis preparation is to begin. Students will be urged to begin the development of their thesis topic as part of Environmental Studies 192 and to begin the thesis no later than the seventh semester.

Honors: Honors may be awarded by a vote of faculty members of the Executive Committee of the Center upon recommendation of the thesis advisor to students whose work in Environmental Studies has demonstrated superior quality and culminated in an Honor's Thesis of distinction.

Senior Prize: Each year the Center awards a prize to the graduating senior who has made the most outstanding contribution to environmental studies at Brown.

I. PRIMARILY FOR UNDERGRADUATES

11. *Environmental Issues* (Foundations F16)

Mr. WARD.

Introduction to environmental studies. A number of case studies of environmental issues, ranging from events of local to global concern, will be examined. The natural science necessary to discuss these issues, the institutional framework in which decisions affecting these issues are made and the values which underlie these decisions will be discussed. The manner in which the methods of the various disciplines are used to reach these decisions will be explored. Sections to be arr.

II. FOR UNDERGRADUATES AND GRADUATES

191. *Analysis and Resolution of Environmental Problems, I.*

Mr. WARD.

Case study method is used to analyze selected environmental problems. Particular emphasis on the use of scientific and technical data by the legal system in the resolution of environmental disputes. For part of the course, the class will divide into small groups to seek solutions to current environmental problems in Rhode Island and the New England regions. Most group projects will involve interaction with State and Federal agency personnel and with public interest groups. Some background in a physical and biological science and in economics is desirable (e.g. Chemistry 3, Biomed 12, Economics 111). Environmental Studies 11 is a prerequisite. Intended for juniors and seniors. Enrollment limited to 25. Written Permission.

192. *Analysis and Resolution of Environmental Problems, II*

Mr. WARD.

Will begin with an exploration of various research methodologies relevant to environmental studies. The remainder of the semester will be devoted to seminars presented by each class member and critiqued by the entire class. Environmental Studies 11 is a prerequisite and normally Environmental Studies 191 also will be taken before this course. Enrollment limited to 25. Written permission.

195, 196. *Independent Study*

Mr. WARD.

Individual analysis of environmental issues, required for all Environmental Studies concentrators. This course may be taken more than once for credit. Written permission required.

The Francis Wayland Collegium for Liberal Learning

Growing out of a number of existing and earlier activities, the Francis Wayland Collegium for Liberal Learning was established in 1980 as a unique system of support for inquiries focused on significant issues of human life. Such modes of learning, which aim at a synthesis of diverse materials, are often not freely available within departments or programs.

The "fractured atoms" of the contemporary world are the by-product of its rich complexity. But while the break-up of old forms of order can lead to disintegration and cynicism, or to an escape into rigid and simplistic forms of new order, it can also lead to careful reshaping of things seen freshly from new vantage points. The Collegium aims at a coherence of inquiry that respects diversity, and at a connectedness of persons in which freedom of thought is based in a community of intellectual concern. These aims are essential for liberal education, which seeks to develop citizens of the modern world who combine autonomy with the will and understanding to act responsibly for the social good.

The Collegium's work proceeds in three closely related directions. First, it supports curricular offerings in integrative studies. Courses may stress a particular mode of thought, expression, or action, and examine its aims, methods, presuppositions and implications; they may consider the place of a particular mode in a broader context of social institutions, ideas, and values; they may study various relations among different modes, and explore the possibilities for an integrative treatment of them; or the courses may focus on fundamental themes of human life or problems of society, and on approaches to them by several disciplines or by modes of thought that may not be found in existing disciplines, the different approaches being treated so as to bring out connections between them. In general, the courses are extra-departmental, but they may be offered in departments or programs, or may be cross-listed in them. The Collegium's second purpose is to furnish a setting in which faculty can discover and develop common interests and mutual support. It seeks to foster faculty growth and renewal in integrative learning by providing opportunities for discussion of significant issues. It also offers opportunity for reaching faculty members whose interests in such topics and methods are only beginning to develop. These activities are intended to further both new research and the improvement of teaching. Thirdly, the Collegium sponsors such activities as lectures, conferences, and workshops in order to broaden its contribution to the consideration of major human concerns by faculty, students, and the public at large.

About thirty-five members of the faculty who especially share the Collegium's concerns are appointed as Fellows, for renewable periods of three years, and one member is Senior Fellow. The Collegium is directed by an Executive Committee consisting of six fellows, the Senior Fellow, and the Dean of the College. For 1983-84, they are E. Ahearn, L. Fruzzetti, G. Morgan, P. Quinn, D. Rueschemeyer, G. Seidel, B. Shepp, W. Crossgrove (Senior Fellow), H. Sheridan (Dean of The College).

Beginning in September, 1983, the Collegium will be located on the first floor of Rhode Island Hall, and interested faculty members and students are encouraged to drop in to find out more about its work.

French Studies

Professors AHEARN, BAUER, GOUX, MAJEWSKI (Chairman); Associate Professors BOSSY¹ CROSMAN,² DURAND,¹ HUGOT, SCHOR³ Assistant Professors GOLOPENTIA-ERETESCU, LESKO; Instructor, DE LA CARRERA; Lecturer, WIART.

¹ On leave 1983-84.

² On leave Semester I, 1983-84.

³ On leave Semester II, 1983-84.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

The Department of French Studies offers standard and Honors concentration programs, focused on language, literature, and civilization.

Program in French Literature. Prerequisite: French 17, 18, 19B, 35, 75, 76 or Advanced Standing credit on entrance (AP score of 4 or 5). The program consists of a minimum of eight courses. Required courses: two upper language courses (i.e., French 19A, 51, 151) plus either French 190 or 198. Elective courses: at least five chosen from the departmental offerings at the 100 or 200 level.

Program in French Civilization. Prerequisite: French 17, 18, 19B, 35, 75, 76 or Advanced Standing credit on entrance (AP score of 4 or 5). Required courses: two upper language courses (i.e., French 19A, 51, 151), plus French 141, 142, and either 190 or 198. Elective courses: three or more appropriate courses at the 100 or 200 level in departments such as French Studies, Art, History, Anthropology and Political Science.

Program in French Language. A minimum of eight courses, as follows: 1. A sequence of two Departmental French language courses: 51 and 151 and one independent study course (beyond 151 level), or two independent courses in French language (both beyond 151 level). 2. Two 100-level "content" courses offered by the Department, in French literature, civilization, or film. 3. Three 100-level courses offered by other departments, offering specific insight into the functioning of language, or into specific language modes, to be distributed into at least two of the following categories: anthropology, linguistics, philosophy, semiotics, theory of literature; a list of appropriate courses will be provided each year by Department. 4. One independent study course to provide a synthesis of the knowledge acquired in various areas of learning.

Honors. The requirements are the same as for the standard concentration programs, with these differences: the minimum number of courses is ten (rather than eight) and French 198 is required as part of the honors thesis project.

Related Courses or Programs. Students in French are encouraged to take courses related to their interests in other modern languages and literatures, in comparative literature, in linguistics, and in such fields as art, history, music, philosophy, and political science.

GRADUATE PROGRAMS

MASTER OF ARTS. Work for the master's degree may be wholly in French Studies or may include one or more courses in such related fields as a second literature, comparative literature, linguistics, history, philosophy or art. A candidate is expected to read, speak, and write French and to have an adequate knowledge of French literature. Demonstration of proficiency in reading either German, or, normally another Romance language will be required.

DOCTOR OF PHILOSOPHY. The general requirements for the doctorate are outlined below:

1. Command of the French language, spoken and written, and an awareness of its structure and potentialities for expression. Candidates in French must demonstrate proficiency in reading two other languages; including another Romance Language. A knowledge of Latin is strongly recommended, and will be required in certain research fields.
2. An understanding of the origins, development, and structure of the French language and its connection with related languages. French 101 is required of all candidates.
3. Knowledge of French literature, consisting of wide acquaintance with its chief movements and writers and a thorough knowledge of selected major authors and works, including their historical and intellectual environment.
4. A limited number of approved graduate courses in a field closely related to the major

interest of the candidate may be included in the doctoral program. Such courses will usually be chosen from comparative literature, a second literature, or linguistics, but studies in related fields may be approved on presentation of sufficient evidence of its relevance to the intellectual purposes of the candidate.

5. Substantial teaching experience under supervision, normally a year of part-time teaching, either under the Department's training program or elsewhere. French 290 (Teaching Methods) is required of *all candidates*.

I. PRIMARILY FOR UNDERGRADUATES

NOTE: French 1, 2, 3, 4, 19A, 19B, 51, 151 constitute the language program. This sequence may be altered in certain cases: with written permission from the placement advisor individual students may skip courses ("acceleration") or repeat them for credit (e.g., after an interruption in the study of French). Courses in the language program offer practice in four skills: listening, speaking, reading, writing. Oral communication receives priority in class. Materials studied cover a wide range of topics and are chosen from a great number of modules (tapes, written texts, slides, films). Starting in French 3, the program is so designed as to enable every student to choose, in close consultation with the instructor, the relative emphasis to be given to each skill and the materials used for individual practice.

1-2. *Basic French*

Ms. WIART and STAFF.

A two-semester course; no credit is given for the first semester alone. Six hours per week: Conversation sections, grammar lectures, and language laboratory. In the second semester an accelerated track enables selected students to go directly to French 17, 18, or 19 in the following semester.

3. *Intermediate French I*

Ms. LESKO and STAFF.

Prerequisite: French 2 or placement.¹ Oral practice in class, grammar review, minimum of three hours of language laboratory. Individualized reading and writing.

4. *Intermediate French II*

Ms. LESKO and STAFF.

Prerequisite: French 2 with written permission, French 3, or placement.¹ For course description, see French 3.

19A. *Writing and Speaking French I*

The STAFF.

Prerequisite: French 2 (accelerated track) with written permission, French 4, or placement. Oral practice in class. Laboratory work, grammar review, reading, and writing are all individualized.

19B. *Introduction to the Literary Experience*

Mr. MAJEWSKI and Ms. DE LA CARRERA.

Prerequisite: French 2 (accelerated track) with written permission, French 4, or placement. Laboratory work (listening comprehension), grammar review, and writing skills will be individualized. Classroom discussion devoted entirely to literary texts from the 17th century to the present.

51. *Writing and Speaking French II*

The STAFF.

Prerequisite: French 19A, 19B or placement,¹ or French 17, 18, or 35. For course description, see French 19A.

¹ See announcement for Placement Tests, page 92.

75. *Literature and Social Thought*

Mr. Goux.

Introduction to several approaches to literature relying on methods drawn from other fields: sociology and history, anthropology, psychoanalysis, semiotics. Three perspectives: a) historical and social contexts, b) thematic or structural invariables, and c) language and reality.

76. *Intensive Introduction to Literature and Literary Methods*

Ms. CROSMAN.

Intended for qualified upper classmen and for freshmen who have attained the highest placement in French. Using selected works of three or four major authors in the areas of prose fiction and poetry, this course offers an intensive introduction to the central concepts and modes of literature and literary criticism. (Replaces FR 35)

II. FOR UNDERGRADUATES AND GRADUATES

NOTE: General prerequisite for all 100-level courses (except 131 and 151) is one of the following: French 17, 18, 19, 35, 51, 75, or 76. All 100-level courses, with the exception of 151, offer specific topics which vary from year to year. Detailed descriptions of the yearly course topics can be obtained from the departmental office. Any course may be repeated for credit, provided that the topic is different. Several 100-level courses are offered in alternate years.

101. *Early French Language and Literature*

Mr. BOSSY.

Readings of texts dating from the eleventh to the sixteenth century and illustrating the development of the French language and literature.

103. *Studies in French Literature of the Renaissance*

Ms. DURAND and Ms. LESKO.

Analysis of the works of writers such as Rabelais, Ronsard, and Montaigne. The course is aimed at identifying the esthetic principles implicit in the works studied, and at discovering the ways in which these writers and others reflect that concern for man and his situation that typifies the Renaissance.

104. *Studies in French Literature of the Seventeenth Century*

The STAFF.

Varying tendencies in literature and thought: the Baroque, Classicism, and Rationalism. The course may examine several important writers of the period, or focus on some significant aspect, such as theme, a genre, a style, or the work of a single major author.

105. *Studies in French Literature of the Eighteenth Century*

Ms. DE LA CARRERA.

History of ideas and the development of form and content in the literary genres of the Enlightenment.

106. *Studies in French Literature of the Nineteenth Century*

Mr. MAJEWSKI and Ms. SCHOR.

The expansion of the artistic consciousness and self-consciousness through the discovery of new poetic, novelistic and dramatic forms, and new means to express and describe reality. Topics will be chosen from such areas as: themes and myths of the romantic imagination, symbolist poetry, and the realist and naturalist novel.

107. *Studies in French Literature of the Twentieth Century*

Ms. SCHOR.

Different tendencies and movements in literature and thought, ranging from the Naturalist and Symbolist legacy to Structuralism. The scope of the course may be either general (consideration of several major writers) or specific (study of some significant aspect, such as a theme or a genre or the work of a single author).

111. *Studies in the French Novel*

Ms. DE LA CARRERA.

A series of inquiries into the nature of the novel in all periods.

112. *Studies in the French Theatre*

Ms. GOLOPENTIA-ERETESCU.

A comparison of selected types of French drama from the *Mystère d'Adam* to the Theatre of the Absurd. The course will focus on one or more aspects of the drama, such as the aims, forms, themes, stagecraft, and concepts of the dramatic art.

113. *Studies in French Poetry* Mr. AHEARN.
Exploration of the poetic sensibility from the Troubadours to René Char.

114. *Studies in French Criticism* The STAFF.
Manifestations of literary criticism from the Renaissance to the present: relationships between the artist and the critic, individual works as seen by different critics, schools of criticism.

115. *Studies in French Cinema* The STAFF.
A study and analysis of the great works of French Cinema.

121. *Studies in Major French Writers* Mr. MAJEWSKI.
An intensive analysis of the works of a single important literary figure.

131A. *Special Topics in French Studies* Mr. HUGOT.
Topic for 1983-84: *Ateliers d'écriture*.

131C. *Special Topics in French Studies* Mr. HUGOT.
Topic for 1983-84: *La presse française*.

132A. *Special Topics in French Studies* Mr. GOUX.
Topic for 1983-84: *Le langage et la monnaie*.

132B. *Special Topics in French Studies* Ms. LESKO.
Topic for 1983-84: *L'objet inaccessible du désir érotique*.

NOTE: The following two courses, 141 and 142, are specifically designed for students interested in French civilization: in these courses, literary texts will be studied along with other documents in light of the cultural, social and anthropological forces that are essential components of any given historical period.

141. *French Culture and Civilization* Mr. BAUER.
Purpose is to provide a general introduction to the civilization of France, and a cross-cultural perspective which will foster more tolerance for an alien way of life and make us at the same time better appreciate our own culture.

142. *French Society Today* Mr. BAUER.
The semiotics of daily life will be discussed including the food and the clothing codes, marks of social distinction in everyday life, rules of etiquette, as well as more complex systems which integrate image and text, like newspapers and magazines, and advertising.

151. *Advanced Written and Oral French* Messrs. BAUER and HUGOT.
Follows French 51 in the sequence of language courses. Prerequisite: French 51 or placement by interview. Students in this course choose specific areas of language performance in which to develop advanced proficiency.

190. *Senior Seminar* Mr. GOUX.
Studies in the development, comparison and synthesis of representative themes, problems, aims and styles of French literature from the Middle Ages to the present. Either this course or 198 is required of all concentrators. Open to others with permission of the instructor. Offered every year.

198. *Senior Thesis*
Independent study in preparation of a senior thesis under the direction of a member of the staff. Either this course or 190 is required of all concentrators in French.

III. PRIMARILY FOR GRADUATES

NOTE: Most of the 200-level courses are offered every second or third year.

204. <i>Studies in Medieval French Literature</i>	Mr. BOSSY.
211. <i>Studies in French Literature of the Renaissance</i>	Ms. LESKO.
213. <i>Studies in French Literature of the Seventeenth Century</i>	Ms. CROSMAN.
215. <i>Studies in French Literature of the Eighteenth Century</i>	The STAFF.
217. <i>Studies in French Literature of the Nineteenth Century</i>	Mr. MAJEWSKI and Ms. SCHOR.
219. <i>Studies in French Literature of the Twentieth Century</i>	Mr. GOUX and Ms. SCHOR.
260. <i>Studies in French Critical Theory</i>	Mr. GOUX.
261. <i>Seminar in French Criticism</i>	Ms. SCHOR.
290. <i>Teaching Methods</i>	Mr. HUGOT.
291, 292. <i>Reading and Research</i>	The STAFF.
Offered every year.	

Geological Sciences

Professors GILETTI¹ HEAD,² HERMANCIE,³ HESS,⁴ IMBRIE, MATTHEWS, YUND; Associate Professors FORSYTH, GRIEVE, PARMENTIER, PIETERS, PRELL, RUTHERFORD⁴ (Chairman), J. TULLIS, T. TULLIS,³ WEBB; Assistant Professors BYRNE, GROMET; Adjunct Professor BERGGREN.

The Department aims to develop in its students a comprehensive grasp of the principles of the geological sciences as well as the ability to think critically and creatively. Formal instruction places an emphasis on fundamental principles and recent developments. The courses of study are conducted by means of lectures, seminars, laboratories, colloquia, and field trips. Undergraduates as well as graduate students have opportunities to carry out research in current fields of interest.

The principal research fields of the Department are geochemistry, mineralogy, igneous and metamorphic petrology, tectonophysics including geophysics and structural geology, climate dynamics-oceanography-sedimentation, and planetary geology. Emphasis in these different areas varies but includes experimental, theoretical, and observational approaches as well as applications to field problems. Field studies of specific problems are encouraged rather than field mapping for its own sake. A wide variety of rock types and structures is available in the nearby area. Interdisciplinary study with other departments and divisions is encouraged.

The Department is presently located in the new Geo/Chem Building and in Lincoln Field Building. Excellent laboratory facilities are available for a wide range of geological, geochemical, and geophysical research.

The Geological Sciences section of the Sciences Library includes complete sets of the principal American and foreign periodicals, publications of the U. S. Geological Survey, state and foreign geological surveys, and general reference books. A complete set of pub-

¹ Acting Chairman Semester I, 1983-84.

² On sabbatical Semester II, 1983-84.

³ On sabbatical Semesters I and II, 1983-84.

⁴ On sabbatical Semester I, 1983-84.

lished topographic and geologic maps for the United States is available.

The Brown Regional Planetary Data Center is located in the Lincoln Field Building. This center, one of seven such facilities in the country, is operated as a cooperative effort by the National Aeronautics and Space Administration (NASA) and Brown University. It contains an extensive variety of photographic prints and rapid access images of planetary bodies. These data include recent images obtained by the U.S. space program of Mercury, the Moon, Mars, Jupiter, Saturn and the satellites and rings of Jupiter and Saturn.

UNDERGRADUATE PROGRAMS

The Department offers four standard degree programs, each of which leads to a Bachelor of Arts or Bachelor of Science degree. The basic concentration in Geological Sciences is complemented by three other programs which take cognizance of the increasingly interdisciplinary nature of the Geological Sciences: Geology-Biology, Geology-Chemistry, and Geology-Physics/Math. The Geology-Biology option places more specific emphasis on the evolution and history of life, and is recommended for students who wish an understanding of the origin and development of life as interpreted from the geologic record. The Geology-Chemistry and Geology-Physics/Math options provide increased emphasis upon chemical and physical processes and phenomena occurring on and within the earth. These options are recommended for students who wish an application of chemical and physical principles toward an understanding of the earth. The suitability of each of these options with respect to career objectives should be discussed with the undergraduate advisor. For each of these programs specific courses are required which are listed below. To suit individual backgrounds and goals, students may enroll in one or more Independent Research courses to pursue topics of special interest not covered in depth by normal course offerings.

Students planning to continue with study in the Geological Sciences are advised to take the course sequence leading to the Bachelor of Science degree. They are advised to have a reading knowledge of French, German, or Russian, and are urged to take at least Chemistry 3, Physics 5, 6 and Mathematics 9, 10. Students planning to specialize in Paleontology should take at least one year of Biology.

General Prerequisite. Geological Sciences 2, 3 is prerequisite to all other courses in the Department except those courses for which other provision is made in the course statement.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Geological Sciences. Courses: Geological Sciences 2, 3, 11, 24, 41, 45, 102, 109; Chemistry 3 or 5, and three of the following: Mathematics 9, 10, Physics 5, and Biomed 11 or 12.

Geology-Biology. Courses: Geological Sciences 2, 3, 11, 24, and two of 41, 45, 102, 109; Biomed 11, 12 plus three additional courses to be approved by the concentration advisor; Chemistry 3 or 5; two of the following: Mathematics 9, 10, Physics 5, 6.

Geology-Chemistry. Courses: Geological Sciences 2, 3, 24, 41, 45, 102; Chemistry 3 or 5, 114, plus two of the following: 11, 15, 106, 115; Mathematics 9, 10; Physics 5, 6.

Geology-Physics-Mathematics. Courses: Geological Sciences 2, 3, 45, 63 and 41 or 161 or 109; Physics 5, 6 or 7, 8 and 47, 50 or Engineering 52, 37; four mathematics courses including either Mathematics 29, 52 or Applied Mathematics 33, 34; Chemistry 3 or 5.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE DEGREE

Geological Sciences. Courses: Geological Sciences 2, 3, 11, 24, 41, 45, 102, 109; Mathematics 9, 10; Physics 5, 6; Chemistry 3 or 5; four courses from mathematics and supporting sciences and upper level Geological Sciences which must have the approval of

the concentration advisor; one semester of Independent Study, Geological Sciences 191 or 192.

Geology-Biology. Courses: Geological Sciences 2, 3, 11, 24, and two of 41, 45, 102, 109; Biomed 11, 12 and three additional courses having the approval of the concentration advisor; Mathematics 9, 10; Chemistry 3 or 5; four courses from mathematics and supporting sciences and upper level Geological Sciences which must have the approval of the concentration advisor; one semester of Independent Study, Geological Sciences 191 or 192.

Geology-Chemistry. Courses: Geological Sciences 2, 3, 24, 41, 45, 102, 109; Chemistry 3 or 5, 15, 114, 115; Mathematics 9, 10; Physics 5, 6; four courses from mathematics and supporting sciences or upper level Geological Sciences which must have the approval of the concentration advisor; one semester of Independent Study, Geological Sciences 191 or 192.

Geology-Physics-Mathematics. Courses: Geological Sciences (option 1) 2, 3, 45, 63, 161, 162, plus one from 41, 109, 116; or (option 2) 2, 3, 41, 45, 63, 109, plus one from 116, 161, 162; Physics 5, 6, or 7, 8 and 47, 50 or Engineering 52, 37; four courses in mathematics including Applied Mathematics 33, 34; Chemistry 3 or 5; 3 additional upper level courses from mathematics and supporting sciences which must have the approval of the departmental concentration advisor; one semester of Independent Study, Geological Sciences 191 or 192.

Honors. Honors work in the geological sciences involves completion of a written senior thesis evaluated by three members of the staff, an oral presentation of the results, and a superior record in the concentration.

GRADUATE PROGRAMS

The graduate program in Geological Sciences is intended for students of exceptional ability and interest. Admission to graduate study is usually limited to candidates for the doctoral degree, and is normally accompanied by the award of a teaching or research assistantship or a University Fellowship. Assistants are expected to devote approximately 20 hours per week to their teaching or research duties. Summer research fellowships are available to graduate students in good standing. The graduate enrollment is limited to approximately fifty students to ensure proper research facilities, and close contact between the students and the faculty. Because of the interdisciplinary nature of the Geological Sciences, candidates are encouraged to apply from a variety of undergraduate backgrounds including biology, chemistry, mathematics, physics, and engineering, as well as geology.

The degrees awarded by the Department include Master of Arts, Master of Science, and Doctor of Philosophy.

MASTER OF ARTS. The requirements include 8 courses of which no more than 2 can be Independent Research courses (Geological Sciences 211, 212).

MASTER OF SCIENCE. The requirements include 8 courses of which no more than 2 can be independent research courses (Geological Sciences 211, 212), and demonstrated ability to pursue independent research. This may be demonstrated by the submission of a written Master's Thesis, a scientific publication, or a formal written summary of activities and accomplishments in the research courses. There is no formal language requirement.

DOCTOR OF PHILOSOPHY. There are no formal course requirements for the Ph.D. degree. Students with the approval of their advisor will devise an appropriate program of study in their major and minor areas. For a student entering with a Bachelor's degree this will normally result in a program of 10 to 14 courses, not including thesis research. Students are encouraged to take courses in other departments where appropriate.

A student is required to pass the Preliminary Examination to establish his or her candidacy for the Ph.D. degree. This examination is generally taken at the end of the fifth semester for those entering with a Bachelor's degree and at the end of the third semester for those entering with a Master's degree. For the purposes of this examination, it is presumed that the candidate will be able to display a broad knowledge of scientific disciplines related to his or her research area. In order to accomplish this, it is recommended that students attain breadth by taking courses in most of the major areas. Students entering with a minimal earth science background will normally remedy this deficiency during the first two years of graduate work.

The Department tries to be flexible in its graduate program, attempting to place the responsibility for the graduate students' education on the students themselves. Course work is supplemented by seminars and colloquia given by visitors and members of the Department, and by field trips. Certain departmental requirements can be waived, if the individual can justify the educational value of the suggested changes in a petition to the Graduate Program Committee.

Research programs within the Department are divided into four main areas: (1) geochemistry-mineralogy-petrology, (2) geophysics-structural geology-tectonophysics, (3) paleo-oceanography-micropaleontology-sedimentology, (4) planetary sciences. Cooperative research and integrated teaching programs exist within these groups; a student's research and course program may lie mainly within one of these groups or it may overlap two or three groups.

Research being carried on in geochemistry-mineralogy-petrology includes the following areas: isotope geochemistry and geochronology; trace element geochemistry; thermodynamics and kinetics of element and isotope exchange and diffusion in minerals; dynamics of geothermal regions; stable isotope fractionation; mechanisms and kinetics of solid state processes; experimental determination of mineral equilibria; stability and compositional equilibration of co-existing minerals in medium to high grade metamorphic terrains; and solution theory of silicate melts.

Research in geophysics is currently being carried out in the following areas: physical characteristics of the crust and upper mantle with emphasis on lateral variations in structure of the lithosphere and asthenosphere; model studies of convection within the earth; earthquake prediction, focal mechanisms and source properties; tectonics of oceanic fracture zones; experimental studies of friction and brittle fracture; analysis of tectonic processes through regional electromagnetic field experiments; coupling of geothermal energy reserves to deep-seated processes in the mantle; the nature and cause of deep-seated volcanic phenomena.

Current research in structural geology and tectonophysics encompasses a broad range of studies from the submicroscopic to the global, including investigations into the driving forces of plate tectonics, the structure and origin of mountain belts, the mechanics of formation of folds and of schistosity, and the determination of the deformation mechanisms and rheological properties of rocks and minerals at crustal and upper mantle conditions. Strong ties exist with the Solid Mechanics group in the Engineering Division, and students are encouraged to take advantage of opportunities for course work and research in that area.

Current studies in paleo-oceanography-micropaleontology-sedimentology cover a wide range of areas including but not limited to: (1) mathematical paleoecology, (2) paleoecological, biogeographical and evolutionary studies of deep-sea Cenozoic deposits bearing fossil plankton, (3) Pleistocene climatic history as recorded by carbonate shorelines, deep sea cores, and Quaternary pollen, (4) petrographic and geochemical studies of diagenetic processes in carbonate sediments, (5) isotopic studies of deep sea sediments.

Through a cooperative program with Woods Hole Oceanographic Institute (1-1/2 hours drive away) students in paleontology, stratigraphy, geophysics, and sedimentary petrology can broaden the scope of their research and have contact with a distinguished staff of scientists engaged in a study of the ocean and its history.

Studies in planetary geology include photographic interpretations of the Moon, Mercury, Mars and other Planetary Surfaces. Emphasis is placed on understanding the structure and composition of a planetary surface and the processes involved during its evolution. Comprehensive collections of Lunar Orbiter, Apollo, Mariner 9, Mariner 10 and Viking and Voyager pictures are available. Computer techniques have been developed to store, retrieve, and analyze much of the photographic and remote sensing information. Opportunities exist for a wide range of research programs including photographic mapping, statistical analysis of landforms, remote sensing of surface composition, and theoretical modelling of surface-modifying processes. Field analog studies are being pursued chiefly in volcanic terrains. Natural and synthesized lunar samples are studied both petrographically and experimentally to determine crystallization histories of the outermost portions of the moon.

I. PRIMARILY FOR UNDERGRADUATES

1. *Face of the Earth*

Ms. TULLIS and Mr. YUND.

The nature of the earth's surface and the processes which have created and continue to change it. Topics include rivers, deserts, and shorelines; volcanism; glaciation; plate tectonics; and earthquakes, with an emphasis on the geologic background for better understanding problems of the environment, natural resources, land use, and geologic hazards. Intended for non-science majors seeking a general introduction to the earth; science majors should take Geological Sciences 2. Several practical sessions during the semester, plus a field trip. Cannot be taken in addition to Geological Sciences 2.

2. *Physical Processes in Geology*

Mr. TULLIS (Messrs. PARMENTIER and BYRNE, 1983-84).

An introduction to the configuration and the origin of the interior and the surface of the earth. Topics include physical processes that occur in the interior of the earth driven by internal heat sources and those that occur at the surface driven by solar radiation. Interior processes include volcanism, earthquakes, magnetism, plate tectonics, and mountain building. Surface processes include atmospheric and oceanic circulation; flow of rivers, groundwater, and glaciers; erosion and deposition of sediments. Four labs and two field trips during the semester. Primarily for science majors, particularly those concentrating in the Geological Sciences. Cannot be taken in addition to Geological Sciences 1.

3. *Chemical Geology*

Messrs. GROMET and RUTHERFORD.

An introduction to the chemical and mineralogical nature of the earth, moon and meteorites, and the role of chemical processes in their evolution. Topics covered include: composition and atomic structure of rock-forming minerals; mineralogy, texture, occurrence and mode of origin of common igneous, sedimentary and metamorphic rocks; chemical aspects of weathering, sedimentation, diagenesis and ore formation; applications of stable and radiogenic isotope techniques to geological problems. The course includes a weekly laboratory and two field trips. Prerequisites: high school chemistry or equivalent and Geological Sciences 1 or 2. Primarily intended for science majors.

5. *Mars, the Moon, and the Earth*

Mr. HEAD.

Space exploration in the last two decades has revealed an astonishing array of surface features on the Moon and planets, including impact craters the size of Europe on the Moon.

gigantic canyons on Venus and Mars that dwarf our "Grand" Canyon, and volcanoes on Mars nearly three times as high as Mt. Everest! How do these features form? Why are they different from those on Earth? Lunar and planetary landscapes will be examined to try to understand the processes shaping these surfaces. The planets and their histories will be compared to gain insight into different paths of planetary evolution. A primary objective of the course is to gain a new perspective on planet Earth by expanding one's awareness to include the processes and history of other planets.

7. *Introduction to the Ocean*

Messrs. IMBRIE and PRELL.

A survey of modern scientific knowledge of the world ocean. Intended primarily for non-science students, the course offers a non-quantitative introduction to the major facts and principles of physical, chemical, biological, and geological oceanography. Emphasis is on the ocean as an evolving, dynamically balanced ecosystem. Topics include: composition and history of seawater; surface and deep circulation systems; waves and beaches; the sea floor; marine sediments and organisms; marine ecology; continental drift; and sea level fluctuations. Three lectures each week plus independent exercises on selected oceanography topics. One field trip to study beach and shore processes. No prerequisites.

11. *Fossil Record*

Messrs. IMBRIE and WEBB.

Evolutionary history of the major groups of fossil animals and plants. Attention is given to the use of fossils as guides to stratigraphic correlation and as indicators of past environments. Two Saturday field trips, one in Rhode Island and one in New York. Prerequisite: Geological Sciences 3, Biomed 12, or written permission.

24. *Stratigraphy and Sedimentation*

Mr. MATTHEWS.

Introduction to depositional environments and processes responsible for formation of sedimentary rocks. Major sedimentary environments in the Recent are discussed, general models are proposed, and stratigraphic sequences in older sediments are examined in the light of these models. Laboratory and independent study projects. Prerequisites: Geological Sciences 2 and 3, or written permission.

28. *Pollution and the Environment*

Mr. GILETTI.

The disposal by man of materials and heat into various reservoirs, such as the oceans, the atmosphere, soils, etc., has initiated numerous "experiments", the nature and consequences of which are poorly known. These experiments involve the introduction, dispersal, mixing, exchange, and ultimate disposition of the additives, some of which are now called pollutants. The nature and rates of these processes will be studied. The definitions of pollutants and the ways (legal, scientific, medical, etc.) in which the definitions are established will be examined from the point of view of the use to which the reservoirs would be put. Times for the reservoirs to recover to particular "acceptable" pollution levels will be treated. A paper, which may include independent field work, will be required. Occasional field trips. Science or Engineering concentrators or written permission.

41. *Mineralogy*

Mr. YUND.

Topics for the first half of the semester include crystallography, principles of mineral optics, crystal chemistry, and X-ray diffraction/crystallography. The second half is devoted to a discussion of the major rock-forming minerals with emphasis on crystal structure, compositional relations, and how mineralogical relations reflect their physical-chemical history. Laboratory includes optical and X-ray diffraction techniques. Prerequisites: Chemistry 3; Geological Sciences 2, 3 or written permission.

45. *Structural Geology*

Mr. TULLIS and Ms. TULLIS (Ms. TULLIS and Mr. PARMENTIER. 1983-84).

An introduction to the geometry, classification, and mechanics of deformed rocks. Topics include: stress and strain, mechanical behavior of real and ideal materials, faulting, folding, minor structures, global tectonics. Laboratory work in geologic map reading.

three dimensional visualization of structures, study of deformed rocks, and model experiments. Two field trips. Prerequisite: Geological Sciences 2 and 3 or written permission.

63. *Geophysical Exploration for Earth Resources* Messrs. FORSYTH and HERMANCE.
An examination of the geophysical methods used in the search for petroleum, geothermal energy, minerals and water, including seismic reflection and refraction, gravity and magnetic potential field anomalies, and electromagnetic techniques. Emphasis will be on the interpretation of data gathered in the field and on computer modelling of the structures in the earth's crust associated with these resources. Occasional labs. Prerequisites: Mathematics 9, 10; Physics 5, 6 or the equivalent.

81. *Planetary Geology* Mr. GRIEVE.
The geology of the solid planets (i.e., Mercury, Venus, Earth, Moon, Mars, asteroids, outer-planet satellites). Emphasis will be on surface morphology and chemistry. Current imagery and remote sensing techniques will be discussed. Temporal successions of events integrated with respect to evolution of planetary interiors, surfaces, and atmospheres will be developed. Prerequisite: Geological Sciences 3 or 5.

II. FOR UNDERGRADUATES AND GRADUATES

102. *Petrology* Mr. HESS.
Origin of igneous and metamorphic rocks with petrographic microscope laboratory to study main types of rocks. Prerequisites: Geological Sciences 41.

109. *Field Geology* Mr. BYRNE.
An introduction to the interpretation of geologic features in the field, and to the fundamental principles and techniques of geologic mapping. Approximately ten days prior to the beginning of classes in the Fall plus two or three weekends early in the Fall semester are devoted to several detailed geologic field mapping problems. One discussion period each week will deal with mapping techniques and the interpretation of geologic maps. Prerequisite: Geological Sciences 24 and 45 or written permission.

110. *Oceanography* Mr. PRELL.
The oceans will be studied primarily from a physical, chemical and biological viewpoint. Topics will include: material and heat budgets; definition and behavior of water masses; chemistry of sea water; nutrient cycles; productivity patterns; submarine topography; nature of the sea floor; circulation and sedimentation rates; and origin of the ocean basins. Prerequisite: written permission. Generally open to undergraduate science concentrators in their third or fourth years. Offered in alternate years.

112. *Historical Oceanography* Messrs. IMBRIE and PRELL.
An introduction to marine microfossils, emphasizing their role in reconstructing the history of the world ocean. Main topics include: morphology, taxonomy, ecology, and geologic record of foraminifera, coccoliths, radiolaria, and diatoms; ecological response models; methods of environmental inference; evolution of the Tertiary and Quaternary ocean. Prerequisites: Geological Sciences 11, 110, or written permission.

114. *Submarine Geology* Mr. PRELL.
Examination of the physiography, structure, and sediments of the ocean basins. Course will emphasize the morphology of the sea floor, active and passive margins, and major deep sea depositional systems. The stratigraphy of the ocean floor, including lithic, seismic, magnetic, and isotopic stratigraphy, will be developed as a means to the study of the history of ocean basins. The evolution of major sea floor features will serve as a focus for integrating various disciplines. Prerequisites: Geological Sciences 24, 110, or written permission. Offered in alternate years.

116. *Regional Geology and Global Tectonics*

Mr. BYRNE.

Development of structural and stratigraphic styles in orogenic belts and their relationship to plate tectonic processes. First part of the course covers rules of plate tectonic theory and their application to understanding mountain building processes. Last half to two-thirds of the course examines the development of the western Cordillera in the context of plate tectonic concepts. Specific aspects of other tectonically important regions (e.g., Appalachians, Andes, Indonesia) will also be incorporated. Prerequisites: Geological Sciences 45 or written permission; 24 is recommended.

135. *Meteorological Aspects of Climatic Change*

Mr. WEBB.

An introduction to meteorology and climatology with attention paid to physical principles and mapping techniques useful in studying climatic change. Students are expected to keep notes on the daily weather during the course. Prerequisites: Physics 5, 6 or equivalent; Mathematics 9, 10 or equivalent. Offered in alternate years.

150. *Economic Geology*

Messrs. RUTHERFORD and GROMET.

The geological associations, characteristics, and origins of economic mineral deposits. The main emphasis is on base and precious metals and uranium. Petrologic and geochemical processes relevant to the formation of economic mineral deposits are discussed, as are the geographic distributions of each type of mineral deposit. As appropriate, exploration and extraction methods are briefly treated. There will be two major projects during the semester which constitute the laboratory for the course. Offered alternate years. Prerequisite: Geological Sciences 41 or written permission.

161. *Solid Earth Geophysics*

Messrs FORSYTH and HERMANCÉ.

Basic problems in the study of the physics of the Earth with emphasis on the fundamental mathematical and physical principles involved. Topics will include: mass, moment of inertia, and internal structure of the Earth; global seismology; the magnetic field and global induction; crustal structure from gravity and seismology; paleomagnetism, marine magnetism, and plate rotation; heat flow and the thermal structure of the Earth. Prerequisites: Geological Sciences 2 or written permission; Physics 47 or Engineering 52; Applied Mathematics 34.

162. *Solid Earth Geophysics*

Messrs. PARMENTIER and FORSYTH.

Basic problems in the study of the physics of the Earth with emphasis on the fundamental mathematical and physical principles involved. Topics will include: cooling of dikes and lava lakes; rheological structure of the Earth; mechanisms and forces causing plate motions; thermal and mechanical models of the lithosphere deduced from studies of gravity and topography; viscous flow in the mantle; special topics of current interest. An objective will be to gain familiarity with the application of basic mathematical tools such as Fourier analysis and integral transforms, complex variables, and boundary layer methods for solving problems which arise in theoretical geophysics. Prerequisites: Geological Sciences 161, Physics 50 or Engineering 137, or written permission.

163. *Interpretation Theory in Geophysics*

Messrs. FORSYTH and HERMANCÉ.

Basic statistical theory and its matrix algebra representation will be reviewed. Modern approaches to the general problems of optimum design of experiments, constructing model solutions to measurements, and describing non-uniqueness of uncertainty in models will be developed with particular emphasis on generalized-linear-inverse techniques. These techniques will then be applied to the interpretation of gravity, seismic, magnetic, and electrical survey data in terms of regional subsurface structures in the earth. Prerequisites: Geological Sciences 63 or 161; Mathematics 29, 52 or Applied Mathematics 33, 34 and Physics 47 or Engineering 52. Students should also be familiar with programming and the use of computers.

165. *Earthquake Seismology*

Mr. FORSYTH.

The location and distribution of earthquakes in space and time; measures of size and intensity of shaking; nature of seismic waves; the study of structure of the interior of the earth using wave propagation; the nature of faulting in earthquakes and relationship to tectonic processes. Emphasis in the course is placed on interpretation of actual records from earthquakes recorded at seismograph stations around the world and the application of elementary elasticity theory to the propagation of seismic waves. Prerequisites: Geological Sciences 2; Physics 5, 6 or Engineering 3, 4; Applied Mathematics 33, 34, or written permission.

167. *Electromagnetic Fields and the Earth's Interior*

Mr. HERMANCE.

The application of classical electromagnetic field theory to describe a variety of geophysical techniques for probing the earth's interior. Beginning with a review of Maxwell's equations, a wide range of the theoretical problems and practical techniques will be discussed which are relevant to delineating subsurface structures of importance to resource exploration as well as to understanding regional geophysical processes associated with mountain building and geodynamics. A background in geology is not expected and students in a variety of scientific disciplines are encouraged to make casual inquiries. Prerequisites: Physics 47, Engineering 52, or equivalent.

171. *Remote Sensing of Earth and Planetary Surfaces*

Ms. PIETERS.

The basic principles and applications of remote sensing techniques to understanding the geology and chemistry of surfaces. Specific topics will include: interaction of the electromagnetic spectrum with surface material (gamma-ray, x-ray, UV, visible, infrared, radar wave lengths); Fresnel equations of transmission and reflection; spectroscopy of common rock forming minerals; reflectance properties of rocks, powders, and soils; alteration and weathering processes; applications of current remote sensing data of the Earth and planets (Spacecraft and Earth-based telescopic) to geological and environmental problems such as: resource assessment, large structure identification, land use, pollution detection, oceanography, composition of extraterrestrial surfaces. Prerequisites: Physics 5, 6 and Geological Sciences 3 or equivalent with written permission.

181. *Physics of Planetary Evolution*

Mr. PARMENTIER.

The evolution of planetary bodies will be discussed on the basis of geological and geophysical evidence derived from planetary exploration of the solar system. This will involve the study of physical processes that may be responsible for volcanism and tectonism on the surface of planetary bodies. Such processes include the accretion of planets, the thermal and chemical evolution of planetary interiors, and the deformation of planetary lithospheres. The approach will emphasize an understanding of basic physical principles and their application to the mechanics and energetics of planetary evolution. Prerequisites: Geological Sciences 161 or written permission.

191, 192. *Individual Study of Geologic Problems*

The STAFF.

Library, laboratory, or field study; includes preparation of thesis. Required of seniors in Sc.B. and Honors Program; open to others by written permission of the Chairman of the Department.

III. PRIMARILY FOR GRADUATES

211, 212. *Research in the Geological Sciences*

The STAFF.

May be repeated for credit.

219, 220. *Seminar in Micropaleontology*

Mr. BERGGREN.

Study of selected groups of microfossils, with emphasis on planktonic forms significant in the interpretation of pelagic deposits. The stratigraphic framework as well as the evolutionary development and biogeographic distribution of various groups will be stressed.

226. *Sedimentary Environments in the Stratigraphic Record*

Mr. MATTHEWS.

The course is divided into three parts. First, the Pleistocene dynamic model is developed in detail and integrated with plate tectonics and seismic stratigraphy to produce a general understanding of sea level and climatic history for the last 100 million years. Second, major sedimentary environments in the Recent are reviewed, general models proposed, and classic stratigraphic sequences examined in the light of these models. Finally, these approaches are brought to bear on regional problems in student-originated independent projects. Offered every other year.

227. *Sedimentary Petrology Seminar*

Mr. MATTHEWS.

Discussion of selected problems of recent interest in the fields of sedimentation and sedimentary petrology. Offered every other year.

230. *Mathematical Models in the Geological Sciences*

Mr. WEBB.

Review of matrix algebra and basic univariate statistical concepts. Theory and practical applications of multivariate statistical models applicable to large arrays of empirical data in ecology, stratigraphy, paleontology, sedimentary petrology, igneous petrology and geochemistry. Emphasis on multivariate regression and correlation procedures; factor, covariance, and discriminant-function analysis; and the use of cluster algorithms. Extensive use of computers. Prerequisite: Mathematics 9 and 10 or the equivalent. Mathematics 52 and a course in statistics are recommended. Offered in alternate years.

235. *Quaternary Climatology Seminar*

Mr. WEBB

Discussion of current problems in paleoclimatology. Students will be expected to write and present short papers analyzing the literature on these problems. When possible, students will do original analysis of their own on previously published data. Topics will include time-series analysis, theory of ice age climates, air-sea-ice interactions, and recent climatic patterns as analogues for past climatic data. Prerequisites: Geological Sciences 135 and 112, or written permission.

239. *Quaternary and Human Paleoecology*

Messrs. WEBB and ANDERSON.

Discussion of current topics concerning human interactions with the physical environment during the past million years. Students will prepare short summaries and critiques of journal articles concerned with topics in this inter-disciplinary field. Areas of study will include: 1) effects of human migration in North American, 2) large mammal extinctions, 3) technological change in response to environmental change, and 4) human records of environmental change. Prerequisite: written permission. Offered in alternate years.

241. *Solid State Mineralogy*

Mr. YUND.

Solid state principles and their application to mineralogy will be emphasized. Topics will include structural relations, kinetics and mechanisms of solid state transformations and reactions, diffusion, and application of transmission electron microscopy to these problems. Applications will emphasize selected silicates. Prerequisite: written permission. Offered in alternate years.

242. *Mineralogy Seminar*

Mr. YUND.

Discussion and evaluation of selected topics of current mineralogical interest. Offered in alternate years.

243. *Igneous Petrology*

Mr. RUTHERFORD.

Study of mineral equilibria in igneous rocks in relation to theoretical and experimental studies in silicate systems. Principles of the evolution of igneous rocks in space and time. Prerequisite: Geological Sciences 246 or written permission. Offered in alternate years.

244. *Metamorphic Petrology*

Mr. HESS.

Study of mineral equilibria, metamorphic facies, and metamorphic facies series of metamorphic rocks. Topics covered include metasomatism, mobile components, partial ana-

texis and petrogenetic grids. Prerequisite: Geological Sciences 246 or written permission. Offered in alternate years.

246. *Phase Equilibria*

Mr. HESS.

Principles of thermodynamics and phase equilibria in unary, binary, ternary and multi-component systems using analytical and graphical methods. Other topics include solution theory, equations of state and thermodynamics of surfaces. Prerequisite: written permission. Offered in alternate years.

251. *Advanced Structural Geology*

MESSRS. PARMENTIER and TULLIS (MESSRS. PARMENTIER and BYRNE 1983-84).

A survey course emphasizing basic physical principles applied to problems in structural geology. Begins with fundamentals of stress and infinitesimal strain tensors, finite strain, and deformation processes in rocks and minerals. Applications include the mechanics of folding, faulting, igneous intrusion, and regional-scale structures. Occasional laboratories and field trips. Prerequisites: Geological Sciences 45 and Mathematics 10 or equivalents.

252. *Theoretical Structural Geology*

Mr. PARMENTIER.

Application of continuum mechanics to problems in structural geology and global tectonics. Includes: the formulation and solution of the equations of motion for elastic, viscous, and plastic materials; finite strain tensors; strain energy and variational methods; and conservation laws for heat and mass transfer in a deforming medium and for flow in a permeable medium. Prerequisites: Geological Sciences 251 and Engineering 175 or equivalents.

253. *Deformation Mechanisms, Microstructures, and Constitutive Behavior*

Mr. TULLIS and Ms. TULLIS.

Covers the deformation mechanisms and recovery processes which operate in minerals and rocks over the range of conditions in the crust and upper mantle. Also covers the microstructures and constitutive relations characteristic of each mechanism. Topics include crystal elasticity, fracture, friction, pressure solution, dislocation glide and climb, diffusion creep, recovery, and recrystallization. Emphasis on the processes that are characteristic of metamorphic rocks, and on advances in understanding derived from high temperature and pressure laboratory deformation experiments. Prerequisite: Geological Sciences 251 or written permission. Offered in alternate years.

255. *Topics in Structural Geology* MESSRS. TULLIS, PARMENTIER, BYRNE and Ms. TULLIS. Consideration of current problems in the field of tectonophysics. Prerequisite: Geological Sciences 251.

273, 274. *Geochemistry*

MESSRS. GILETTI and GROMET.

The distribution of the elements and particular nuclides in the earth, with reference to geochronology, stable isotope geochemistry, and the principles governing the distribution of the elements during the major geological processes. The origin of the elements, development of the solar system, and early earth history based on data from earth, lunar, and meteorite materials; rigorous treatment of radioactive and stable isotope geochemistry and its application to significant earth problems.

275, 276. *Geochemistry Seminar*

MESSRS. GILETTI and GROMET.

Discussion of current problems in geochemistry including study of recent publications on cosmic or terrestrial isotopic and element distribution. Theoretical implications will be stressed.

278. *Radiochemistry*

Mr. GILETTI.

The nature, types, energetics, statistics, and mathematical treatment of radioactive decay will be treated, followed by discussion of the interaction of radiation with matter, and

detection, counting, and safety aspects of radiation. Applications will be discussed largely with geological examples. Prerequisite: permission of the instructor. Offered in alternate years.

281. *Planetary Geology Seminar*

The STAFF.

Consideration of the surface geologic processes of the terrestrial planets, implications for the characteristics of planetary interiors, and comparison of the geologic histories of the solid-body planets. Emphasis will be placed on current problems in these areas.

283. *Advanced Geoelectricity and Geomagnetism*

Mr. HERMANCE.

Detailed theoretical considerations will focus on a critical review of the current literature. Topics may be selected from the following areas: magnetotelluric and geomagnetic deep-sounding of the earth's crust, electromagnetic potential separation, the impedance tensor over laterally inhomogeneous and anisotropic media, applications of signal processing, the generation of natural electromagnetic phenomena, and wave propagation in the earth-ionosphere cavity. Prerequisite: Geological Sciences 167, or permission of the instructor.

285. *Geophysics Seminar*

The STAFF.

Discussion of current problems in geophysics. Prerequisite: permission of the instructors.

291, 292. *Special Topics in the Geological Sciences*

The STAFF.

Prerequisite: written permission.

German

Professors BARNOUW,¹ CROSSGROVE, LOVE, A. SCHMITT, WARNOCK (Chairman); Associate Professor D. SMITH; Assistant Professors FRASER, K. GOODMAN,² POORE; Visiting Assistant Professor LUBICH.³

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE

German Literature. Prerequisite: German 11 (or 12). Required: 19, 51, and six 100-level courses from the German offerings; at least one of these will be in the Age of Goethe. Final project is the Senior Colloquium, which is an oral presentation before the Department of a special study conducted by the student. See also: Standard Interdepartmental Concentration Programs (page 106.)

Chemistry and German. Students interested in a joint concentration leading to the A.B. in Chemistry and German should consult the listing for the Standard Interdepartmental Concentration in Chemistry and German on page 112.

Independent Concentration. A student may work out an independent concentration program with a member of the German Department as sponsor and advisor. Such a program may involve a particular period or aspect of German Civilization or of German and other literatures.

Honors. Candidacy for honors in German assumes a better than average academic record, particularly in the major field. Requirements are the same as those for the standard concentration with the addition of two 100-level courses from the German offerings

¹ On leave, 1983-84

² On leave, Semester II, 1983-84

³ 1983-84

and presentation of an acceptable honors thesis, for which one course credit may be granted (198, Senior Conference).

Study Abroad Programs. Interested students are urged to consult with the German Department about opportunities for participation in Brown University programs for study at Bamberg (Federal Republic of Germany) and Rostock (German Democratic Republic). We also maintain at the graduate level an exchange program with the University of Kiel (Federal Republic of Germany).

GRADUATE PROGRAMS

MASTER OF ARTS. Work for the master's degree includes eight courses, of which up to two may be in related fields. Candidates are expected to read, speak, and write German, and to have a broad knowledge of German literature. A reading knowledge of another foreign language is also required. For details, write to the Chairman of the Department.

DOCTOR OF PHILOSOPHY. The general requirements for the doctorate are:

1. Command of the language, spoken and written, and an awareness of its structure and potentialities for expression. Candidates must demonstrate proficiency in reading two additional foreign languages, approved by the Department. An alternate option is to establish competency in one language (generally French) and to demonstrate intensified study of the literature by successfully completing one pertinent course at the 100 or 200-level.
2. An understanding of the origins and developments of the German language and its connection with related languages.
3. Knowledge of German literature, consisting of wide acquaintance with its chief movements and writers and a through knowledge of selected major authors and works, including their historical and intellectual environment.
4. Students are encouraged to take courses in fields related to their major interest. Such courses may be chosen from a second literature, linguistics, or another related field such as art, history, philosophy, or political science.

For further details, write to the Chairman of the Department.

PRIMARILY FOR UNDERGRADUATES

1-2. *Beginning German* The STAFF.
Introductory course for beginners; acquisition of all four basic skills: listening, speaking, reading, and writing. Five hours per week.

11-21. *Intensive Beginning German* (double course) Ms. GOODMAN and STAFF.
Covers material similar to that of German 1-2 in one semester, with somewhat more emphasis on developing speaking skills. Nine hours per week.

1R-2R. *German for Reading: Introductory Course.* The STAFF.
Fundamentals for graduate students and others who need to develop reading competency in German. Open to juniors, seniors and graduate students.

3. *Intermediate German I* The STAFF.
Emphasis on developing vocabulary, grammatical and reading competence, while maintaining speaking and listening abilities. Four hours per week. Prerequisite: German 2 or placement.

4. *Intermediate German II* The STAFF.
Intensive intermediate German. Readings in contemporary texts. Stress on active use of German and vocabulary development. Four hours per week. Prerequisite: German 3 or placement.

7-8. *Beginning Yiddish*

Mr. WARNOCK.

11. *Introduction to German Literature*

The STAFF.

Close textual reading of representative works of prose, poetry and drama by major authors of the last 200 years, including contemporary East and West German writers. Continued emphasis on writing, speaking and reading skills. Filmed versions where appropriate. Prerequisite: German 4 or placement.

15. *German for International Trade Relations.*

Mr. SCHMITT

Introduction to modern business communication and the language of economic dialogue. With specialized and technical vocabulary students are introduced to characteristic areas of European business life such as banking and finance, industry, international trade and advertising. Prerequisite: German 4 or better and some knowledge of capital markets and economics.

19. *Writing and Speaking German I*

The STAFF.

Using texts that introduce students to the main characteristics of German society, the course develops facility with sophisticated grammatical structures and vocabulary; reinforcement through active use of the written and spoken language. Prerequisite: German 4 or placement.

51. *Writing and Speaking German II*

The STAFF.

Designed to increase idiomatic control through concentration on written practice: translation, functional writing, free composition. Written and oral reports. Prerequisites: 11, 12, 15, 19 or instructor's permission.

II. FOR UNDERGRADUATES AND GRADUATES

NOTE: Most 100-level courses are offered in alternate years. Prerequisites (except as specified): any two of the following: German 11, 12, 15, 19; or permission of the instructor.

121. *Early German Literature*

Mr. WARNOCK.

An introduction to the literature of Germany during the Middle Ages and the Renaissance. Conducted in German.

125. *German Literature in English Translation*

Topics vary. In 1981-82 Ms. Terras offered "Gunter Grass, artist in, of and against his times."

131. *The Age of Goethe I*

Mr. SCHMITT.

Presentation and analysis of major ideas and works of the Enlightenment, *Sturm und Drang*, and early Weimar Classicism with emphasis on Klopstock, Lessing, Wieland, Herder, Lenz, Goethe, and the young Schiller. Conducted in German.

132. *The Age of Goethe II*

Mr. SCHMITT.

Discussion of major authors of German Classicism, such as Wieland, Herder, Goethe, Schiller, and their position within contemporary literary, cultural, philosophical, and political movements. Conducted in German.

141. *Romanticism*

Ms. GOODMAN.

Readings from German romantic authors, with a focus on their discussion of the nature of human personality and the importance of the unconscious. Conducted in German.

142. *Realism*

The STAFF.

German literature from the decline of Romanticism to the rise of Naturalism. The politics of literary forms in an era of revolution and counter-revolution.

143. *The Turn of the Century (1880-1920)*

The STAFF.

Trends and writers: Naturalism and Impressionism; the flow and ebb of Expressionism; Nietzsche, Hauptmann, Hofmannsthal, Schnitzler, Rilke, Trakl, Werfel, Kaiser, Kafka and others. Lectures in German, discussion of texts.

144. *Prose Fiction*

Mr. SMITH.

Topic for 1983-84: Realism and Cinematic Variations: German Fiction and Film in a Contemporary Context. Meets twice weekly; screenings and small discussion groups arranged. All texts available in translation, films subtitled.

145. *Drama*

Mr. LOVE.

Topics vary. In 1983-84 Mr. Love will offer "Richard Wagner: Strategies of Aesthetic Revolution" (jointly with David Laurent, Music).

146. *Poetry*

The STAFF.

Topics vary. Conducted in German, papers in English.

147. *20th Century German Literature*

Ms. POORE.

Topics vary. In 1982-83 Ms. Poore offered "Post-War Drama." In 1983-84 Ms. Poore will offer "The 'Golden' Twenties." Conducted mainly in German.

148. *Aspects of Marxist Aesthetics*

Mr. SMITH.

The origins of Marxist aesthetics in the works of Marx and Engels and the development of its current forms: Soviet and East European Orthodoxy, Euro-Communist Revisionism and Freudian-Marxist synthesis. Conducted in English. Crosslisted as Semiotics 166B.

153. *Introduction to Middle High German Language and Literature*

Mr. WARNOCK.

The structure of Middle High German language studied inductively through the reading of shorter texts in a variety of genres and dialects.

154. *Structure and History of the German Language since 1200*

Mr. CROSSGROVE.

The structure of Modern Standard German and the various forms of spoken German; the evolution of these languages since the Middle Ages in the context of German social and cultural history.

170. *Advanced Written and Oral German*

The STAFF.

Designed to develop accuracy and fluency of expression, and to sharpen awareness of idiomatic and stylistic nuances. Discussion of current cultural and political events. Offered every year. Prerequisite: German 51 or written permission.

191. *Seminar in German Civilization*

Topics vary. In 1983-84 Mr. Crossgrove will offer "Land-Use, Culture and Civilization in Northern Europe."

194. *Undergraduate Seminar*

Topics vary. In 1982-83 Mr. Love offered "Nietzsche and the 19th century." In 1983-84 Mr. Schmitt will offer "Heinrich von Kleist and his time."

198, 199. *Senior Conference*

III. PRIMARILY FOR GRADUATES

NOTE: Many of the 200-level courses are currently being offered only on demand.

201. *Introduction to Germanic Philology*

Mr. CROSSGROVE.

203, 204. *Old Icelandic*

Messrs. CROSSGROVE and RUSSOM.

209. *The Teaching of German*

The STAFF.

Practical and theoretical issues in language pedagogy. Contrastive analysis of English and German.

211, 212. *Studies in Germanic Linguistics and Pedagogy.* Mr. CROSSGROVE.
Independent reading and research or, in response to specific needs or desires of students, seminars on older Germanic languages or related special topics.

215-216, 217-218. *Basic Course for Graduate Students* The STAFF.
A two-semester double-credit course required for all first-year Ph.D. candidates and optional for M.A. candidates. Jointly taught by faculty members in the German Department.

222. *Middle High German Literature* Messrs. CROSSGROVE or WARNOCK.

225. *Renaissance and Reformation* Mr. SMITH.

227. *Baroque Literature* Mr. WARNOCK.

232. *Literature of the Eighteenth Century* Mr. SCHMITT.

234. *Romanticism* The STAFF.

243. *Literature of the Nineteenth Century* The STAFF.

246. *Modern Literature* The STAFF.

261. *Studies in German Literature* The STAFF.

284. *Poetry* The STAFF.

285. *Narrative Prose* The STAFF.

286. *Drama* The STAFF.

288. *Studies in Literary Theory* The STAFF.

291, 292. *Reading and Research* The STAFF.

SWEDISH

1-2. *Beginning Swedish* Messrs. CROSSGROVE, WEINSTEIN and STAFF.
Introduction to Swedish and Sweden. Four hours per week.

Hispanic and Italian Studies

Professors AMOR Y VÁSQUEZ,¹ DURAND,² FIDO,³ Oldcorn, Ribbans,⁴ Trueblood.⁵
Assistant Professors GUNZBERG,² MERRIM, RÍOS-AVILA,⁶ and SCHAFER.⁷

The Department of Hispanic and Italian Studies offers regular courses and opportunities for group and individually directed study in the language, literature, civilization and culture of Spain and the Spanish-speaking New World and of Italy. There are degree programs leading to the B.A., M.A., and Ph.D.

The University Library contains ample materials for study and research in these fields, including new and standard books, reference works and literary and professional journals. The Chambers Dante Collection and the Church Collection on Latin America provide good background material in these subjects, while the Italian field is kept up to date by the

¹ Sabbatical leave, 1984-85.

² Sabbatical leave, 1983-84.

³ Director of the Bologna Program, 1983-84.

⁴ Sabbatical leave, 1984-85; Chairman, until June 1984.

⁵ Emeritus, Adjunct Professor.

⁶ Leave of absence, 1983-84.

⁷ Wriston Fellow, II, 1983-84; Sabbatical leave, Semester II, 1984-85.

acquisition of all current publications having research value to the student of Italian language and literature. The John Carter Brown library is rich in printed-source material on the Spanish colonial period.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE

Hispanic Literature and Culture. Prerequisite: Hispanic Studies 33; or two of the following: Hispanic Studies 11, 12, 13 or, with the approval of the concentration advisor, one of these plus a suitable course in another literature. Program: Two of the following: 19, 51, 170; at least three of the following: 121, 122, 124, 126, 129, 133; at least three of the following: 137, 142, 145, 148, 149, 150, 160. With the approval of the concentration advisor, one or more of these courses may be replaced by a course in another Romance literature, in comparative literature, in history, philosophy, art, or another appropriate field.

Hispanic Language and Linguistics. Prerequisite: Hispanic Studies 33; or two of the following: Hispanic Studies 11, 12, 13, or with the approval of the concentration advisor, one of these plus a suitable course in another literature. Program: Hispanic Studies 19, 51, 170; Hispanic Studies 201 or 202, General Romance 201, or Linguistics 11 or 22; Hispanic Studies 121, 124; and 133 or 137; two additional courses to be chosen from among the following: an approved 100-level course in Linguistics, Comparative Literature 171, Portuguese 19, 150, a course included in the concentration program in Italian Studies.

Italian Studies. It is possible for students who begin the study of Italian at Brown to concentrate. Those interested should discuss their plans with the concentration advisor. Requirements: eight relevant courses beyond the second-year level, including Italian Studies 19 and 51, 161 or 162, and at least three courses of the sequence 131, 132, 133, 134, 135, the remainder to be chosen from the department's offerings above the 100-level. Qualified undergraduate students are strongly encouraged to register for 200-level courses. With the approval of the concentration advisor, a student's program may include one or more courses in another Romance literature, or from other closely related fields, such as comparative literature, history, art, political science or philosophy.

Up to four of the required courses, or their equivalents, may be taken during the Brown Junior year in Bologna (ask concentration advisor for brochure and more information).

Latin American Studies. Prerequisite: Language proficiency in Spanish and Hispanic Studies 19 or 51. Program: Hispanic Studies 13 or 137; also one of the following senior courses in directed reading and research leading to the completion of a senior project: Anthropology 193 or 194, Economics 199, Hispanic Studies 198, History 197H or 197I, Political Science 142, Sociology 190 or 191; plus five additional courses to be chosen from among the following: Afro-American Studies 121, 122, Anthropology 112, 142, 152, 242 (with permission); Economics 151, 152; History 121, 122, 127, 153; Hispanic Studies 133, 137, 150 (if suitable subject); Portuguese 11, 12, 19, 150; Sociology 15 or 60.

Honors in Hispanic Studies. The usual number of courses is ten, to be distributed in the manner recommended for the regular concentration program. Hispanic Studies 198 will be taken as part of the honors thesis project.

Related Courses or Programs. Students in Hispanic or Italian Studies should consider the election of one or more courses in such related fields as a second literature, linguistics, history, philosophy, or art. A candidate is expected to read, speak and write Spanish or Italian and have an adequate knowledge of the corresponding literature. In addition, the candidate must demonstrate a reading knowledge of one other foreign language, ordinarily French or German.

GRADUATE PROGRAMS

MASTER OF ARTS. Work for the master's degree may be wholly in Hispanic or in Italian literature or may include one or more courses in such related fields as a second literature, linguistics, history, philosophy, or art. A candidate is expected to read, speak and write Spanish or Italian and have an adequate knowledge of the corresponding literature. In addition, the candidate must demonstrate a reading knowledge of one other foreign language, ordinarily French or German.

DOCTOR OF PHILOSOPHY.

The requirements for the doctorate are outlined below:

1. Command of the Spanish or the Italian language, spoken and written. In addition a knowledge of two other languages, usually French and German, will be required. In certain fields of specialization a knowledge of Latin or another language may be substituted.
2. An understanding of the development and/or the linguistic basis of the Spanish or the Italian language.
3. Knowledge of Hispanic or Italian literature, consisting of wide acquaintance with the chief movements and writers and a thorough knowledge of selected major authors and works, including their historical and intellectual environment.
4. The program may include a number of individually directed reading and research courses. A limited number of approved graduate courses in a field closely related to the major interest of the candidate may also be included. Such courses will usually be chosen from a second literature or linguistics, but studies in another related field may be approved on presentation of sufficient evidence of its relevance to the intellectual purposes of the candidate.
5. It is expected, circumstances permitting, that every graduate student will serve at least a term as a teaching assistant and will have attended a course of instruction in teaching methods.

HISPANIC STUDIES

I. PRIMARILY FOR UNDERGRADUATES

1-2. *Basic Spanish*

The STAFF.

A course for beginners: fundamentals of grammar and basic vocabulary. Six hours of classes distributed among grammar presentation, reading, conversation, drill and training in the language laboratory. Elective for students who have not presented Spanish for admission. No credit is given for the first semester alone, but with written permission a qualified student may elect the latter half of the sequence.

3. *Intermediate Spanish I*

The STAFF.

Intensive three-week oral practice and full review of Spanish grammar followed by readings in Spanish and Spanish American literature: short stories, poetry, drama. Discussion and analysis of reading, conducted in Spanish, with accompanying compositions in Spanish. Three class hours and one laboratory hour per week. Prerequisite: placement.¹

4. *Intermediate Spanish II*

The STAFF.

The course aims to broaden the students' understanding of the Hispanic world, with special emphasis on Hispanic America, and to improve their ability to communicate orally and express themselves in written Spanish. Readings will include, in accordance with student interest, contemporary fiction and nonfictional works dealing with political, social, historical and literary aspects of Hispanic America. Prerequisite: work of high quality in 2, 3 or placement.

¹ See statement on Placement Tests, page 92.

11, 12. *Expression and Values in Spanish Literature*

The STAFF.

A study of literature as an interplay between artistic expression and underlying schemes of values. Each work is examined to reveal essential aspects of a value system (reason, passion, intuition, society, art, etc.) and their effect on literary expression. The readings exemplify various forms (novel, drama, essay, poetry) and are representative of major periods from the medieval to the present. The problems and topics are approached primarily through class discussion. For the relation of these courses to concentration in Hispanic Studies, see concentration statement above. Prerequisite: 4, or placement by examination,¹ or permission of the course chairman.

13. *Modern and Contemporary Writers of Spanish America*

Ms. MERRIM and STAFF.

An introduction to Spanish American literature. Intensive and extensive reading and discussion of major literary works by Spanish American authors of the modern and contemporary periods. For the relation of this course to concentration in Hispanic Studies, see concentration statement above.

19. *Spanish Composition and Conversation*

The STAFF.

Practice in writing and speaking Spanish. Four hours per week: two hours of discussion and analysis, one hour of language laboratory, one hour of oral practice. Weekly compositions. Prerequisite: Hispanic Studies 4 or placement.¹

33. *Intensive Survey of Spanish Literature*

Mr. AMOR and STAFF.

An intensive introduction of the major authors and literary movements in Spanish literature, from medieval to modern times. Special attention to the definition of genre and the building up of critical vocabulary and techniques. Intended as an advanced preparatory course for 100-level courses for students who achieve the highest placement in Spanish. Prerequisite: 4 or placement, or written permission. May not be combined with 11 or 12. For its relation to concentration in Hispanic Studies see Appendix A.

51. *Advanced Composition and Conversation*

The STAFF.

Intensive practice in writing and speaking Spanish. Oral reports, weekly compositions. Four hours per week: three hours of discussion and analysis, one hour of language laboratory. Prerequisite: Hispanic Studies 19 or placement.¹ Open also, with written permission of the instructor, to students who have completed two of the following: Hispanic Studies 11, 12, 13, 33.

II. FOR UNDERGRADUATES AND GRADUATES

Prerequisite for all courses except 102 and 103: 33; or two of the following: 11, 12, 13 or, upon consultation with the instructor, a single semester of either of these sequences plus an appropriate course in another literature.

102. *Twentieth Century Hispanic Literature in English Translation*

Mr. DURAND.

Selected works in various genres by the most important Spanish writers of the twentieth century, beginning with the Generation of 1898. Authors studied will include: Unamuno, Machado, Ortega y Gasset, Lorca, and others.

103. *Contemporary Latin American Fiction in Translation*

The course will deal with the ideological and aesthetic orientations of some of the most significant literary developments of recent decades. Novels and short stories by Spanish American and Brazilian writers that mirror the changing realities of the continent—regionalism, societal factors, conflict and upheaval—and become a vehicle for the affirmation of cultural identity.

¹ See statement on Placement Tests, page 93.

121. *Studies in the Language and Literature of the Middle Ages* Ms. SCHAFFER.
An examination, with its historical and cultural background, of a substantial area of Medieval Spanish literature. Topic for I, 1983-84: Arabs, Jews and Christians in Spain: the interaction of three cultures in literature, philosophy and art.
122. *Studies in the Theatre of the Golden Age* The STAFF.
An examination of an important aspect of the Spanish drama of the Golden Age, from Juan del Encina to Calderón, with appropriate historical and cultural background. Not offered every year.
124. *Studies in the Literature of the Golden Age* The STAFF.
A coherent critical examination of a substantial theme in the Spanish Golden Age literature, with appropriate historical and cultural background. Topic for II, 1983-84: Cervantes. A reading of Don Quixote. Cervantes' creative originality in the short story and drama will also be considered. Provision may be made for students without a reading knowledge of Spanish to read the course material in English.
126. *Studies in the Nineteenth Century* Messrs. DURAND and RIBBANS.
A thorough examination of an important aspect of nineteenth-century Hispanic literature in Spain against the appropriate historical and cultural background. Normally offered every second year.
129. *Studies in the Twentieth Century* Messrs. AMOR and RIBBANS.
A critical examination of an important area of twentieth-century Hispanic literature against the appropriate historical and cultural background. Not offered every year.
133. *Studies in Early Spanish-American Literature* Ms. MERRIM.
A close examination of an important theme of the literature of Spanish-America of the colonial and early independence period, in relation with the historical development of the continent. Not offered every year.
137. *Studies in Contemporary Spanish American Literature* Ms. MERRIM and STAFF.
Will examine closely one of the important aspects of contemporary Spanish-American literature in relation to the political and cultural development of the continent. Topic for I, 1983-84: Contemporary Spanish-American poetry: a study of modern masters.
142. *Studies in Narrative Fiction* Messrs. DURAND and AMOR.
Will cover studies of narrative fiction in Spain and Spanish America without being limited by geographical or chronological considerations.
145. *Studies in Poetry* Messrs. AMOR and RIBBANS.
Essential aspects of poetry in Spain and/or Spanish America without limitation of period or country. Topic for II, 1983-84: Modern Poetry of the Hispanic World: the resurgence of lyric poetry in the last hundred years. Bécquer, as predecessor, Rubén Darío and the modernistas as imitators; Machado, Jiménez, Lorca, Neruda and others as culminating figures. Mr. Amor. Offered in alternate years.
148. *Studies in the Theatre* The STAFF.
Important aspects of the theatre in Spanish which do not fall within the area of the other courses. Offered in alternative years.
149. *Studies in the Literature of Ideas* Mr. RIBBANS and STAFF.
The record of the Spaniard's concern with "the problem of Spain" since the eighteenth century. Spain, the Spaniards in themselves, in relation to Europe and to mankind. (An alternative parallel course on the evolution of ideas in Spanish America may be offered). Offered in alternate years.
150. *Special Topics in Hispanic Literature* The STAFF.

A topic that transcends usual course boundaries and is of special concern to a member of the department will form the basis of a seminar in which undergraduates under his or her direction will explore its ramifications. Not offered every year. Topic for II, 1983-84: The Spanish Civil War: Antecedents, Significance and Cultural Impact. Mr. Ribbans.

160. *Studies in Catalan Language and Literature* Mr. RIBBANS.

A rapid study of the rudiments of the language will provide sufficient reading knowledge for the study of selected texts in Catalan; these will be studied against the historical and cultural background of Catalonia. The emphasis of the course will be placed alternately on medieval and modern literature. Instruction will be in English. Course normally offered in alternate years.

170. *Studies in Stylistics and Linguistics* Ms. SCHAFFER.

Advanced grammar and composition, stylistic analysis and translation, as a key to understanding the mechanics of the Spanish language as applied particularly to the literature of Spain and Spanish America. Not offered every year.

198. *Senior Conference* Mr. RIBBANS and STAFF.

Special work or preparation of Honors thesis under the direction of a member of the staff. Open to Honors students and others with written permission.

III. PRIMARILY FOR GRADUATES

201. *History of the Spanish Language* Ms. SCHAFFER.

Study of the phonological and morphological development of the language (with reference to the dialects and to Portuguese and Catalan). Syntax, semantics, and word-formation will also be discussed. Knowledge of Latin recommended.

202. *Hispanic Linguistics* Ms. SCHAFFER.

Phonetics and phonology of the Spanish language, including discussion of articulatory and acoustic features, emphasizing transcription and production. Application of principles of general linguistics.

203. *Studies in Spanish Literature of the Middle Ages* Ms. SCHAFFER.

210. *The Study of Literature: Methods and Approaches*

Messrs. RIBBANS, FIDO, and STAFF.

Introduction to problems, instruments, and techniques of literary scholarship with consideration of the more significant critical methods, particularly as applicable to Hispanic literature.

211. *Cervantes' Work, I* Mr. TRUEBLOOD and STAFF.

212. *Cervantes' Work, II* Mr. TRUEBLOOD and STAFF.

215. *Studies in Spanish Literature of the Golden Age* Messrs. TRUEBLOOD and RIBBANS.

Topic for 1983-84: Myths of Metamorphosis in Italian and Spanish Literature of the 16th Century. Mr. Trueblood.

216. *Seminar in Spanish Literature of the Golden Age* The STAFF.

225. *Studies in Spanish Literature of the Eighteenth and Nineteenth Centuries*

Messrs. DURAND and RIBBANS.

Topic for 1983-84: Los protagonistas femeninos en las novelas de Galdós. Mr. Ribbans.

227. *Studies in Spanish Literature of the Twentieth Century* Messrs. AMOR and RIBBANS.

Topic for 1983-84: La poesia de J. R. Jiménez y Antonio Machado. Mr. Ribbans.

235. *Studies in Spanish American Studies* Mr. AMOR and Ms. MERRIM.

Topic for 1983-84: Nueva novela historica hispanoamericana. Mr. Amor.

252. <i>Seminar in Spanish American Literature</i>	Mr. AMOR and Ms. MERRIM.
262. <i>Seminar in Spanish Literature</i>	Mr. RIBBANS and STAFF.
291. <i>Independent Research</i>	
291A. <i>Research in Spanish Literature of the Middle Ages</i>	Ms. SCHAFFER.
291B. <i>Research in Spanish Literature of the Golden Age</i>	Messrs. TRUEBLOOD and STAFF.
291C. <i>Research in Spanish Literature of the Eighteenth and Nineteenth Centuries</i>	Messrs. DURAND and RIBBANS.
291D. <i>Research in Spanish Literature of the Twentieth Century</i>	Messrs. AMOR and RIBBANS.
291E. <i>Research in Spanish American Literature</i>	Mr. AMOR and Ms. MERRIM.
291F. <i>Research in Intellectual History</i>	Mr. RIBBANS.
291G. <i>Research in Spanish Regional Literature</i>	Mr. RIBBANS.
292. <i>Thesis Preparation</i>	The STAFF.

ITALIAN STUDIES

I. PRIMARILY FOR UNDERGRADUATES

1-2. *Elementary Italian* Ms. GUNZBERG and STAFF.
A year course. Elective for students without previous training in Italian. No credit for first semester alone. Fundamentals of Italian grammar and development of skills in speaking, comprehension, and writing. Language Laboratory training.

1X. *Intensive Elementary Italian* Ms. GUNZBERG and STAFF.
Course will cover the same material presented in Italian 1-2. One semester equivalent to the standard two-semester sequence. Two semester course credits. Eight class hours weekly plus two laboratory hours.

3. *Intermediate Italian I* Ms. GUNZBERG and STAFF.
Review of the fundamentals of grammar, with emphasis upon skills in speaking and writing. Short readings from modern literature and articles on current events. Prerequisite: 1-2, or placement by examination,¹ or written permission.

4. *Intermediate Italian II* Ms. GUNZBERG and STAFF.
Specific problems in Italian grammar. Reading of one or more short novels, composition and conversation. Prerequisite: 3, or placement by examination,¹ or written permission.

2X. *Intensive Intermediate Italian.* The STAFF.
Course will cover the material included in Brown's present Italian 3-4 sequence. The duration of the course—to be given each year in Bologna as a requirement for our program there—will be three months, and weekly instruction 10 hours. Two semester course credits. Prerequisite: Italian 2 or 1X.

19. *Writing and Speaking Italian I* Ms. GUNZBERG.
A third-year course with intensive practice in speaking and writing. Selected works illustrative of the development of Italian culture over the last 200 years will provide a basis for reading and discussion. Prerequisite: 4, or placement by examination, or written permission.

51. *Writing and Speaking Italian II* Ms. GUNZBERG.
Continuation of 19. Discussion of representative works by influential Italian authors from Dante to the eighteenth century. Prerequisite: 19, or placement by examination, or written permission.

¹ See statement on Placement Tests, page 92.

90A., 90B. *Introduction to Italian Civilization.*

The STAFF.

90A: to be taught at Brown and in Bologna. An introduction to the characteristic features and principal phases of post-medieval vernacular Italian culture. The course will discuss the evolution of the culture of modern Italy since the 13th century, situating historically the various intellectual, cultural, and sociological trends of the last 8 centuries. Prerequisite: Italian 2 or 1X.

90B: to be taught in Bologna. A continuation of Italian Studies 90A, structured in connection with the University of Bologna courses taken by participants in the Program. Prerequisite: Italian 4 or 2X and 90A.

II. FOR UNDERGRADUATES AND GRADUATES

Prerequisite for all 100 courses: Italian Studies 4 or placement by examination,¹ or written permission

101. *Dante in English Translation*

Messrs. FIDO and OLDCORN.

The course, primarily for students with no knowledge of Italian, will be devoted to the study of Dante's works, with the emphasis on the *Vita Nuova* and the *Divine Comedy*. Concentrators in Italian will be expected to read the material in the original.

102A. *Boccaccio's "Decameron" in English Translation*

Mr. FIDO.

102B. *Boccaccio's "Decameron"*

Mr. FIDO.

For concentrators who will do their work in Italian.

103. *Realism in the Italian Cinema*

Ms. GUNZBERG.

The realistic tradition in Italy since World War II. Given in English.

131. *Literature of the Middle Ages from St. Francis to Savonarola*

Mr. OLDCORN.

Readings in early Italian literature, including religious writers and love poets of the 13th century, Petrarch, Boccaccio, the Humanists of 15th century Florence, Ferrara, etc. Prerequisite: Italian 19 or 51.

132. *Great Authors and Works of Italian Renaissance.*

Mr. FIDO.

Readings from Machiavelli, Castiglione, Ariosto, Tasso, Galiei, with special attention to the theory and practice of modern genres: "canzonieri," narrative poems, treatises in dialogue form, comedies, etc. Prerequisite: Italian 19 or 51.

133. *Literature of the Enlightenment*

Mr. FIDO.

Major cultural trends and authors of the eighteenth century. Offered in alternate years.

134. *Literature of the Risorgimento and of United Italy*

Messrs. FIDO and OLDCORN.

From romanticism to decadentism through Foscolo, Manzoni, Leopardi, Verga, Carducci, Pascoli, D'Annunzio. Offered in alternate years.

135. *Contemporary Italian Literature*

Mr. OLDCORN.

From Svevo and Pirandello to "Hermetic" poetry and neorealism. Offered in alternate years.

140. *Special Topics in Italian Literature*

Messrs. FIDO and OLDCORN.

A topic that transcends usual course boundaries and is of special concern to a member of the department will form the basis of a seminar in which undergraduates under his or her direction will explore its ramifications. Not offered every year.

161, 162. *The Divina Commedia*

Messrs. FIDO and OLDCORN.

A close reading of Dante's poem in the light of contemporary European and American critical interpretations.

¹ See statement on Placement Tests, page 92.

198. *Senior Conference*

Special work or preparation of an honors thesis under the direction of a member of the staff.

III. PRIMARILY FOR GRADUATES

200. *Teaching Methodology for Italian Instructors* Ms. GUNZBERG.
Classroom performance, phonetic and morphological structure, techniques for oral drill, testing, critiquing.

201. *History of the Italian Language* Ms. SCHAFFER.
Study of the phonological and morphological development of the language, with reference to dialects. Reading and analysis of medieval texts. Knowledge of Latin recommended. Not offered every year.

202. *Italian Linguistics* Ms. SCHAFFER.
Phonetics and phonology of literary Italian and regional dialects, including discussion of articulatory and acoustic features. Application of principles of general linguistics, plus linguistic geography. Not offered every year.

210. *The Study of Literature: Methods and Approaches* Messrs. FIDO, RIBBANS, and STAFF.
Introduction to problems, instruments, and techniques of literary scholarship with consideration of the more significant critical methods, particularly as applicable to Italian literature.

213. *Studies in the Duecento and Trecento* Messrs. FIDO and OLDCORN.
Monographic studies in the "Scuola Siciliana," the "Dolce stil nuovo," Dante, Petrarch, Boccaccio.

215. *Studies in the Renaissance and Baroque* Messrs. FIDO and OLDCORN.
Monographic studies in major sixteenth and seventeenth century authors.

217. *Studies in the Enlightenment and Romanticism* Mr. FIDO.
Writers and cultural movements from 1750 to 1860.

219. *Studies in Modern Literature and Theatre* Mr. OLDCORN.
Problems and figures from 1860 to the present.

230. *Seminar in Italian Literature and Criticism* Mr. FIDO.
Analytical study of specific authors, works, or subjects. Not offered every year.

291, 292. *Reading and Research* The STAFF.
Courses on special subjects individually planned and supervised.

GENERAL ROMANCE

201. *Introduction to Romance Linguistics* Ms. SCHAFFER.
Basic discussion of the distinctive features and evolution of the major Romance Languages, including an examination of comparative and historical methods.

240. *Problems in Romance Linguistics* Ms. SCHAFFER.
Synchronic and diachronic problems in Romance linguistics. A selection of topics ranging from phonetic and lexical differentiation to dialectology and sociolinguistics.

History

Professors H. P. CHUDACOFF, L. P. CURTIS, C. FORNARA, A. GLEASON, S. R. GRAUBARD, J. B. GRIEDER, B. LYON, W. McLOUGHLIN, A. MOLHO,¹ C. E. NEU, R. C. PADDEN, J. T. PATTERSON, K. RAAFLAUB,¹ N. RICH, D. G. ROHR, J. W. SCOTT, J. L. THOMAS, D. UNDERDOWN, L. E. WILLIAMS, G. S. WOOD; Adjunct Professor N. ROELKER; Associate Professors: P. BENEDICT,¹ M. J. BUHLE,² R. S. JONES, R. B. LITCHFIELD; Assistant Professors: M. GLUCK,³ N. LAMOREAUX, J. MCCLAIN³ J. RICHARDS; Lecturers: D. SCOTT, E. WIDMER.

The objective of the History Department is to provide a rich program of courses in the history of Europe, the Americas, and Asia. The department has no single point of view, approach to the field, or pedagogic method. It offers, rather, a varied program of courses in diplomatic, economic, intellectual, political, and social history which use methods of instruction appropriate to the subject matter and to the students' level of sophistication. Introductory and intermediate courses combine lectures, discussions, and papers, while undergraduate seminars and third-tier courses normally do not include lectures. Courses that examine historical developments during a given period are generally comprehensive in nature. Other courses follow more topical approaches. By taking advantage of the variety of offerings, students, it is hoped, will develop broader perspectives on both the past and the present.

The Department recommends that all concentrators elect at least one seminar. If the student desires an evaluation of total performance in the concentration program, this will be the primary responsibility of the instructor, or instructors, of the seminar(s). Should the student take a course of independent study instead of a seminar, the supervisor of that course will prepare the evaluation. Students who elect neither a seminar nor independent study will be responsible for making their progress in the discipline sufficiently well known so that at least one member of the staff can write a detailed and reliable evaluation.

The facilities for advanced work in history, including graduate study and research, are ample, in some fields exceptional. The historical section of the University Library covers all the major fields and contains an abundance of source materials, archives, government documents, state papers parliamentary and congressional debates, sessional papers etc. The Library also has complete sets of the principal historical reviews. Among the special collections may be mentioned the Church Collection on South America; the Rider Collection of Rhode Island History; the McLellan Collection of Lincolniana; the John Hay Collection; the Bullard and Hoffman Napoleon Collections; also, in the field of international law, the Wheaton Collection, and the Gardner Collection of Chinese Materials.

Students also have access to the John Carter Brown Library, which is the richest collection in its special field, with books on North and South America that were printed in the colonial period.

The libraries of the community are also available for consultation and research; the Providence Public Library; the Rhode Island Historical Society Library; the Rhode Island State Archives; and the Providence Athenaeum.

¹ On leave 1983-84

² On leave, Semester II, 1983-84

³ On leave, Semester I, 1983-84

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Concentration in history consists of a minimum of eight courses in history.

The aim of the concentration is to encourage students to develop a sense of the past and of the varieties of historical writing. Each student must decide, through consultation with Concentration Advisors and other members of the Department, what particular combination of courses will fulfill this goal. The Department strongly recommends the following guidelines:

1. At least two of the eight concentration courses ought to deal with a culture outside the concentrator's primary area of concern. A crosscultural perspective is essential for understanding the history of any single nation, problem or area.
2. In order to gain a better sense of change through time, students who emphasize nineteenth and twentieth century history are encouraged to take at least one of the eight courses on a period prior to 1700.
3. Each concentrator ought to take at least one undergraduate seminar. These seminars are more topical in their approach than lecture courses and provide students with an opportunity to work more closely with members of the Department.

Any two courses in the 0-89 group may be counted toward concentration but not more than two. Students are urged to take a sequence (History 1 and 2, History 51 and 52, History 41 and 42, Classics 1 and 2) prior to enrolling in the concentration. It is advisable for students planning to emphasize modern or early European history to take both History 1 and 2. Students interested in Asian history must normally complete History 41 and 42. Students who wish to emphasize ancient (Greco-Roman) history must take either History 1 and 2 or Classics 1 and 2. Freshmen and sophomores should note that (with the exception of History 121-122, 131-132, and 127) History 1 and 2 (or equivalent) are prerequisites for freshmen and sophomores who take courses numbered 100-148. History 41 and 42 are prerequisites for courses numbered 140-148. Freshmen and sophomores should also note that History 1 and 2 or Classics 1 and 2 are prerequisites for Ancient history courses numbered above 100.

Advance Placement credit does not count for concentration. One or two courses taught in other departments or other universities may be accepted for concentration with the advice and approval of the Concentration Advisor. However in no case will a concentration be approved consisting of fewer than six courses taught by faculty with appointments in the Brown History Department.

The History Department encourages study abroad undertaken and designed as a serious contribution to the student's understanding of some aspect of historical knowledge. This means, in general, that study abroad in history should build on work initiated at Brown, and that history courses taken at foreign institutions must meet the Department's standards in respect to content and performance. Prior consultation with appropriate members of the history faculty and/or concentration advisors is required. It is normally expected that the intention to concentrate in history will have been declared, and the concentration program approved, before study abroad is undertaken. Ordinarily, a maximum of two course credits for work satisfactorily completed at foreign institutions may be counted toward fulfillment of the concentration requirements in history at Brown, under the rubric of "courses taught outside the History Department at Brown."

Courses taken at a foreign university or at a domestic university other than Brown which a student wishes to offer for concentration credit must first be approved by the Department Advisor for Transfer Credits and then by the Concentration Advisor. A Concentration Advisor may seek advice regarding such approval from a member of the Department who is a specialist in the area of the course or who has pertinent information bearing on it before he or she grants concentration credits.

NOTE: Students who contemplate enrolling in the Honors Program in History should consult with the Departmental Honors Advisor at the time they register for concentration. All Honors candidates are required to take History 93 and 94 in their senior year and are strongly advised to take History 92 in the spring semester of their junior year. Other requirements for the Honors Program will be indicated by the Honors Advisor.

COMBINED A.B.-M.A. PROGRAM. This program is open only to very exceptional and outstanding students. The requirements of the program may be met by either of two options: (1) sixteen history courses, two of which must be 200-level seminars (including at least one research seminar) taken with two different instructors with a grade of B or better in both, or (2) sixteen history courses, one of which must be a graduate seminar, another of which would involve the writing of a master's thesis. Students may petition for acceptance of a limited number of courses from other departments to satisfy part of the sixteen-course requirement. Not only the Department but also the Committee on Academic Standing and the Graduate Council must approve requests for admission to the program.

RELATED COURSES OR PROGRAMS. Attention is called to courses related to the study of history in art, economics, English and foreign literatures, philosophy, and sociology, and to those History courses offered by the Department of Classics.

GRADUATE PROGRAMS

Master of Arts. Each candidate shall follow an integrated program of advanced study approved by the department. Normally the student should be able to complete the M.A. program in one year. There are three possible routes to the M.A.: (1) eight courses, including the colloquium required of all first-year graduate students (for double credit) and at least one research seminar, plus the writing of an M.A. thesis; (2) eight courses, including the colloquium required of all first-year graduate students (for double credit) and two other 200-level seminars (including at least one research seminar) taken with two different instructors with a grade of B or better in each; (3) satisfactory completion of the first year of study for the Ph.D. program with a grade of B or better in two seminars. Normally all courses are chosen from those offered by the History Department, but a maximum of four courses, not including the seminars, may be taken outside the Department, provided the student presents a coherent program. There is no foreign language requirement for the M.A. degree.

Doctor of Philosophy. Ordinarily the student should be able to complete the Ph.D. program in five years. The program is essentially divided into three stages: (1) first year courses and seminars; (2) preparation for the Preliminary Examination; (3) writing of the dissertation.

Each candidate for the Ph.D. in the first year will be expected to enroll in the Colloquium required of all first-year students (for double credit); three other 200-level seminars (of which two must be research seminars); and three other courses (which may be either seminars taken for S/N credit, 100-level courses, extra-departmental courses, reading courses, or, in the case of students in Asian History, language courses).

Students who have already earned an M.A. degree in another University may waive one ABC-credit seminar during the second semester of their study. But they must still satisfactorily complete two research seminars during their first year.

At the beginning of their first term, candidates for the Ph.D. should discuss their program of study with the Graduate Advisor and choose the four fields which they will present in the Preliminary Examination. These four fields constitute a student's basic program and should form a coherent whole. In special cases, one of the fields may be in a discipline other than history, provided approval is obtained from the Department. During the second year students will devote their time to preparation for the Preliminary Examination.

tion. Before the end of the second year of graduate study, students should indicate the field in which they intend to write the dissertation. This will be the major field; the others will be minor fields.

Normally during the fifth semester of full-time graduate study, candidates will present themselves for the Preliminary Examination. The examination will consist of two parts, written and oral. The written portion will consist of four three-hour examinations, one for each field. Within one month of the written examination, the candidate will take the oral examination. In this examination one half-hour will be devoted to each minor field and a somewhat longer period will be allowed for the major field.

The final stage of the program involves the writing of a dissertation. After the thesis has been approved by three readers, the Final Examination (oral) will focus on its problems and potentialities.

The foreign language requirement for the Ph.D. consists of written and oral translations from the foreign language into English. A dictionary may be used in the written portion of the examination. The oral translation consists of sight translation from the foreign language into English, not oral use of the language. Failure to meet these requirements will be sufficient grounds to bar a student from continuing in the Ph.D. program. The requirement will vary according to the student's major area of interest.

1. American history: The language requirement will be set by each director of the student's major field.
2. English and British history: A reading knowledge of either French or German. With the consent of the major field advisor another language may be substituted. The director of the student's major field may require additional languages as well. The language exam will be taken during the student's registration week in September. In case of failure the exam may be retaken and must in any case be passed prior to the Preliminary Examination.
3. Continental European history: A reading knowledge of at least two languages, including either French or German. The director of the student's major field may require additional languages as well. Proficiency in at least one of the languages must be satisfactorily demonstrated (in September) before the student enrolls in the Ph.D. program. The second language examination must be passed before the student is allowed to take the Preliminary Examination.
4. Asian history: Proficiency in Chinese, equivalent to the completion of Chinese 7-8, plus Chinese 104 and/or Chinese 119 or their equivalents. Proficiency in a second foreign language: before taking the preliminary examination the student must have passed the examination in the second language, and have demonstrated satisfactory progress toward completing the Chinese requirements.

LIST OF FIELDS

The History of Greece or Rome, or an approved portion thereof
 Medieval England
 Medieval Continental Europe
 The History of Italy, 1200-1600
 The History of Europe, 1492-1715
 The History of Europe, 1715-1870
 The History of Europe, 1870 to the present
 Early Modern England, 1500-1783
 Modern Britain, 1760 to the present
 France under the Ancient Regime
 Modern France, 1750 to the present
 The History of Germany since 1648

The History of Russia since 1689
 The History of Central Europe since 1648
 The History of Italy, 1600-1870
 Spain and her American Empires, 1400-1800
 The History of European Science
 The Intellectual and Cultural History of Modern Europe
 European Social and Demographic History, 1700-1900
 European Women's History, 1750 to the present

American History (The student may offer no more than two of these fields, each with a different examiner):

Early American History
 Modern American History
 American Economic and Business History
 American Political and Diplomatic History
 American Urban and Social History
 The History of American Science and/or Technology
 American Intellectual History
 American Social and Cultural History
 American Women's History
 History of Religion in America
 The English Speaking Caribbean before 1838

Asian History. (The student may present not more than three of the following fields):

Chinese Intellectual history
 Modern Chinese Social and Political history
 Chinese Diplomatic History
 Southeast Asian History
 Inner Asian History
 Modern Japanese History

Notations to List of Fields

Students may petition the Department for fields that are not listed.

I. PRIMARILY FOR UNDERGRADUATES

Prerequisites: History 1, 2 is not prerequisite for concentration but is strongly recommended. With the exception of History 121, 122, and 127, History 1, 2 or equivalent is prerequisite for freshmen and sophomores for all courses numbered 101 through 138. History 41, 42 (formerly Asian History 51, 52) is prerequisite for all courses numbered 141 through 147. These requirements may be waived by written consent of the instructor.

1, 2. *European History Since the Middle Ages* Mr. ROHR.
 A primary purpose of History 1, 2 is to introduce students to the period of European history which began with the Renaissance, the period of modernization which transformed European society from one which was deeply religious, traditional, highly stratified and land-based into one which is secular, urban, innovative and revolutionary. History 1 deals with the period 1500 to 1815; History 2 deals with the period since 1815. A second

purpose is to instruct students in historical thinking: how to formulate significant questions, how to test evidence for credibility; how to resolve conflicting interpretations of events; how to understand those events as products of multiple and indeterminate causation; how to draw tentative conclusions from imperfect data. Instruction is given in the form of lectures (one or two each week) and section discussions (one or two each week). Written work includes either several brief reports or a term paper.

41, 42. *Introduction to East Asian Civilization* Messrs. MCCLAIN and WILLIAMS.
A survey of selected institutions and developments in the Far East and of their emergence and evolution since antiquity. The first half of the sequence is focused on China; the second is on Japan. Prerequisite to courses numbered 140 through 148.

51, 52. *American History since 1763* The STAFF.
A general study of American society, politics, and institutions, and of the relations of the United States with other countries.

90. *Development and Modernization in a Colonial Society: Origins of the Third World in Brazil* (Foundations 90) Mr. PADDEN.
See description under Foundations 90.

92. *Selected Topics in the Writing and Interpretation of History* The STAFF.
Honors seminar for juniors. Topics will vary from year to year.

93, 94. *Honors Courses. Research and Writing of Honors Thesis* The STAFF.
(See description above of Honors program.)

II. FOR UNDERGRADUATES AND GRADUATES

101. *Europe in the Middle Ages* Mr. LYON.
An introduction to the political, institutional, religious, intellectual, social, and economic developments that created a new Europe between the fall of the Roman Empire and the Renaissance.

102. *The Intellectual and Cultural Ambience of Medieval Europe* Mr. LYON.
Emphasis upon the rise of Christian thought and scholasticism, the intellectual revival of the 11th and 12th centuries, the evolution of Roman and Canon law, and the development of the cathedral school and medieval university. These developments are related to contemporary, medieval, social, and economic history.

103. *Social and Economic Problems and Institutions of the Middle Ages* Mr. LYONS.
A study of the collapse of the Roman Empire, and the development and function of seigniorialism, feudalism, the town, the bourgeoisie, the guild, trade and finance, and capitalism.

104. *The Concept of Political Freedom in Greek and Roman Antiquity* (Classics 136) Mr. RAAFLAUB.

106. *Greco-Roman Historiography* (Classics 151) Mr. FORNARA.
(See description under Classics 151).

107. *Renaissance Italy* Mr. MOLHO.
A detailed study of Italian society and culture from the late thirteenth to the early sixteenth centuries. An attempt will be made to provide an economic, social, and political framework for the rise of humanism and the development of the arts.

108. *Europe in the Age of Charles V* Mr. BENEDICT.
Analysis of the changes affecting European society during the period traditionally considered the watershed between medieval and modern times (ca. 1475-1559). Major themes to be explored include: demographic growth and economic change; the rise of the "New Monarchies"; the diffusion of the Renaissance to Northern Europe; and the transforming religious crises of the Reformation and Counter-Reformation.

109. *English Constitutional and Legal History in the Middle Ages* Mr. LYON.
A detailed examination of the medieval development of English institutions and the common law. Emphasis will be placed on the development of a strong monarchy, on the growth of local institutions of self-government, and representation in a central parliament.
111. *Europe, 1559-1715: From Religious War to Absolutism* Mr. BENEDICT.
Survey of the leading developments in European history over a century and a half in which political stability and a new intellectual order gradually emerged out of the chaos of religious conflict.
112. *Old Regime France* Mr. BENEDICT.
France from ca. 1500 to ca. 1750. This course will attempt a total portrait of a society which eclipsed all others in Europe in its day, then slowly began to unravel.
117. *European History, 1748-1815: The Enlightenment, the French Revolution and Napoleon (formerly 113)* Mr. LITCHFIELD.
The culture and politics of late 18th century France, the Revolution and the Napoleonic period. Emphasis on the development of political consciousness among different groups; and on the interaction between events in France and international Jacobinism in England, Germany, and Italy.
114. *19th Century France* Ms. SCOTT.
Society and politics from the Restoration to the first World War, with emphasis on the causes and consequences of revolutionary upheaval.
118. *European Social History in the Eighteenth and Nineteenth Centuries (formerly 116)* Mr. LITCHFIELD.
A detailed analysis of the beginnings of industrial modernization in Western Europe, ca. 1730-1880. Attention is given to agriculture and peasants, the demographic transition, the economic process of industrialization, and the accompanying transformation of middle and working class social life, the family, popular culture, and protest in this period.
119. *Europe 1870-1918* Mr. GRAUBARD.
A political and cultural history of Europe, 1870-1918, with emphasis on the pre-war decade.
120. *Europe, 1914 to the Present* Mr. GRAUBARD.
An intensive examination of two World Wars and their consequences for European Society.
121. *The Ethnohistory of European Expansion to The Americas: Europeans and Africans in the Americas, 500-1700* Mr. PADDEN.
The comparative study of major European and African transits to the Western Hemisphere. The role of native Americans and the continuing ecological revolution precipitated by the physical meeting of Europeans, Africans, and natives are explored in depth, as are the consequences and implications of semi-institutionalized miscegenation and proliferation of new genotypes. Emphasis is placed on Portugal's early exploitation of Africa and the development of colonial Brazil, Spain's invasion and exploitation of the greater Caribbean islands and subsequent creation of the mainland kingdoms of New Spain (Mexico) and Peru, and England's penetration of the Caribbean and counter-colonization of the North American mainland. Imperial systems of control, colonial formation, transculturation, capitalism, and processes of modernization and development are subjected to comparative historical analysis.
122. *The Ethnohistory of European Expansion to The Americas: Comparative American Societies, 1670-1850* Mr. PADDEN.
Comparative study of the origins and perception of American identities, as manifested in the Era of Greater American Revolution (1776-1826) and the emergence of Spanish, Bra-

zilian, Anglo, and Black American nationalisms. Emphasis is placed on the eighteenth-century Enlightenment as the intellectual foil against which American identities tended to be formed, and on Haitian revolution, the Empire of Brazil, Mexican and Argentine federalism, and the federal republicanism of the United States. Special attention to programs of modernization and development and to problems of political, social, economic, and ethnic integration.

123, 124. *The Foreign Relations of the Great Powers, 1815 to the Present* Mr. RICH.
An analysis of the foreign relations of the great powers, with emphasis on the social, economic, and ideological forces involved in the formulation of foreign policy. The chronological break is in 1914.

125. *Twentieth-Century Intellectual History* Mr. GRAUBARD.
The course will deal with a selected number of major texts that have significantly affected thought in the twentieth century.

126. *Women in 19th Century England and France* Ms. SCOTT.
The impact of industrialization on women's work, position in the family, social and political status. Focus on a comparison of the experience of middle and working class women in England and France during the development of industrial capitalism. Two major purposes: 1) to cover substantive material from England and France and 2) to develop a framework for analyzing the historical experiences of women. Final examination (take home) and 3 short papers.

127. *The National History of Mexico* Mr. PADDEN.
The political, economic, and social development of the Mexican nation from onset of the Independence movement in 1810 to the present. Major components include the Juárez era, the Porfiriato, the Revolution of 1910, and the Institutionalized Revolution, culminating in the contemporary scene. Relations with the United States and European powers, especially in the areas of foreign investment, industrialization, and programs of modernization and development, are of particular significance. Although primarily concerned with the nineteenth and twentieth centuries, considerable reading and review of the colonial area is required because it is not possible to achieve acceptable comprehension of contemporary Mexican life and culture without it.

128. *Modern Italy* Mr. MOLHO.
The history of Italy from the Risorgimento to the present, with emphasis on the impact of modernization on Italian society and culture.

129, 130. *European Intellectual History 1790 to the Present* Ms. GLUCK.
The course will examine in some detail the major cultural and intellectual tendencies that emerged in Europe during the nineteenth and twentieth centuries. The first semester will cover the period between 1790 and 1870 and will focus on such seminal thinkers as Burke, Rousseau, Schiller, Hegel, Bentham, Darwin and Marx. The second semester will continue from 1870 to the present and will include the works of Nietzsche, Bergson, Freud, Weber and others.

131, 132. *English History, 1500-1783* Mr. UNDERDOWN.
The political, social, economic, and cultural development of Early Modern England; the origins and growth of British imperialism.

133, 134. *Modern Britain, 1760 to the Present* Mr. CURTIS.
An introduction to British history since 1760 with emphasis on social structure, industrialization, reform movements, the rise of labour, and the warfare-welfare state of the twentieth century. (See University course 138.)

135, 136. *Greek History* (Classics 121, 122) Mr. FORNARA.
For description, see Classics 121, 122.

137, 138. *Russian History*

Mr. GLEASON.

The development of Russia from the Kievan period to the present.

139. *The Soviet Union*

Mr. GLEASON.

140. *History of Imperial China: From the Sung Dynasty to the Mid-Ch'ing* Mr. WIDMER.141. *History of Sino-Russian Relations*

Messrs. WIDMER and MERCHANT.

This course will begin in the Mongol period; move to an examination of the meeting of the Chinese and Russian empires in the 17th century; to the bases of their coexistence in the imperialism in China between 1858 and 1900. The second half of the course will deal with the interaction of the two revolutionary regimes in the 20th century. The course will follow a schedule of two lectures and one discussion section a week. It will be open to students who can attest some familiarity with Chinese or Russian history, or by the consent of the instructors.

143, 144. *China in Revolution, 1800 to the Present*

Mr. GRIEDER.

A survey of modern Chinese history, emphasizing social, political, and intellectual developments from the early 19th century to the People's Republic. The course will deal with the background of China's confrontation with the West, the decay of imperial institutions, various aspects of the impact of alien economics, social and intellectual influences, the rise of radicalism, the politicization of the peasantry, and the establishment of successive revolutionary regimes.

145. *Modern History of Inner Asia*

Mr. WIDMER.

Beginning with the life of Chinggis Khan, the course covers the rise of nomadic empires and the expansion into the steppe of the sedentary societies of Russia and China. The concluding analysis is focused on modern Sino-Russian relations.

146. *Chinese Diplomatic History, 1800 to the Present*

Mr. WILLIAMS.

Analyzes the processes that have characterized China's foreign relations as the traditional order in East Asia was challenged and ultimately broken, as China attempted to contain Western and Japanese attack and as the People's Republic has sought great power status.

147, 148. *History of Japan*

Mr. MCCLAIN.

The first half of the course treats the history of Japan to 1800. Specific topics include the development of the imperial institution and traditional forms of political authority, the emergence of warrior elites and a feudal society, the evolution of Japan's unique cultural heritage, and the social and political changes that resulted from Japan's "sixteenth century revolution." The second half, Japan from 1800 to the present, will focus on the Meiji Restoration, modernization, Japan's emergence as an industrial and military power, the road to Pearl Harbor, and the post-World War II "economic miracle." Each semester, particular attention will be paid to the relationship between social and economic change and political developments. Either semester may be taken independently.

149. *Modern Southeast Asia*

Mr. WILLIAMS.

An investigation of both the indigenous and more recently imported elements in the transformation of Southeast Asia. Emphasis is placed on the relationship among traditionalism, imperialism, colonialism, and nationalism.

151. *The History of the American Colonies, 1580-1760*

Mr. WOOD.

The origins and development of American society out of the interaction of European elements and the environment of the New World.

152. *The Era of the American Revolution*

Mr. WOOD.

The political, intellectual, and social sources and consequences of the American Revolution. History 151 is recommended but not required as a prerequisite.

153. *History of the Early Republic*

Mr. WOOD.

A survey of social, political, and cultural developments from the formation of the Constitution to the Age of Jackson. History 152 is recommended but not required.

154. *Multi-Racial Societies in the Americas before 1800*

Mr. JONES.

Social scientific conceptual schema are utilized in the study of the social and cultural significance of race in the new world before the 19th century.

155. *Slave Societies in the English Speaking Caribbean*

Mr. JONES.

Will be concerned with such slave societies in the English speaking Caribbean as Old Providence, Barbados, the Bahamas, Belize, Jamaica, Trinidad, St. Kitts and St. Vincent. Among the topics to be examined are Afro-Caribbean institutions, the sugar economy, slavery, maroon societies, mulatto populations, and Afro-Indian communities. At least one course in History or Afro-American Studies, or written permission.

159, 160. *History of American Foreign Policy since 1890*

Mr. NEU.

A two-semester course on the history of American foreign policy since 1890, with emphasis upon domestic forces shaping governmental decisions, the bureaucratic dimensions of diplomacy, and the interaction between the United States and other nations and cultures.

161. *The changing Economic Order: American Economic History, 1607 to 1860*

Ms. LAMOREAUX.

The first half of the economic history survey will focus on questions of economic growth—its rate, pattern, and spread; factors which retarded or promoted it; its relationship to political and social change.

162. *The Changing Economic Order: American Economic History 1860 to the Present*

Ms. LAMOREAUX.

The second half of the economic history survey will pursue the themes developed in the first half of the course, but the primary emphasis will shift from growth to institutional change.

163, 164. *History of American Women* (American Civilization 160, 161)

Ms. BUHLE.

A survey of American social life, from pre-industrial to modern times, from the perspective of women's place and participation.

166. *Problems in Afro-American History*

Mr. JONES.

Social scientific paradigms are employed in this overview of Afro-American history. Particular emphasis is placed on the relationship between the changing American social structure and the thought patterns, attitudes, values, and beliefs of whites and blacks.

167. *The Age of Jackson*

Mr. THOMAS.

An examination of Jacksonian politics and institutions (1824-1848) with an historical treatment of such topics as constitutional problems, Manifest Destiny and foreign policy, social reform, slavery, and abolitionism.

168. *The Civil War and Reconstruction, 1848-1877*

Mr. THOMAS.

An examination of political, economic, and social problems in the crisis of the 1850's, the Civil War and Reconstruction.

169, 170. *The United States in the Modern Era.*

Mr. PATTERSON.

Political, social, economic, cultural, and intellectual trends in the United States since 1885. Little coverage of foreign policy. Chronological break is 1930.

173, 174. *The Social and Intellectual History of the United States Since 1789*

Mr. McLoughlin.

An examination of American cultural development with emphasis on the interaction between major movements or forces affecting social change, and the prevailing (or novel) ideas, myths, values, and beliefs of the American people.

175, 176. *American Urban History*

Mr. CHUDACOFF.

This course will examine the urban dimension of American history. It is both a survey, covering a period from colonial times to the present, and a specialized focus, placing the city in its historical context and exploring American history from an urban frame of reference. It will divide around 1850 or 1860, the watershed between the old "walking" city and the modern, mechanized city.

177. *History of Religion in America*

Mr. McLOUGHLIN.

An evaluation of the major religious ideas, leaders, and movements which have influenced American society from 1607 to the present with special attention to revivalism, millennialism, the Protestant ethic, separation of church and state, perfectionist reform, anti-Catholicism, and the conflicts between religion and science.

196. *Undergraduate Seminar in Interpretations of Asian History.*

The STAFF.

Discussion and research concerning various elements of Asian history. The topics that are considered in individual sections of the course will vary from year to year.

197. *Undergraduate Seminar in Interpretations of History—Semester I*

The topics that are considered in individual sections of the course will vary from year to year.

198. *Undergraduate Seminar on Interpretations of History—Semester II*

The topics that are considered in individual sections of the course will vary from year to year.

199. *Undergraduate Reading Course*

The STAFF.

Guided reading on selected topics.

III. PRIMARILY FOR GRADUATES

201. *Proseminar in Medieval History*

Mr. LYON.

Reading knowledge of French or German required.

202. *Seminar in Medieval History*

Mr. LYON.

Reading knowledge of Latin and French or German required.

207. *Seminar in Renaissance History*

Mr. MOLHO.

Concentrated reading on selected topics in the Renaissance. Reading knowledge of either French, German, or Italian required.

208. *Seminar in Roman History: the Conflict of Orders* (Classics 208)

Mr. RAAFLAUB.

For description, see Classics 208.

211. *Proseminar in the History of France, 1500-1750*

Mr. BENEDICT.

Reading on selected topics in French history and historiography, 16th-18th centuries. Reading knowledge of French required.

216. *Seminar in European Social Demographic, and Economic History: 18th-19th Centuries*

Mr. LITCHFIELD.

218, 219. *Seminar in Modern European History*

Mr. RICH.

Domestic and international politics of modern Germany.

221. *Advanced Studies in the Sources and General Literature of the Expansion of Europe.*

Mr. PADDEN.

Intensive examination of the history of Ibero-American colonial historiography. Extensive exercise in comparative and critical analysis of historical works and sources, with emphasis upon problems involved with the expansion of Europe and American colonization.

222. *Graduate Research Seminar in the Expansion of Europe* Mr. PADDEN.
Original research on problems within the broad area of the expansion of Europe into the western hemisphere.
226. *Seminar: Modern European Labor History* Ms. SCOTT.
231. *Proseminar in Early Modern English History* Mr. UNDERDOWN.
Research seminar, with emphasis on topics from the period 1529-1688.
232. *Seminar in Early Modern English History* Mr. UNDERDOWN.
Research seminar with emphasis on topics from the period 1529-1688.
233. *Proseminar in Modern British History* Mr. CURTIS.
Interpretations of British history from the reign of George III to the era of World War I.
234. *Research Seminar in Modern British History* Mr. CURTIS.
Problems in British society, politics, and culture since 1800.
237. *Problems in Nineteenth-Century Russian Intellectual and Social History* Mr. GLEASON.
A reading knowledge of Russian is desirable, but French or German may be substituted.
241. *Problems in Modern Chinese Intellectual History* Mr. GRIEDER.
Offered in alternate years. A reading knowledge of Chinese is ordinarily expected.
242. *Problems in Sino-Southeast Asian Relations* Mr. WILLIAMS.
Topics in the history of Chinese involvement with Southeast Asia will be selected annually. A reading knowledge of Chinese or a Southeast Asian research language is expected.
- 244, 245. *Readings in Malay and Indonesian History* Mr. WILLIAMS.
A reading knowledge of Malay/Indonesian is required.
248. *Problems in Japanese Modernization* Mr. MCCLAIN.
249. *Approaches to Modern China* The STAFF.
A conference course designed to familiarize students with techniques in the interpretation of modern China. This seminar is considered to complement Chinese 104. Materials and Methods of Sinology. A reading knowledge of Chinese is normally expected.
251. *Introduction to Advanced Study in Early American History: Historiography, Approaches, and New Interpretations* Mr. WOOD.
252. *Seminar in Early American History* Mr. WOOD.
260. *Seminar in Twentieth Century American Foreign Policy* Mr. NEU.
261. *Graduate Seminar in Economic History* Ms. LAMOREAUX.
This course will be tailored to the needs and backgrounds of the students taking it but the primary aim will be to develop the skills necessary to conduct diometric research.
263. *Proseminar in American Labor History (American Civilization 263)* Ms. BUHLE.
The impact of industrialization on American social life and values, 1820-1870, with special emphasis on the family and community. Recent historiography will be contrasted to earlier interpretations.
268. *Seminar on Nineteenth-Century American Reform* Mr. THOMAS.
Topics in the history of major reform movements in the nineteenth century.
274. *Problems in American Social and Intellectual History* Mr. McLoughlin.
276. *Seminar in American Urban History* Mr. CHUDACOFF.
An advanced examination of the issues and methodology of American urban history plus primary research on specific topics.

277. *Seminar in the History of Religions in America* Mr. McLoughlin.
285. *Proseminar in the History of Science and Technology* Ms. Richards.
An introduction to the study of the history of science and technology by means of selected topics. Emphasis will be on readings in secondary literature and the writing of interpretive essays.
286. *Seminar in the History of Science and Technology* Ms. Richards.
Research and writing, including the use of primary sources, in the history of science and technology in Europe and America, and the history of science policy.
290. *Seminar in Modern United States History*
- 291, 292. *Reading and Research* The Staff.
Work with individual students in connection with special reading, problems of research, or preparation of thesis. Offered every year.
293. *Colloquium* The Staff.
Required of first year graduate students and open to other graduate students.
295. *Workshop* The Staff.
Required of second year graduate students and open to other graduate students.

History of Mathematics

Professors PINGREE and TOOMER (Chairman); Assistant Professor HOGENDIJK (Visiting).

The program of the Department is concerned with the history and transmission of mathematics, astronomy and related disciplines in Antiquity, the Middle Ages and the Renaissance. The great variety and complex character of the problems connected with this field permit different approaches; consequently students either with primarily mathematical and astronomical training or with a background in classical and historical studies may take part. For graduate students knowledge of the relevant ancient languages and ability to read at least French and German among modern languages is required. Emphasis is laid on the study of original source material. The facilities of the University Libraries are adequate for the printed literature, and the Department has a large and growing collection of photographs and microfilms of original documents.

Programs leading to the M.A. and Ph.D. degrees are worked out with regard to the training, abilities and interests of the individual student.

I. FOR UNDERGRADUATES AND GRADUATES

143. *Introduction to the History of Mathematics* Mr. HOGENDIJK.
144. *Selected Topics in Ancient and Medieval Mathematics* Mr. HOGENDIJK.
- 152, 153. *History of Ancient Astronomy* Mr. TOOMER.

II. PRIMARILY FOR GRADUATES

- 211, 212. *Readings in Arabic Mathematics* Mr. HOGENDIJK.
- 211A, 212A. *Apollonius' Conics V to VIII* Mr. TOOMER.

211B. <i>Greek Astrological Texts</i>	Mr. PINGREE.
212B. <i>Byzantine Scientific Texts</i>	Mr. PINGREE.
291, 292. <i>Kepler's "Astronomia Nova"</i>	Mr. TOOMER.
291A, 292A. <i>History of Indian Astronomy</i>	Mr. PINGREE.

Courses in Sanskrit taught by Mr. PINGREE are listed under the Classics Department. Courses in Classics taught by Mr. TOOMER are listed under the Classics Department. Members of the Department participate in the Ancient Studies Program and teach in the Foundations Courses F13, F14 (Ancient World).

Judaic Studies

Professors NEUSNER (Co-director), DIETRICH, FRERICHs, (Co-director), GOLDSCHIEDER, GOLDSTEIN, HIRSCH, ZUCKERMAN; Assistant Professors FLECK¹ SORKIN;¹ Scheuer Visiting Associate Professor, AVIEZER RAVITZKY;² Fellows of the Program: Professors BAR-NOUW and WARNOCK.

The Program serves as an interdisciplinary focus for studies of Jews and Judaism, including, but not limited to, historical, linguistic and philosophical perspectives and approaches. The Program faculty offers courses at the undergraduate and graduate level, and the Program supervises undergraduate concentrations and graduate programs. The chronological scope of the program's area of interest includes ancient Israel as well as modern Jews and modern Israel. Represented within the faculty associated with the Program in Judaic Studies are three principal humanistic disciplines: history, literature, and religion. Work in the social sciences is carried on as well. The undergraduate curriculum of the Program's courses is organized along *disciplinary* lines. The undergraduate concentration of the Program, for its part, is developed along *interdisciplinary* lines. It follows that the Program in Judaic Studies is not a non-disciplinary exercise in Jewish studies, but at every point a carefully crafted effort to show how diverse academic disciplines deal with a single subject, the Jews. The educational goal of the concentration, spelled out below, is to provide students with a clear idea of how different approaches to the framing and answering of questions of systematic learning deal with the same social entity over a long period of history. Studying the Jews' history, the history of their religion, their languages, their diverse literatures, as well as the sociology, politics and philosophy characteristic of their community, the student learns three important things: first, at least some of the facts of the matter, that is, some Hebrew, some knowledge of history, some mastery of the description, analysis and interpretation of the religion of the Jews; second, at least some clear knowledge of how a historian, a sociologist, a political scientist, a philosopher, or a scholar of the history of religions frames questions and answers them; third, a preliminary notion of what it means to look at the same thing from different angles.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Ten courses in all, two courses of the ten will be in the Hebrew Language. All concentrators will have one full year of Hebrew. The remaining eight courses will be chosen in at least three paired learning modules (thus: three sets of the two courses, with two further

¹ Beginning 1983-84.

² 1983-84, Semester II only.

courses chosen among the Programs's offerings).

A learning module (a set of two courses) will be defined in one of two ways.

1. A learning module of two courses may provide an introduction to the method of a discipline and the application of that method to Judaic Studies, for example, the disciplines of history, literature, religion, or other (philosophy, political science, archaeology, and the like) presented as a theory of systematic learning in one course, and applied to a Judaic topic in a second course.
2. A learning module may provide a comparison of a Judaic topic with some other topic and so introduce the student to comparative studies as an approach to learning, for example, the study of religion in America and American Judaism, or a topic in Christianity and a comparable topic in Judaism.

Modules involve work in a variety of departments. One highly recommended module, for instance, will consist of R.S. 11, Theory of Religion, with any one of the Program's courses in the disciplines of Religious Studies. We expect that further modules will draw upon other Religious Studies courses for purposes of comparison. Thus both disciplinary and substantive courses of other departments will serve the Program in Judaic Studies. An example of (1) a disciplinary module in the present Course Catalogue would be Political Science 50, Foundations in Political Analysis, and Special Themes and Topics 21, Modern Jewish Society and Politics (both: Mr. Zuckerman). An example of (2) a module of comparison would be Judaic Studies 1 and Religious Studies 2, thus, how one would view as a whole both Judaism and Christianity. Further examples would be these: one course in modern European intellectual history and one in modern Jewish intellectual history; a course in the literature of ancient Israel (Old Testament) and in the literature of earliest Christianity (New Testament); or R.S. 72 and J.S. 74, Christianity and Judaism in Late Antiquity, respectively. All concentrators will enroll in the senior seminar, R.S. 199, in Semester II of the senior year. In that seminar, all concentrators will write a senior essay meant to draw together the threads of the concentrations, both substance and disciplines. A comprehensive examination will be required of all concentrators. Questions will be framed to encompass a wide range of course selections in the students' patterns of concentration. Recognition of excellent work in R.S. 199 and in the comprehensive examination will take the form of a degree with honors. The Program in Judaic Studies will provide counsel to concentrators on courses outside of the concentration to be recommended in particular. It will further take full responsibility to provide faculty advisers for all concentrators. Potential concentrators who request advisers will be accommodated as well.

GRADUATE PROGRAMS

MASTER OF ARTS. The Master of Arts in Judaic Studies will be conferred upon completion of an approved program of eight semester courses and a thesis. Interdisciplinary approaches will be expected in the construction of the program of courses and in the thesis. The candidate is expected to develop competence in the theory of religion, or other disciplinary option, through formal course work. M.A. candidates must pass an ETS examination at the designated level in either French or German.

DOCTOR OF PHILOSOPHY IN HISTORY OF JUDAISM. The doctoral program presupposes that degree candidates will acquire a broad base of knowledge across the total chronology of Judaism, but will complete the degree with research-level competence in Judaism in late antiquity. Degree Requirements:

- a. *Theory of Religion:* The candidate is expected to develop competence in the theory of religion through formal course work. Other disciplinary options may be introduced.
- b. *Language Requirement:* The student must demonstrate by ETS examination a read-

ing knowledge of at least two foreign languages (ordinarily French and German). The student must possess upon entrance the ability to read classical post-biblical Hebrew and Aramaic texts, particularly of the talmudic period, and modern scholarly Hebrew.

- c. *Preliminary Examination:* The preliminary examination must be completed by the end of the first semester of the year in which the student expects to receive the degree. Examination Areas: 1. Religion and literature of ancient Israel; 2. Judaism in late antiquity; 3. Judaism in medieval and modern times; 4. Analytic questions on the history of Judaism, utilizing several approaches to the study of Judaism within the academic study of religions.
- d. *Candidacy:* The candidacy of the student for the degree of Doctor of Philosophy shall be certified no later than the end of the seventh semester in the student's program.
- e. *Preparation for Teaching:* All doctoral students serve as teaching assistants and fellows, under senior faculty supervision. This part of their education is meant to train them as future teachers, colleagues, and members of departments.

The doctoral program in the History of Judaism stresses scholarly study of Judaism in late antiquity. Dissertations and other research projects investigate problems in that period. Doctoral students also take courses and graduate seminars in the biblical, mediaeval and modern period. The Program annually offers graduate seminar work in the biblical and modern periods in particular. While the principal methodological emphases of graduate studies derive from the study of religion, other disciplinary courses, for example, in sociology and anthropology, are regularly taken by doctoral students. Accordingly, the aim of the Program is to turn out young scholars able (1) to teach in a broad spectrum of courses in the study of religion, with emphasis upon Judaism, and in the history of Judaism, and also (2) to pursue research in the limited area of Judaism in the first six centuries of the Common Era. Alumni of the Program now teach in departments of Religious Studies, Near Eastern Studies, and History. The greater part of doctoral studies takes place in seminars, such as those listed above. Graduate students participate also in upper-level courses in other departments and programs of the University, including anthropology, philosophy, classics, religious studies, women's studies, and the like. Work on the dissertation begins upon entry and is conducted in J.S. 203, 204, which meets on a twelve-month a year cycle. Presentation of a publishable dissertation is required for the degree; all dissertations to date have been published and are listed in the catalogue of series under Mr. Neusner's editorship. Doctoral studies generally extend for three full years for students with substantial prior education, and for four or even five years for others. All students who have sought academic positions, from the beginning of the Program (and its predecessor) in 1968 to the present date, currently hold such positions, most of them now are tenured and four are chairmen of their departments. Candidates for admission to the Program should write for applications and further information to the following: Graduate Advisor, Program in Judaic Studies, P.O. Box 1826, Brown University, Providence, RI 02912. The Program normally admits one or two students a year and awards, on the average, one doctoral degree annually.

I. PRIMARILY FOR UNDERGRADUATES

Interdisciplinary and Comparative Studies

1. *Judaism as a Religion*

Mr. NEUSNER.

For most of their history, until the beginning of the twentieth century, the Jews have been regarded as a religious group. This course takes up the problem of defining the religion of

that group by considering several systems of Judaism—world view, way of life—created by groups of Jews from biblical to modern times. These several systems are treated one by one and also in comparison with one another.

2. *Biblical Israel and the Judaic Tradition: An Interdisciplinary Approach.*

Mr. FRERICHS.

Examines a series of views which inform the world of Biblical Israel and which find expression in later forms of Judaism. In each major instance a different disciplinary approach is used: historical, literary, theological, sociological, anthropological. Major attention to the following: the sovereignty of God in history; Israelite views of the universe: cosmology and cosmogony; the role of law, apodictic and casuistic; Israel and the plastic arts: the prohibition of cultic images; holy person: priest, prophet, wise man; forms of political authority; theocracy, democracy, kingship; nature of deity: role of multiplicity; concepts of time; knowledge: human and divine; the nature of man: views of life, death, suffering, sickness, healing, youth, old age.

3. *Contemporary Religious Thought: Judaic and Christian* (Religious Studies 19)

Mr. DIETRICH.

Interested students should register for Religious Studies 19.

4. *Modernization and the Transformation of Jewish Communities* (Special Themes and Topics 21)

Mr. ZUCKERMAN.

Interested students should register for Special Themes and Topics 21.

5. *The Idea of History of Judaism*

Mr. NEUSNER.

The conception that events constitute history and bear meaning comprises a principal definition of Judaism. The role of history and reflection upon its significance, the transformation of events into destiny and catastrophe into prophecy—these form the focus of the course. Readings include samples of the historical literature of the Jews from the beginnings of history-writing to the present day.

6A. *Judaism and the Human Experience: Demonization and Holocaust: An Historical Account*

Mr. SORKIN.

The destruction of the Jews of Europe, from 1933-1945, in the historical context of their systematic dehumanization. The human dimension of mass murder, as described in historical sources.

6B. *Judaism and the Human Experience: Woman in Jewish Culture: Image and Status*

Ms. WEGNER.

This course explores the cultural image, social role and legal status of women at selected points during 2,500 years of Jewish history. We examine statements about women, culled from Bible, Mishnah, Talmud and other Judaic texts, as sources of women's status in Jewish law down to and including the present day. We focus on the question, "How far does traditional Judaism treat women as persons?" and analyze the conflict between the subordinate status of women in Jewish law and the desire of many contemporary Jews for women's full equality in matters of private right and public rite. The historical inquiry is placed in perspective by comparing the status of Jewish women with that of women in dominant surrounding cultures. Primary texts and ethnographic materials are read against a backdrop of anthropological and feminist theory, to provide an interdisciplinary approach to the problem of women's place in patriarchal cultures.

6C. *Judaism and the Human Experience: Religious Life in the State of Israel*

Mr. RAVITZKY.

Trends and movements in the spiritual life of the Jewish state, from 1917 to the present. Stress on such religious figures as Rav Kuk, the spiritual ideals of the kibbutz movement, and events in the diversification of Israeli orthodoxy since 1967.

Language Studies

11-12. *First Year Hebrew*

Mr. BROOKS.

Elements of modern Hebrew grammar and syntax.

13-14. *Second Year Hebrew*

Mr. FLECK.

Reading and conversation in Modern Hebrew.

Literary Studies

32. *How To Read a Jewish Book*

Mr. NEUSNER.

Judaism is a religious tradition that came to expression through the writing of holy books. The relationship of book-writing to religious experience and thought forms the problem of this course, which seeks to define what can be holy about a book, and how a book can capture the life of a community. The books at hand range from biblical books to the Bible as a whole, then to books that succeeded and those that did not, in the later history of Judaism. The course closes with the problem of defining what is Jewish, and what is Judaic, about contemporary writing.

33. *The Bible as Literature*

Mr. FRERICHs.

An analysis of the literary traditions represented in the Hebrew Bible, with attention to questions of genre, language and form. The English translation of the Bible will be the basis of instruction. Approaches and perspectives on the Bible as literature will be derived from ancient and modern sources. Attention will be given to the influence of biblical form and content on subsequent aspects of Jewish literature. The drive of the course is to examine those aspects of the literary aspects of the Hebrew Bible which inform subsequent expressions of the Jewish consciousness through explicit Jewish literature.

49. *Modern Hebrew Literature in Translation: Between Word and World:**The Flowering of Modern Hebrew Literature*

Mr. FLECK.

Reading and analysis of masterworks of modern Hebrew fiction from the later 19th century up to the establishment of the State of Israel. In addition to the analysis of individual works, this course will address the following questions concerning the very nature of modern Hebrew literature: What, indeed, is modern about modern Hebrew literature? What is the relationship between modern Hebrew literature and earlier forms of Hebrew literature, on the one hand, and modern European literatures, on the other? What effect did the initial confrontation between an ancient tongue and the modern genre *par excellence* have upon narrative modes and techniques, themes, the genre itself? What are the relationships between periods, generations, and trends in modern Hebrew literature? What effect did the rise of a Hebrew speaking center in Palestine and the establishment of the State of Israel have upon the literature?

50. *Modern Hebrew Literature in Translation: Up Against History:**The Contemporary Israeli Novel*

Mr. FLECK.

An outstanding characteristic of Israeli fiction of the last three decades has been its insistence upon confronting major historical events and forces. Students in this course will read and analyze works by S. Yizhar, Yehuda Amichai, Aharon Appelfeld, Amos Oz, and A. B. Yehoshua. In addition to the analysis of individual works, students consider, with the help of selected theoretical texts, the larger question of history in the novel: the pressures and problems the historical theme creates for the writer of fiction.

Historical Studies

52. *The History of Ancient Israel, to Alexander the Great*

Mr. FRERICHs.

A study of the history of Ancient Israel from the Mosaic Age to the end of the Persian Period and the rise of Alexander the Great. Emphasis will be placed on the interrelation-

ship of political and religious history with particular attention to the roles of particular offices and institutions: kingship, prophecy, the wise man, the Temple. The course will be based upon the use of literary sources from Israel (Bible) and the Ancient Near East as well as artifactual evidence. No prerequisites.

54. *History of the Jews from 70 to 640*

Mr. NEUSNER.

In late antiquity, from the second to the seventh centuries, Judaism as we know it came into being. In these formative centuries, the classics of Judaism beyond the Bible, in particular the Mishnah and the two Talmuds, the literature of biblical exegesis known as midrash, the Jewish prayerbook, and many other authoritative works, came into existence. They expressed, to begin with, the world view and way of life of a small circle of intellectuals, called rabbis, but eventually came to serve and speak for the entire Jewish nation, wherever it lived, from antiquity to modern times. The problem of the course is to explain the formation of Judaism.

61. *The Jews in America*

Mr. SORKIN.

Survey of the history of the Jews in this country from 1654 to the present, with emphasis on contemporary political, social, economic, demographic and cultural trends. The role and position of the Jews in American society since World War II form the center of interest. The course uses and illustrates social scientific methods of description and interpretation.

63. *Contemporary Jewry: World War I and Beyond*

Mr. SORKIN.

World War I shattered the European world; in so doing, it also transformed the possibilities of European Jewish life. World War I marked the end of the era to which European Jewry had responded in the struggle for emancipation, the encounter with modern secular culture and the adjustment to the modern nation state and bourgeois society. When that world disappeared, a volatile mass society took its place. European Jewish life had to be reconstituted in relationship to the new political, social and cultural forms of mass society. We will examine the history of European Jewry from World War I to the present, focusing on central topics. We will consider European Jewry in relationship to new forms of politics, new social structures and the contours of mass culture. We will consider not only the way in which mass society (e.g. Nazism, Russian Socialism) impinged on the Jews, but also the internal response and accomplishments of European Jewry.

Religious Studies

72. *The Religion of Ancient Israel and the Formation of Judaism*

Mr. FRERICHs.

This course focuses upon those aspects of the religion of ancient Israel which inform subsequent developments in Judaism. Of particular interest are the interactions of the Israelite priesthood with the rabbinate; the role of covenant(s) in defining the relationship between the people of Israel and its deity; the role of the Promised Land; attitudes toward political authority and the forms of that authority; forms of revelation: law, teaching, oracular revelation, wisdom: sacrificial and non-sacrificial worship, the Temple and the synagogue. Selective reading in the English Bible and later Jewish literature.

73. *Judaism Before A.D. 70 (Religious Studies 63)*

Mr. MOEHRING.

Interested students should register for Religious Studies 63.

75. *Judaism in Medieval Times.*

Mr. RAVITZKY.

Survey of the main currents in the intellectual life of Judaism in both the Christian and the Muslim worlds, from the rise of Islam to the eighteenth century, with emphasis upon the development of Jewish mysticism and Jewish philosophy.

76. *Judaism in Modern Times*

Mr. SORKIN.

The entrance and incorporation of the Jews and Judaism into European society in the 19th century was a painful, protracted, complicated and multidimensional process. It involved the transformation of social and economic structures, the reshaping of political institutions and the rethinking of intellectual and religious traditions. The process involved a series of fundamental conflicts: How could a community-based religion with a highly sophisticated form of inherited authority fit into a society based on individual rights? How could an all-encompassing religious tradition fit into a socially-differentiated society with an increasingly insistent secular culture? How could a minority group with a religion regarded as inferior attain political equality and social acceptance? We will do an in-depth study of European Judaism's secularization and embourgeoisment as a social, political, economic and cultural process, understanding it within the framework of the emergence of modern European society.

77. *Modern Judaic Thought*80. *The Mystical Tradition in Judaism*89. *American Judaism*

Mr. NEUSNER.

The ancient Judaic religious tradition moved to America in several forms and stages. It was mediated by immigrants; hence, the several expressions of Judaism in this country demand interpretation in relationship to the world view and way of life of immigrants, their children (the second generation), and their grandchildren (the third generation) and beyond. The history of Judaism in America is therefore described, analyzed, and interpreted against the social world of successive generations of the American Jews. Emphasis upon the religious developments of the mid- and later twentieth century.

90. *Problems in Contemporary Judaism*

Mr. SORKIN.

95. *Modern Jewish Society and Politics (Special Themes and Topics 21)* Mr. ZUCKERMAN.
Interested students should register for Special Themes and Topics 21.

99. *Topics in Judaic Studies*

II. FOR UNDERGRADUATES AND GRADUATES

Language Studies

111-112. *Aramaic Talmud Studies*

Mr. SCHWARTZ.

This course provides students with the tools for reading and understanding in the original language the formative documents of Judaism: the Mishnah, Tosefta, Talmud of the Land of Israel and Talmud of Babylonia. Students will study the technical terms, grammar, rhetoric and style of discourse that characterize each of these documents. We shall consider how the framers make their points and the techniques of interpretation they employ.

199. *Senior Seminar in Judaic Studies*

The STAFF.

The senior seminar, required of all concentrators, focuses upon a single problem in Judaic Studies, analyzed and presented from several different disciplinary perspectives. The seminar is meant to highlight the interdisciplinary character of the concentration by underlining the diverse ways in which a given problem or phenomenon may be described, analyzed, and explained or interpreted. Each student is required to present a significant, substantial essay, exposing the diverse methodological possibilities inherent in the study of the history, literature, and religious expressions of the Jewish people from the beginnings to the present.

III. PRIMARILY FOR GRADUATES

200. *Theory of the Study of Religion* (Religious Studies 200)

201-202. *Seminar in Biblical Studies*

Mr. FRERICHs.

203-204. *Seminar in Talmudic Studies*

Mr. NEUSNER.

Focuses on the history of the formation of the principal ideas of talmudic Judaism, as these are expressed in the classical writings of late antiquity. Topics include slavery, women, the role of intention and attitude, and other issues in the larger world view of the nascent rabbinic system. Work in this seminar results in the doctoral dissertations of all graduate students.

205-206. *Seminar in Medieval Judaism*

207-208. *Seminar in Modern Judaism*

Mr. DIETRICH.

Major movements, thinkers and documents in 19th and early 20th century Judaic religious thought, e.g., Mendelssohn, the Judaic Hegelians, Hermann Cohen, Rosenzweig, against the backdrop of major shifts and changes in the life of the Jewish people in the 19th and 20th century (emancipation, assimilation to patterns of life and thought in Western European and American civilization, the rise of modern anti-Semitism, the Reform movement in Judaism, the emergence of various forms of Jewish nationalism, including Zionism). Topic to be announced each year. Two semester or one, at the option of the instructor. Topic for 1983-84 (one semester). Mendelssohn, Hermann Cohen and Franz Rosenzweig: Fundamental themes of their systems and the interconnection of the three systems of thought.

209-210. *Seminar in the History of the Jews in Modern Times*

Mr. SORKIN.

211-212. *Seminar in the Literature of the Jews in Modern Times*

Mr. HIRSCH.

213-214. *Seminar in the Social Sciences and Judaic Studies*

MESSRS. ZUCKERMAN, GOLDSTEIN, GOLDSCHIEDER.

215-216. *Topics in Judaic Studies*

THE SCHEUER VISITING PROFESSOR.

Languages and Literatures

Departments of Languages and Literatures include the following:

Chinese (see Linguistics)
Classics
Comparative Literature
Egyptology
English
French Studies
German
Greek (see Classics)

Hispanic Studies
Japanese
Italian Studies
Latin (see Classics)
Linguistics
Portuguese
Russian
Slavic

A complete listing of the courses offered in each of these departments is provided under the respective department headings.

Law and Liberal Education

Professor EDWARD N. BEISER, *Director*; Preceptors in Law and Liberal Education: JAMES FREIDMAN; JAMES KAINEN.

The Center for Law and Liberal Education is administered by an Executive Committee consisting of Professors BEISER (Political Science—Director), BRINTNALL (Political Science), BROCK (Philosophy), FRIEDMAN (Law and Liberal Education), KAINEN (Law and Liberal Education), REEDER (Religious Studies), RUESCHEMEYER (Sociology), WARD (Chemistry), and WOOD (History).

The Center for Law and Liberal Education seeks to utilize legal materials in a manner appropriate to the goals of undergraduate liberal arts education. It is in no sense a professional or preprofessional enterprise. Rather, it subjects legal institutions, processes and concepts to rigorous and systematic exploration from a variety of points of view. Legal topics provide the occasion for the disciplined examination of fundamental normative and empirical questions.

UNDERGRADUATE PROGRAM

LAW AND SOCIETY

The Center sponsor an *honors concentration* entitled Law and Society. The following courses must be completed not later than the end of the junior year: Economics 111; History 51 and 52, or History 109 or History 152; Philosophy 158 or Philosophy 160 or Philosophy 165; Political Science 116, Political Science 117, Sociology 142. (Note that Political Science 116 must be taken during the sophomore year.)

A seminar for concentrators (Law and Society 185) is taken during the junior year. A senior tutorial (Law and Society 191) and either a senior thesis (Law and Society 193, 194) or a senior project (Law and Society 192) are required.

Each concentrator will design a cognate field of at least three courses at the 100 level or above, in one or more departments, to be completed by the end of the 8th semester.

Enrollment in this concentration is limited to 15 members of the junior class.

I. PRIMARILY FOR UNDERGRADUATES

11. *The Rule of Law* (Foundations 11)

The STAFF.

A critical analysis of central issues in political theory as reflected in the American legal system. Particular attention will be paid to the relationship of the individual to the community, and to the issue of equality. Careful discussion of legal materials will facilitate the analysis of the central empirical and normative assumptions of the liberal state. Topics to be considered include: discrimination (racial and gender), the environment, property rights, obscenity and censorship. Designed to stimulate the consideration of issues which are central to education at Brown, the course requires student self-discipline and active participation. Not open to juniors and seniors. Limited to 150 students, chosen at random with preference given to freshmen.

II. FOR UNDERGRADUATES AND GRADUATES

152. *Energy Policy and the Legal Process*

Mr. FRIEDMAN.

An analysis of relationships between American legal thought and the use of natural resources. Constitutional and statutory issues concerning the regulation of natural resources and energy industries will be discussed. Specific topics include alternative con-

ceptions of private property in American law; the development of petroleum resources, nuclear power, centralization of energy industries and technology. Not open to freshmen.

181. *The Nature of Rights*

Mr. FRIEDMAN.

This seminar examines competing theories of the rights of the individual in society. Readings in legal theory and in case law. Written permission required.

182. *Topics in American Legal History*

Mr. KAINEN.

This seminar examines selected aspects of American legal history, relying heavily on the examination of original sources. Students will be required to prepare major research papers. Written permission required.

185. *Junior Seminar*

The STAFF.

Required seminar for concentrators. Written permission required.

191. *Senior Tutorial*

The STAFF.

192. *Senior Project*

The STAFF.

193, 194. *Senior Thesis*

The STAFF.

Linguistics

Professors BLUMSTEIN, KUCERA, LIEBERMAN (Chairman), WRENN; Associate Professors BARON, LATTIMORE, MESKILL; Assistant Professors CHIERCHIA, CLANCY, HUNTLEY, JACOBSON, RABSON; Lecturers LEE, WHITE, YAMASHITA and RYAN; and members of associated departments.

The Department of Linguistics offers an undergraduate concentration in Linguistics and cooperates with Psychology and Computer Science in an interdepartmental standard concentration program in Cognitive Science. Additional interdepartmental concentrations are available with Anthropology, Applied Mathematics, Computer Science, and the language departments. The graduate program offers courses leading to the degree of Master of Arts and Doctor of Philosophy in Linguistics. Specializations include (but are not limited to) psycholinguistics (including neurolinguistics and speech physiology and phonetics); theoretical linguistics (including phonological, syntactic and semantic theory); computational and mathematical linguistics. In conjunction with the Rhode Island School for the Deaf, the Linguistics Department also offers a Ph.D. program in linguistics for training curriculum supervisors in deaf education.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Linguistics is at the crossroads of many fields of inquiry. The concentration in linguistics is designed both for students interested in the discipline itself and also for those wishing to use their understanding of language to pursue other disciplines. Linguists are concerned with such issues as what all human languages have in common, why languages change, and how our linguistic abilities interact with our cognitive abilities. Fields as diverse as anthropology, literary criticism, semiotics, and language pathology rely heavily upon methods and models developed in linguistics. The analytic and communicative skills necessary in the field of law, medicine, journalism, social services, and advertising are fostered by understanding the structures and meanings of which human language is composed.

The concentration in Linguistics consists of a minimum of eight courses, including:

(A) Core Component (five courses)

- (1) Linguistics 22 (which may be waived in special instances)
- (2) an introductory course in phonology (Linguistics 121 or 122)
- (3) an introductory course in syntax (Linguistics 131)
- (4) two more courses in Linguistics above the 100 level

(B) Individual Component

A minimum of three more courses in linguistics or appropriately related disciplines, of which no more than two may be courses below the 100 level. Students may focus on theoretical linguistics, language and speech, language and society, psycholinguistics, language and philosophy, individual languages (modern or classical), or language and literature, to list just some of the possibilities.

Concentration components are worked out in consultation with the concentration advisor.

Honors: Candidates for Honors in Linguistics will take a minimum of ten courses for the concentration which will consist of all requirements for the standard degree plus an additional two courses in Linguistics or appropriately related disciplines above the 100 level. One of these courses may be an independent study project upon which the thesis is based. Honors candidates should formalize their projects in consultation with their advisors by the end of the second semester of the junior year.

See also concentrations in Cognitive Science-Psycholinguistics and in Anthropology-Linguistics.

STANDARD COGNITIVE SCIENCES PROGRAM FOR THE BACHELOR OF ARTS OR BACHELOR OF SCIENCES DEGREE.

The undergraduate programs in Cognitive Science are designed to provide an interdisciplinary approach to the study of thinking and the nature of intelligent systems by combining coursework from anthropology, computer science, linguistics, psychology, and other related disciplines. The A.B. program is designed primarily for students interested in language and human cognition, and who have only secondary interest in computer science and artificial intelligence. Any A.B. program focussing mainly on language and human behavior along the lines of the current Psycholinguistics program will receive, with the mutual agreement of the student and the Center Executive Committee, the concentration designation, Cognitive Science-Psycholinguistics. The Sc.B. program is intended for students who have a strong interest in artificial intelligence and the experimental science aspects of Cognitive Science.

Requirements for the A.B. Degree

Prerequisites: Linguistics 22, Psychology 1, and either Psychology 9 or Applied Mathematics 165. Requirements: A total of eight courses including 1) Linguistics 142 and Psychology 152; 2) Four Cognitive Science courses with at least two courses from one department (Psychology 153, 180, 181, 182, 185, 197, 199, 233; Linguistics 112, 113, 121, 123, 131, 142, 143, 170, 198, 253; Anthropology 114, 160, 193, 194, 214, 261; Computer Science 21, 141, 193, 194, 195, 196, 279); 3) Two electives (Psychology 17, 48, 81, 100, 102, 108, 119, 187, 195, Computer Science 1, 4, 11, 12, 52, 152, 156, Anthropology 2, Engineering 94A, 122, 163, Neural Science 1, 2, University Course 129, 130, Philosophy 2, 10, 55, 155, 162, 175, Linguistics 113, 114, 122, 124, 126, 136, 144, 245, 251, 252, and no more than one of 11, 32, 45, 52, 53).

Requirements for the Sc.B. Degree

Prerequisites: Same as for A.B. degree plus Computer Science 11, 12, 51. Requirements: A total of 11 courses including 1) Linguistics 141, Psychology 152, and Computer Science 141; 2) Four Cognitive Science courses (same as for A.B.

degree with the omission of Computer Science 141 and the inclusion of one independent study or thesis course); 3) Same as for A.B. degree with the omission of Computer Science 1, 4, 11, 12 and 52.

GRADUATE PROGRAMS

MASTER OF ARTS. The requirements for the degree of Master of Arts include a minimum of eight courses at the graduate (100 or 200) level, a thesis, and a reading knowledge of one foreign language. Students are required to take or have taken the equivalent of Linguistics 121, 122, 131, and 165. The remaining courses may be made up from further offerings in Linguistics or in other departments, in consultation with the graduate advisor.

The thesis is usually undertaken during the second semester and completed during the summer or the third semester; only in exceptional cases is it possible to complete all work for the degree in one academic year. The thesis requirement may be waived for those students passing the general linguistics examination for the Ph.D. at the end of their fourth semester of study.

The usual foreign languages are French, German, and Russian, though others may be offered at the discretion of the graduate advisor. A student who is not a native speaker of English may, with the approval of the Department, offer English to fulfill the language requirement, but may not offer his/her native language. A score of at least 550 on TOEFL is required to certify proficiency.

DOCTOR OF PHILOSOPHY. The doctoral program in Linguistics has two components: (1) work in General linguistics including phonology, syntax, and either historical linguistics or psycholinguistics; (2) concentration in a special field, (such as those described on page 1). The candidate is required to demonstrate competence in phonology, syntax, and either historical linguistics or psycholinguistics, to take an oral examination on a topic in his/her special field, to write a dissertation, and to present an open colloquium on the subject area of the dissertation. For students beginning graduate work with little or no previous work in linguistics, this program normally takes four years of full-time work as a minimum.

Course work normally takes three years including the basic courses required for the M.A. (see above) and such other courses as seem to meet the needs and wishes of the individual student. Those with considerable previous graduate work in linguistics may be able to finish the course work in two years. Near the end of the third semester of study, there will be a formal review of the student's performance by the staff of the department, including, where appropriate, the staff of other departments, to determine whether the student should be (1) admitted to the Ph.D. program immediately, (2) required to write an M.A. thesis before proceeding in the Ph.D. program, (3) advised to complete a terminal M.A. program, or (4) advised to pursue his/her goals elsewhere. Examinations in the general areas will be normally taken in the student's second year and the Special Field examination during the third year.

Proficiency in two foreign languages must be demonstrated. One of these languages should be French, German, or Russian. Options for the second foreign language are available with regard to the specific program of the student. A native speaker of a language other than English may offer English as one of the two languages required, but a native language may not be offered. Proficiency in at least one of these languages must be established before the examination in the Special Field is taken.

After the student has passed the examinations in general linguistics, he/she should select a field in which the dissertation is to be written and is encouraged to begin to define a specific topic within that field. The dissertation is usually in the area of the

specialized field, but this is not expressly required. Upon passing the Special Field Examination, the student will choose an advisor for his/her dissertation, and, in consultation with the advisor, will submit to the Department a dissertation proposal and a proposed committee consisting of at least two other members; both the proposal and the committee must be approved by the Department. When the final draft of the dissertation has been accepted by the committee, an open colloquium on the subject area of the dissertation will be scheduled.

LINGUISTICS

I. PRIMARILY FOR UNDERGRADUATES

11. *Language and Man*

Mr. MESKILL

The nature of language and its role and function in human life. Topics include: language and communication, theory of language, its biological foundations, language universals, language change and history, dialect studies, and language in social context.

22. *Introduction to Linguistic Theory*

Mr. MESKILL

An introduction to the basic principles governing the structure of language, and to theoretical issues concerning these principles. Will cover three main areas: Phonology (the study of sound systems); Syntax and Semantics; and Historical Linguistics (the study of how languages change over time). Will develop skills in analyzing linguistic data, and in understanding the theoretical implications of the data.

32. *The Evolution of Language*

Mr. LIEBERMAN

Human language appears to be the result of a gradual, Darwinian process, and different levels of language may have coexisted at various times. Studies of the vocal communications of primates and reconstructions of the vocal mechanisms of fossils show that many extinct hominids lacked human speech though they may have had relatively well developed linguistic abilities. The functional aspects of human speech and human grammar will be examined with regard to the fossil record and the communications of living primates.

45. *Modes of Representation*

Ms. BARON

Three basic modes of linguistic representation are explored: speech, writing, and sign language. Each language type will be distinguished from non-linguistic communication (e.g. kinesics, art, and pantomime). Several exemplary representation systems will be analyzed, including American Indian pictographs and American sign language.

53. *Language, Thought and Reality*

Mr. HUNTLEY

Languages obviously differ in many respects. How deep these differences go is a controversial question and one which is at the heart of a tangled web of disputes about the relationship between language and thought. This course will examine this question as one of a number of theoretical questions concerning translation from one language to another. Other questions to be discussed will be: is the notion of 'exact translation' viable?; what is the relationship between languages and conceptual frameworks?; are there language universals?; are languages moulds for 'reality' rather than simply mirrors of it?; can language be said to embody beliefs and attitudes which another language does not? (e.g. can a *language* be described as sexist?).

These are questions which do not fall naturally within the exclusive purview of any one academic discipline. They are important to linguistics, philosophy, anthropology, sociology and the study of literature and languages. These disciplines each have their own reasons for being concerned with these questions, but equally they each have their own dis-

tinctive ways of approaching them. The course will provide a forum for comparative discussion of these different approaches and critical evaluation of the assumptions underlying them.

II. FOR UNDERGRADUATES AND GRADUATES

104. *The Written Word*

Ms. BARON.

The recent hullabaloo about a purported decline in our nation's ability to write well reflects some underlying assumptions about the role of literacy in our lives: first, that sloppy writing implies sloppy thinking; and second, that the kind of writing which is taught in schools is necessary for functioning in contemporary American society. This course examines historical, cross-cultural, and psycholinguistic evidence which bears upon these presuppositions. The goal is to bring intellectual coherence to this current pedagogical debate, distinguishing between real linguistic issues and those which are ideological in character. Of particular interest to students of linguistics, anthropology, psychology, semiotics, and education. Written permission required for freshmen.

111. *Semantics*

Messrs. HUNTLEY and CHIERCHIA.

Introductory survey of semantics in relation to linguistic theory. Topics include: problems of meaning and reference; the semantic theory of truth; quantification and scope; the relation between syntax and semantics; semantics and pragmatics.

112. *Methods and Problems in Semantics*

Messrs. HUNTLEY and CHIERCHIA.

Detailed examination and selected methods and/or problems of semantic theory, e.g., the semantic role of 'deep structure,' the relation between semantics and formal logic, the nature of semantic representations, the interaction of semantics and pragmatics. Prerequisite: 111 or written permission.

113. *Formal Semantics I*

Messrs. HUNTLEY and CHIERCHIA.

An introduction to logic as it relates to linguistic semantics. The basic concepts of model-theoretic semantics will be developed through detailed discussion of sentential logic and first-order predicate logic followed by an introduction to model logic. The primary focus will be the relevance of these concepts to the study of natural languages. Prerequisite: 22 or 111, or written permission.

114. *Formal Semantics II*

Messrs. HUNTLEY and CHIERCHIA.

Model-theoretic approaches to the study of the semantics of natural languages. Detailed examination of specific proposals, with special attention to those developed within the framework of 'Montague semantics.' Prerequisite: 113 or Philosophy 55 or written permission.

121. *Phonology I*

Mr. MESKILL.

Introduction to articulatory phonetics, with laboratory practice in phonetic transcription; phonological distinctiveness and redundancy, including the nature of the phonemic principle and problems in phonemic analysis; brief attention to acoustic phonetics and distinctive feature theory. Prerequisite: 22 or written permission.

122. *Introduction to Phonological Theory*

Mr. MESKILL.

Critical analysis of approaches to phonological theory, including Prague school, American structuralism, generative theory, and natural phonology. Application of the various theories to natural language data and evaluation of the results from a theoretical and practical standpoint. Prerequisite: 22 or written permission.

123. *Physiologic and Acoustic Phonetics*

Mr. LIEBERMAN.

Quantitative study of speech production and perception in relation to phonetic and phonological theories. The course will examine vocal tract anatomy and physiology in relation to the source-filter theory of speech production, the myoelastic-aerodynamic theory of

phonation, and the encoding and perceptual decoding of human speech, with critical evaluation of phonetic feature theories. Lectures, discussions, and laboratory demonstrations.

124. *Research Methods in Physiologic and Acoustic Phonetics* Mr. LIEBERMAN.

Introduction to laboratory techniques and the analysis of data relevant to physiologic and acoustic phonetics. Emphasis on the use and interpretation of sound spectrograms, waveform and spectrum analysis, electromyography, cineradiography, high-speed motion pictures, computer modeling of oral tract output, and experimental techniques involving the preception of synthetic and natural speech. Prerequisite: 123.

126. *Generative Phonology* Messrs. MESKILL and CHIERCHIA.

The theory and practice of generative phonology. Topics include the goals of phonological theory, distinctive features, the nature of underlying representations, phonological rules and rule ordering, the cycle, and theories of naturalness and markedness. Prerequisite: Linguistics 122 or written premission.

131. *Introduction to Syntax* Ms. JACOBSON.

The basic principles of syntactic theory and argumentation. Prerequisite: 22, or written permission.

136. *Topics in Syntax* Ms. JACOBSON.

Will focus on current issues in syntactic theory. Topics will include: constraints on transformational rules; the role of phrase structure rules and lexical rules; the status of grammatical relations. Prerequisite: 131.

141. *Psycholinguistics: Introduction* Ms. BLUMSTEIN.

Survey of approaches to psycholinguistics. Topics include biological and neurological prerequisites for language, speech perception, syntactic and semantic processing, aphasia, and child language. Psychological evidence for theoretical linguistic assumptions are considered. Prerequisite: 11, 22, or Psychology 1 or written permission.

142. *Syntactic Theory and Syntactic Processing* Ms. BLUMSTEIN and Ms. JACOBSON

The interface between work in theoretical syntax and psycholinguistic research on syntactic processing. Consideration of how results in psycholinguistics give evidence as to competing theories in syntax, and how controversies in syntax can be used to guide experimental research. Prerequisites: 131 and 141.

143. *Child Language Acquisition* Ms. BARON and Ms. CLANCY

Analysis of the process by which children acquire a first language. Traditional and current models of language acquisition; biological, psychological, and sociolinguistic factors influencing linguistic development. Students will get practical experience in collecting and analyzing data. Prerequisite: 22, or previous background in Linguistics.

144. *Topics in Child Language Acquisition* Ms. BARON and Ms. CLANCY

In-depth study of specific issues in first language acquisition. A different topic will be selected each year. Topics will include language disability, early semantic development, the role of socialization in language acquisition. Students will conduct primary research projects. The course may be repeated for credit. Prerequisite: Linguistics 143.

145-146. *Sign-Language for Educators of the Deaf* Ms. WHITE

This course will train students in manual communication with the deaf. Alternate communication systems will be examined (American Sign Language, some of the varieties of "signed English"), although primary attention will be given to those forms of sign most useful in communicating with deaf children in school settings. Primarily intended for those students with some prior background in linguistics and with a commitment to deaf education. One half-credit each semester; no credit for 145 without 146. Enrollment limited to 15. Written premission is necessary (contact Professor Baron, Dept. of Linguistics).

148. *Language and the Brain*

Ms. BLUMSTEIN.

Introduction to the study of neurolinguistics—the study of the relation between brain organization and language behavior. Topics include the study of aphasia from a clinical, neurological, and linguistic perspective, split-brain patients, and laterality of brain function. In addition, the effects of neurological deficits on higher cortical functions as artistic realization (music and art) will be considered. Prerequisites: one of the following courses Linguistics 11, 22, 32, 45, 52, Psychology 1 or written permission.

165. *Historical and Comparative Linguistics*

The STAFF.

Introduction to the study of historical linguistics. Topics include: Language variation; types of language change; linguistic reconstruction; the comparative method and wave theory; the status of 'sound laws'; the cause of change. Will focus on the relation between historical linguistics and linguistic theory from the models of the neogrammarians through structuralism to generative grammar.

166. *Topics in Historical Linguistics*

Ms. BARON and STAFF.

Selected areas of current interest in diachronic linguistics. Topics will include: diachronic syntax; diachronic phonology; approaches to language variation. Prerequisites: 165 or written permission.

170. *Introduction to Computational Linguistics*

Mr. KUCERA.

Computer processing and analysis of language data; design and operation of digital computers and the structure of programming languages; discussion of linguistic theory and concrete programming problems in the area of diachronic linguistics, communication theory, generative grammar, machine translation, ATN parsing, and stylistic analysis. Also listed as Applied Mathematics 170.

172. *Introduction to Mathematical Linguistics*

Ms. JACOBSON.

An introduction to the basic concepts and goals of mathematical linguistics. Will investigate formal grammars, concentrating on the properties of regular, context-free and context-sensitive languages and will then look at the formalization of transformational grammars and at the question of the power of such grammars. Consideration of the relevance of results in mathematical linguistics to current theories of natural language. Prerequisite: 22 and/or some background in basic set theory and logic. Some familiarity with syntax is also recommended.

191. *Foundations of Modern Linguistic Theory*

Ms. BARON.

Examination of the emergence of modern linguistic theory in the late 19th century and its subsequent development up until the present. The course will discuss how the shape of linguistic theory has been influenced by other scientific disciplines.

198. *Senior Conference*

The STAFF.

Special work in preparation of an Honors thesis under the direction of a member of the department. Open only to senior Honors concentrators.

III. PRIMARILY FOR GRADUATES

245. *Linguistic Theory and Models of Language*

Mr. KUCERA.

Contemporary issues, problems, and debates in linguistic theory. May be repeated for credit with different instructor. Open to graduate students in Linguistics and various language departments. Others should obtain permission from the instructor.

251,

252. *Seminars in Linguistic Theory*251A. *Seminar in Syntactic Theory*

Ms. JACOBSON and Mr. CHIERCHIA.

Topic will vary from year to year.

252A. *Seminar in Semantics*

Messrs. CHIERCHIA and HUNTLEY.

Topic will vary from year to year.

In addition to those listed above, additional seminars on linguistic theory are generally offered each year. Seminar topics in recent years have included: Phonological theory, pragmatics, philosophy of linguistics, Turkish structure, applications of mathematical linguistics to natural language, the evolution of language.

253. *Seminars in Psycholinguistics*

Ms. BLUMSTEIN.

The implications of psycholinguistic research for linguistic theory. Topics will alternate among research methods in psycholinguistics, neurolinguistics (language and related cortical functions) and speech perception (perception of segmental and prosodic aspects of the speech signal). Prerequisite: 142 or written permission.

261, 262. *Seminars in Historical Linguistics*

The STAFF.

Topics will vary from year to year. Past topics have included comparative Algonkian, Old English phonology, historical phonology, Shakespeare's grammar, written language.

291, 292. *Special Topics, Thesis Research*

The STAFF.

Individual reading and research under the direction of a member of the department. Permission of the graduate advisor and of the prospective supervisor required.

CHINESE

I. PRIMARILY FOR UNDERGRADUATES

1-2. *Basic Chinese*

Messrs. LATTIMORE and WRENN and Ms. LEE.

Extensive practice of the pronunciation system and of the basic grammatical patterns. Introduction to the writing system and the beginning of character learning. Lecture and practice sessions six times weekly; tape-lab sessions to be arranged. A year course; no credit is given for the first semester alone.

3-4. *Intermediate Chinese (Spoken)*

Messrs. LATTIMORE and WRENN and Ms. LEE.

Drill and practice in speaking Chinese with some reading of materials prepared for conversational use. Three practice sessions weekly. Additional tape-lab hours to be arranged. Prerequisite: Chinese 1-2.

5-6. *Intermediate Chinese (Reading)*

Messrs. LATTIMORE and WRENN and Ms. LEE.

Reading of annotated teaching materials. Three reading sessions weekly. Prerequisite: Chinese 1-2.

7-8. *Introduction to Literary Chineses*

Messrs. LATTIMORE and WRENN.

Introduction to Classical Prose. Three hours weekly. Prerequisite: Chinese 5-6.

II. FOR UNDERGRADUATES AND GRADUATES

101. *Specialized Readings in Chinese*

Ms. LEE.

Readings and translations of materials in modern Chinese fiction and essays. Three hours weekly. May be repeated for credit with different content. Prerequisite: Chinese 5-6.

103. *Introduction to Ch'ing Documentary Style*

Messrs. LATTIMORE and WRENN.

Three hours per week. May be repeated for credit with different content. An introduction to the documentary form and style of various classes of official government documents in the Ch'ing period (1644-1911). Prerequisite: Chinese 8.

104. *Introduction to Materials and Methods of Sinology*

Messrs. LATTIMORE and WRENN.

Three hours per week. An introduction to and practice in the use of basic reference materials and techniques necessary for advanced work in Chinese sources. Prerequisite: Chinese 8.

108-109. *History of Chinese Literature*

The STAFF.

Three hours per week. A broad historical survey of Chinese literature from the second millennium B.C. to the present, to develop an ordered sense of the development of the literary forms within the Chinese literary tradition. Extensive readings in English supplemented by intensive reading, discussion, and translation of samples from the various genres. Prerequisites: competence in modern written and spoken Mandarin at the 5-6 level, Literary Chinese at the 7-8 level, and History 41, 42, or an equivalent knowledge of the social and intellectual history of China.

JAPANESE

I. FOR UNDERGRADUATES AND GRADUATES

1-2. *Basic Japanese*

Ms. YAMASHITA and Mr. RABSON.

A course intended for non-native speakers of Japanese. It will emphasize the attainment of good spoken control of the language, and will develop a foundation of literacy. The writing system will be introduced from the beginning of the course. A year course; no credit will be given for Japanese 1 alone. No prerequisites.

3-4. *Intermediate Japanese*

Mr. RABSON and Ms. YAMASHITA.

Further oral and written practice based on readings about aspects of Japanese culture. Readings are designed to enhance vocabulary and provide points of departure for conversation in Japanese. A year course, no credit is given for the first semester alone. Prerequisite: Japanese 1-2 or equivalent.

5,6. *Advanced Japanese*

Ms. YAMASHITA and Mr. RABSON.

Reading of actual articles and excerpts from works of literature. Emphasizes the development of reading proficiency in various styles of Japanese prose. Discussion in Japanese. Prerequisite: Japanese 3-4 or equivalent.

7,8. *Readings in Japanese*

Mr. RABSON and Ms. YAMASHITA.

Reading and discussion of literary works and articles from Japan's current journals, particularly in the social sciences. Extensive materials will be covered to increase reading speed while maintaining accuracy. Practice in writing is also emphasized. Prerequisite: Japanese 6 or equivalent.

Master of Arts in Teaching

COMMITTEE FOR THE PROGRAM

MARK SCHUPACK, PH.D., *Dean of the Graduate School, Professor of Economics*; REGINALD D. ARCHAMBAULT, ED.D., *Director of Master of Arts in Teaching Program, Professor of Education*; LEALLYN BURR CLAPP, PH.D., PD.D., LL.D., *Professor of Chemistry*; DAVID HARRY HIRSCH, PH.D., *Professor of English*; DONALD G. ROHR, PH.D., *Professor of History*; MICHAEL IRA ROSEN, PH.D., *Professor of Mathematics*.

To prepare teachers to serve in the secondary schools with a richer background in the liberal arts and sciences and with a demonstrated ability to teach, the University has established a graduate program leading to the degree of Master of Arts in Teaching. The program represents an effort of the whole University to assist in the improvement of schools.

It is designed for the liberal arts graduate without teaching experience who wishes to teach in secondary schools. The program is in harmony with a trend to require a master's degree for permanent teacher certification.

The Master of Arts in Teaching Program is firmly based on the belief that effective teaching in secondary schools requires a merging of scholarship and professional competence; the intent is to provide breadth in the major areas affecting education and depth in the field of academic interest. Emphasis is placed, therefore, on the study of academic subjects, with the candidate permitted to take as many courses in the teaching field as preparation will allow. Prospective teacher candidates take a number of courses designed to provide them with an adequate knowledge of educational theory and sufficient practice in teaching. This preparation fulfills the certification requirements of most states.

ADMISSION

The Master of Arts in Teaching Program is open to qualified men and women who hold a bachelor's degree from a recognized liberal arts college or its equivalent. Previous study in the field of education is not required.

It is expected that those admitted to the program will have either an undergraduate major in their teaching field or a background that is adequate to warrant their pursuing the courses offered in fulfillment of degree requirements. Selection will be based on the scope and adequacy of the applicant's preparation, the academic record, and on the potentiality for advanced study of teaching.

Candidates for admission are required to present evidence of ability to carry on academic work of high quality at the graduate level. They must possess the purpose and personality needed for a successful career in teaching. An additional period of study or specific additional courses may be required as a condition of admission if a candidate's prior preparation warrants such requirement.

Application for admission to the program must be made on the official form obtainable from the Office of the Graduate School. All applications must be supported by official transcripts from each college or university attended, and a letter from the student stating his or her plans for graduate study. Also required are three letters of recommendation sent directly to the Dean of the Graduate School from persons well acquainted with the applicant and qualified to comment on the potentiality for teaching and capacity for graduate work.

Applications for admission should be filed as early as possible, preferably by February 15. Applications received after this date will be considered, but preference for admission and financial assistance will be given to those who apply by that time. No application for admission can be considered after May 15.

DEGREE REQUIREMENTS

The Master of Arts in Teaching Program requires the candidate to complete successfully at least eight semester courses at the graduate level, four of which must be in the field of the major, and four in the Education Department.

Supervised practice teaching is required.

The course of study for the degree varies within broad limits according to the previous background and interests of the individual student. Each student will be encouraged to make maximum use of the resources of the entire University.

SCHOLARSHIPS

A number of scholarships toward tuition are available.

FURTHER INFORMATION

A booklet describing the Master of Arts in Teaching Program in detail is available from the Office of the Graduate School. All inquiries regarding the Program should be addressed to that office.

Mathematics

Professors ACCOLA,¹ BANCHOFF (Chairman), BAUM, BROWDER, COLE, FEDERER, FLEMING, FULTON, B. HARRIS, J. HARRIS,² LUBIN,³ MACPHERSON, NOMIZU, ROSEN, STEWART, STRAUSS, WERMER;³ Associate Professors BRYLINSKI, GROSS, KALLIN, LANDMAN; Assistant Professors BAKER, FARRIS, GUPTA.

Students are encouraged to take advanced courses whenever their preparation qualifies them to do so.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Mathematics. All students contemplating a concentration in mathematics should take Mathematics 9, 10 or 17, 18 by their freshman year and Mathematics 18 or 29 or 35 and 52 or 54 or Mathematics 25, 26 by their sophomore year.

The concentration program consists of Mathematics 25 and 26 or Mathematics 18 or 29 or 35 and 52 or 54; and Mathematics 153; and any three of the following: 101, 104, 106, 111, 112, 113, 114, 126, 127, 141, 154, 156, 161, 162, 169, or any 200-level course in mathematics; and two additional courses chosen either from among those already listed, or in Applied Mathematics, Chemistry, Computer Science, Economics, or Physics, and approved by the concentration advisor.

Students who are thinking of applying for graduate school in mathematics are strongly urged to take Mathematics 154, 113, and 114.

Mathematical Economics. See page 121.

Mathematics—Physics. See page 121.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE DEGREE

This program is intended for a student who has strong interests in pure mathematics but also wants to learn more science than is normally included in the A.B. program. It is expected that most students interested in this program will choose it at admission, but it will be possible for a student to be admitted to the program as late as the fifth semester.

Foreign Language: Ordinarily the candidate should demonstrate a working knowledge of French, German or Russian, either by an achievement test or by passing a course at the fourth semester level or higher. A student who receives placement beyond the fourth semester level in any other language is urged to study at least one of these three languages.

Course Requirements: Sixteen semester courses in Mathematics, Applied Mathematics, and Science. These must include Mathematics 52 or 54, 113, 114, 153, 154, or 156, at least five other courses in Mathematics, and four approved courses in Applied Mathematics or Science.

¹ On leave, 1983-84

² On leave, Semester I, 1983-84.

³ On leave, Semester II, 1983-84.

It is recommended that students take eight semester courses in Humanities and Social Sciences, including at least two in each category.

Honors: Candidates for Honors in mathematics are normally enrolled in an Honors program at the end of the sophomore year. The Honors program usually consists of a concentration program plus at least two but not more than six additional semester courses in mathematics or related subjects. An Honors Thesis must be submitted as a part of the program.

The Honors program in mathematics is extremely flexible. Some students take Mathematics 197 in one or more semesters. This course consists of independent reading and conferences with a faculty member. The Honors Thesis may be prepared as a part of the work in Mathematics 197. Some students take a graduate course. This is particularly valuable for those who contemplate graduate study. The Honors Thesis may consist of a report on a problem, or set of related problems, studied in connection with a graduate course.

GRADUATE PROGRAMS

The Mathematics Department accepts candidates for the degree of Master of Arts, Master of Science, and Doctor of Philosophy. The graduate program in mathematics is primarily a Ph.D. program planned to prepare specially able students for a career of basic research and college teaching.

There are four basic one-year courses: Real Function Theory (221, 222), Complex Function Theory (225, 226), Algebra (251, 252), and Topology (241, 242). Normally a student completes three of these in the first year and takes the fourth in the second year, along with one or two other courses. Students who enter with the equivalent of one of these basic courses take the other three in their first year. Students with less extensive background may be advised to take a 100-level course as preparation for one of the basic courses.

In addition to advanced courses, members and students of the department conduct formal and informal seminars on a wide range of topics. Prominent scholars are invited to lecture on their recent research at a weekly colloquium. Teaching is considered an important part of graduate education in mathematics, and most students are given a teaching assignment in the second or third year.

Students are admitted to candidacy for the doctor's degree on the basis of performance in the courses they have taken and such other evidence as may be available. The main requirement for the Ph.D. is the doctoral thesis, which must be original mathematical research of sufficient quality to be published in a recognized mathematical journal. Thesis research is done under the direction of a faculty member with whom the student has established close scientific contact. Doctoral candidates present their completed thesis to the department in a final public oral examination.

For the master's degree, the Mathematics Department requires that at least four courses at the graduate level be completed in fulfilling the course requirements (See General Regulations). In addition, the candidate is required to submit an acceptable thesis, which, in contrast to the doctoral thesis, may be purely expository.

The foreign languages acceptable for the language requirements are French, German, and Russian; two are required for the Ph.D. and one for the master's degree. A foreign student may substitute English for one of the languages by passing the TOEFL at the approved level (See General Regulations).

The mathematical library is part of the Physical Sciences Library. The Mathematics collection is one of the finest anywhere and provides complete facilities for research. It is the policy of the department to acquire all important new publications in mathematics. Many out-of-print books and journals are recorded on microfilm and are available for general use.

Attention is called to the courses offered by the Division of Applied Mathematics, the Department of Computer Science, and the Department of the History of Mathematics, which are open to students in the Mathematics Department.

I. PRIMARILY FOR UNDERGRADUATES

3. *Pre-Calculus Mathematics*

An intensive one-semester course for students planning to take Mathematics 9, 10 who require additional preparation for the calculus sequence. Topics will be taken from algebra, trigonometry, and plane analytic geometry. Students with four years of secondary school mathematics are discouraged from taking this course. Students planning to register for this course should consult with the instructor during Orientation Week.

5, 6. *Analytic Geometry and Calculus*

An introduction to the calculus intended for students whose high school preparation in algebra and trigonometry is inadequate for 9, 10. Placement in this course is by permission of the instructor only. The sequence Mathematics 5, 6 covers roughly the same amount of calculus as Mathematics 9.

7. *Calculus with Applications to Social Sciences*

A one-semester introduction to calculus recommended for students who wish to learn the basics of calculus for application to social sciences or for cultural appreciation as part of a broader education. Topics include functions, graphs, equations, inequalities, differentiation and integration, exponential functions; applications such as simple linear programming, marginal analysis, growth and decay. May not be taken for credit in addition to 9.

8. *The Mathematical Way of Thinking*

The content and history of mathematics with emphasis on the way mathematicians analyze and solve problems. Variable content is drawn from topics in logic, theory of sets, number theory, higher dimensional geometry, infinity, and probability. Does not satisfy prerequisites for concentration in the mathematical or physical sciences.

9, 10. *Calculus*

An intensive course in the calculus of functions of one variable; exponential and trigonometric functions; infinite series; applications. Required in the freshman year of candidates for the degree of Bachelor of Science and recommended for students intending to concentrate in mathematics or the sciences. Mathematics 9 may not be taken in addition to 7; 10 may not be taken in addition to 17.

12. *Introduction to Mathematical Modeling*

The use of mathematics in the analysis of practical problems. Elementary topics from differential equations, matrix algebra, probability and statistics. Examples from biology and medicine. Prerequisite: 9 or the equivalent. (Will not be offered in 1983-84)

17. *Advanced Placement Calculus*

For students who enter with a background in calculus equivalent to Mathematics 9. Includes topics covered in Mathematics 10 or 29. Vectors and the calculus of vector-valued functions, differential equations and infinite series, along with a review of fundamentals. Placement in the course is determined on the basis of advanced placement examinations given by ETS or the department during Orientation Week and after consultation with students. Mathematics 17 may not be taken in addition to 10.

18. *Intermediate Calculus*

Three-dimensional analytic geometry; differential and integral calculus for functions of two or three variables; partial derivatives, multiple integrals, Green's Theorem. Prerequisite: Mathematics 10 or 17. Mathematics 18 may not be taken in addition to 25, 29, or 35. Offered both semesters.

25, 26. *Intermediate Calculus with Linear Algebra*

Covers the same topics as Mathematics 29 and 52, but integrates them into one course, emphasizing the relations between calculus and linear algebra. 26, 52, or 54 is a prerequisite for all 100-level courses except 126. Prerequisite: 10 or advanced placement by the department. Mathematics 25 may not be taken in addition to 18, 29, or 35. Mathematics 26 may not be taken for credit in addition to 52 or 54.

29. *Calculus and Differential Equations*

Three-dimensional analytic geometry, differential and integral calculus of functions of two and three variables, partial derivatives, multiple integrals, and ordinary differential equations. Prerequisite: Mathematics 10 or 17.

35. *Calculus, Honors Sequence*

A third semester calculus course for students of superior aptitude and motivation. Topics covered include multiple integration, partial differentiation, line integrals, Green's theorem, plus additional material selected by the instructor. Prerequisite: Mathematics 9, 10 or Advanced Placement credit for Mathematics 9, 10 and permission of the instructor.

52. *Linear Algebra*

Vector spaces, linear transformations, matrices, systems of linear equations, inner products, eigenvalues, applications. Prerequisites: Mathematics 10 or 17.

54. *Honors Linear Algebra*

Linear algebra for prospective mathematics concentrators and science and engineering students who have a good mathematical preparation. Topics will include: matrices, linear equations, elementary row and column operations; determinants, characteristic polynomials and eigenvalues; vector spaces and linear transformations; inner products, hermitian, orthogonal and unitary matrices; bilinear forms; elementary divisors and Jordan normal forms. Will provide a deeper and more extensive treatment of the topics in Mathematics 52 and can be substituted for Mathematics 52 in fulfilling prerequisites. Prerequisites: Mathematics 18, 29, or 35.

II. FOR UNDERGRADUATES AND GRADUATES

The standard requirements for all 100-level mathematics courses except Mathematics 101, 126, 127, or 169 are Mathematics 18 or 29 or 35 and 52 or 54, or Mathematics 25, 26.

101. *Analysis: Functions of One Variable*

Completeness properties of the real number system, topology of the real line. Proof of basic theorems in calculus, infinite series. Topics selected from ordinary differential equations. Fourier series, Gamma functions, as well as topology of Euclidean plane and 3-space. Prerequisites: 18, 29, 26, or 35. Mathematics 52 or 54 may be taken concurrently. Most students are advised to take 101 before 113.

104. *Topics in Geometry*

Topics chosen from affine, Euclidean, non-Euclidean, and projective geometries. Prerequisite: standard requirements.

106. *Elementary Differential Geometry*

Intrinsic and extrinsic, local and global properties of smooth curves and surfaces in three-space. Prerequisite: standard requirements.

111. *Ordinary Differential Equations*

Ordinary differential equations including existence and uniqueness theorems and the theory of linear systems. Topics may also include stability theory, the study of singularities, and boundary value problems. Prerequisite: standard requirements.

112. *Introduction to Differential Equations*

The classical equations of mathematical physics and their generalizations. Solutions in series of eigenfunctions, maximum principles, characteristics, Green's functions, well-posed problems. Prerequisite: 111 or written permission.

113, 114. *Functions of Several Variables*

Topology of Euclidean spaces, compactness and connectivity. Convexity, differentiability, inverse and implicit function theorems, exterior differential forms, integration on manifolds, Stokes formula, Lebesgue integration, applications to geometric and physical problems. Prerequisite: standard requirements. It is strongly recommended that a student take a 100-level course in analysis before attempting Mathematics 113.

126. *Elementary Complex Analysis*

Cauchy-Riemann differential equations, contour integration, conformal mapping. Dirichlet problem. Required of candidates for the degree of Bachelor of Science with a concentration in Applied Mathematics; elective for others. Prerequisite: 18, 29 or 35.

127. *Topics in Functional Analysis*

Infinite-dimensional vector spaces, with applications to some or all of the following topics: Fourier series and integrals, distributions, differential equations, integral equations, calculus of variations. Prerequisites: at least one 100-level course in Mathematics or Applied Mathematics, or permission of the instructor.

141. *Introduction to Combinatorial Topology*

Topology of Euclidean spaces, winding number and applications, knot theory, fundamental group and covering spaces, Euler characteristic, simplicial complexes, classification of two-dimensional manifolds, vector fields and the Poincaré-Hopf Theorem. Prerequisite: standard requirements.

153, 154. *Algebra*

Groups, rings, integral domains, fields, and related topics. Mathematics 153 is required of all students concentrating in mathematics. Prerequisite: standard requirements.

156. *Elementary Number Theory*

Selected topics in number theory treated from the algebraic point of view: Unique factorization, prime numbers, modular arithmetic, quadratic number fields, quadratic reciprocity, and related topics. Prerequisite: 153 or consent of the instructor.

161. *Introduction to Probability*

Basic probability theory, discrete and continuous distributions, normal, Poisson and related distributions, random variables. Prerequisite: standard requirements.

162. *Mathematical Statistics*

Central limit theorem, point estimation, interval estimation, multivariate normal distributions, tests of hypotheses, linear models. Prerequisite: 161 or permission of the instructor.

169. *Mathematical Population Models* (Applied Mathematics 169)

Population models with age structure; matrix projection and renewal equation methods. Differential equation models of interacting populations. Probabilistic models; birth and death processes, branching processes. Applications to models from demography, ecology, and population genetics. Prerequisites: Mathematics 52 or 54 and a course in differential equations (Applied Mathematics 33 or Mathematics 111) or written permission.

181, 182. *Special Topics in Mathematics*

Topics in special areas of mathematics not included in the regular course offerings. Offered from time to time when there is sufficient interest among qualified students. Contents and prerequisites vary and admission to this course is only by permission of the instructor.

197. *Honors Conference*

Collateral reading, individual conferences.

III. PRIMARILY FOR GRADUATES

201. *Differential Geometry*

Introduction to differential geometry (differentiable manifolds, differential forms, tensor fields, homogeneous spaces, fiber bundles; connections, linear connections, and Riemannian geometry; followed by selected topics in the field.

205, 206. *Algebraic Geometry*

Theory of algebraic curves: Riemann-Roch theorem. Abel's theorem, correspondences and Castelnuovo's inequality—elliptic, hyperelliptic and modular curves. General theory of algebraic varieties and schemes.

221, 222. *Real Function Theory*

Point set topology, function spaces, Lebesgue measure and integration. L^p spaces, Hilbert space, Banach spaces and applications.

225, 226. *Complex Function Theory*

Introduction to the theory of analytic functions of one complex variable. Content varies somewhat from year to year, but always includes the study of power series, complex line integrals, analytic continuation, conformal mapping, introduction to Riemann surfaces.

237, 238. *Partial Differential Equations* (Applied Mathematics 223, 224)

Elliptic boundary problems and the Cauchy problem plus topics such as: the Malgrange-Ehrenpreis-Hormander Theory, equations of mixed type, spectral theory of differential operators, nonlinear equations of various types. Prerequisites: Real and complex variables. Highly recommended: Functional analysis.

241, 242. *Topology*

An introductory course with emphasis on the algebraic and differential topology of manifolds. Simplicial and singular homology, de Rham cohomology, and Poincaré duality.

251, 252. *Algebra*

Basic properties of groups, rings, fields and modules. Topics included recently are: finite groups, representations of groups, rings with minimum condition. Galois theory, local rings, algebraic number theory, classical ideal theory, basic homological algebra, and elementary algebraic geometry.

263, 264. *Probability* (Applied Mathematics 263, 264)

This is the basic course in probability at the graduate level and serves as a prerequisite to all other graduate probability courses in the Department of Mathematics and the Division of Applied Mathematics. Semester I will not presume knowledge of measure theory, whereas Semester II definitely does.

271, 272. *Advanced Topics in Mathematics*

Recent topics include: Elliptic and Modular Functions, Riemann-Roch Theorems, Advanced Differential Geometry, Advanced Algebraic Topology, and p-adic analysis.

291, 292. *Reading and Research*

The STAFF.

Preparation of a thesis under the direction of a member of the faculty.

Medical Education Program

Since 1973, the Division of Biology and Medicine has offered a program leading to the M.D. degree. For the students admitted to this program as college freshmen, the continuum of premedical and medical education is expected to require seven or eight years. The program includes one of the standard or independent undergraduate concentrations at the choice of the student (A.B. or Sc.B.) and, for those who elect to enroll in the graduate school, it may include work toward the Master of Medical Science or Doctor of Philosophy. Detailed curriculum requirements are given under Requirements for Degrees on page 126.

Program in Modern Literature and Society

The objectives of the Program in Modern Literature and Society are to develop and offer interdisciplinary courses in literature, history, and social studies and to integrate curricular development and serve as a focus for research in these fields.

Two Co-Directors (Professors Duncan Smith and Perry Curtis), appointed by the President, coordinate and administer the Program. The Co-Directors serve as the chairpersons for an Executive Committee appointed by the Provost and Dean of the Faculty.

The Directors and Executive Committee create and supervise courses and the standard undergraduate interdepartmental concentration program in Modern Literature and Society. They encourage departmental and interdepartmental development of interdisciplinary studies in literature, social history, and culture. They explore, define, and make recommendations with the object of promoting undergraduate and research programs in the sociology of literature, comparative cultural studies, the interaction between literature and history, writers and politics, and the methods of literary and historical criticism.

Music

Professors LAURENT, NELSON; Associate Professors JOSEPHSON (Chairman), ERMEY, KOETTING, SHAPIRO, WALDBAUER; Assistant Professors BAKER, BALZER, KLEEMAN, LEWIS; Lecturer, Mr. CHRISTIE.

The courses of study in Music permit areas of specialization in composition, musicology, and ethnomusicology. Advanced degree courses presuppose a knowledge of the history and theory of music, of the requisite languages for graduate study, and at least a basic skill in playing a keyboard instrument. The Department wishes to cultivate in its students an approach to music that is both creative and scholarly; hence, the students are encouraged to devote a certain amount of time to both areas. Each student develops a program of study in consultation with a faculty advisor.

UNDERGRADUATE PROGRAM

Music 13-14 is a prerequisite to concentration. It should be taken in freshman year, if possible; it must be completed by the end of sophomore year. Keyboard ability is required of concentrators, and will be tested by the end of sophomore year.

The concentration minimum includes Music 91, 92 which should be taken in sophomore year; one course each in counterpoint and ethnomusicology; and four electives. Students are urged to take Music 15, 16 and a seminar from among Music 119 or the 190's series. Membership in chorus, orchestra, or wind ensemble is recommended.

Students intending to go on in composition are urged to take a second counterpoint course, Music 114, 115-116, and 118. Additional composition courses are available through Music 191, 192. Students intending to go on in history or theory are urged to take Music 195 and 196 as well as German.

Advanced Placement credit does not count for concentration. Neither does credit from the following courses: Music 1, 11, 12, 12A, or 30 through 39. For concentration credit restrictions in Music 51-54, 61-66, and 155-158, see the main entry under MUSIC in the Course Announcement.

A concentration is available in ethnomusicology. It requires 10 courses including Music 5, 6, 91, 92; one course in counterpoint; and 5 electives. Two courses in Anthropology may be credited towards the concentration.

Students considering an Honors Program in Music should consult with the Department Concentration Advisor at the time they register for concentration.

GRADUATE PROGRAMS

MASTER OF ARTS. The program of study leading to this degree will be either in composition or ethnomusicology. All students for the degree, however, will be expected to take courses in both history and theory.

Prerequisites for Admission: Candidates for the degree of M.A. in Music will be admitted by examination only. Prospective students are urged to take the examination at Brown at a time stipulated by the Department of Music. In the case of those who are unable to come to Brown for this purpose, the examination may be administered in absentia. Candidates will be examined in harmony and counterpoint, in the history and literature of music.

Requirements for the M.A. Degree:

1. General requirements of the Graduate School must be met.
2. Deficiencies shown by the entrance examination must be made up during the first year of graduate study.
3. Eight semester courses taken for graduate credit are required.

COMPOSITION: (ALL OF THE ABOVE REQUIREMENTS IN ADDITION TO THE following:)

4. A reading knowledge of French, German or Italian must be presented.
5. In certain cases final written and oral examinations may be required.
6. An original work, the form, style and scope of which shall have been approved by the department, must be presented. Work of high quality accepted during one of the graduate courses and fulfilling the requirements just stated may be acceptable.

ETHNOMUSICOLOGY: (REQUIREMENTS 1, 2, AND 3 listed above as well as the following:)

4. Course work must include Music 135, 136, 198, and two courses numbered 235, 236, or 238.
5. A reading knowledge of German must be presented.
6. A general examination in field theory and world music cultures is to be taken upon the completion of course work.
7. Two papers must be presented. Each must demonstrate the ability to investigate thoroughly the scholarship on a topic and to organize and articulate a scholarly argument.
8. After the first and third semesters of course work, students who wish to pursue the Ph.D. will be evaluated in writing.

DOCTOR OF PHILOSOPHY. In ethnomusicology only. Prerequisites for admission: Candidates for the Ph.D. in Music will be admitted by examinations only. Applicants will be eligible for examination upon completion of applications for admission to the Graduate

School. Prospective students are urged to take the examination at Brown at a time stipulated by the Department of Music. In the case of those who are unable to come to Brown for this purpose, the examination may be administered in absentia. Candidates will be examined in harmony and counterpoint, in the history of music.

Requirements for the Ph.D. degree:

1. General requirements of the Graduate School must be met.
2. Deficiencies shown by the entrance examination should be made up during the first year of graduate study.
3. The requirements of the M.A. in ethnomusicology must be met during the first two years of graduate study. Sixteen additional Tuition Units on the graduate level are required, and these must include Music 238 and two courses numbered 235 or 236 (including Transcription and Notation.)
4. In addition to German, a second foreign language relevant to the area of primary or secondary research must be presented.
5. There will be comprehensive written examinations in Western music and field theory and world music cultures. Two areas of specialization (geographical and/or theoretical) will be examined orally.
6. A 50-minute colloquium must be presented before the faculty and interested students.
7. A dissertation on an original subject must be presented. A written research proposal, including bibliography, must be approved by the dissertation committee before fieldwork is undertaken.

I. PRIMARILY FOR UNDERGRADUATES

1. *Introduction to Western Music* Mr. LAURENT and Ms. LEWIS.

Following an introduction to basic music notation and theory, the course examines selected works by Bach, Beethoven, Brahms, Brubeck, Cage, Chopin, Debussy, Ellington, Gershwin, Josquin, Machaut, McCartney, Monteverdi, Mozart, Schoenberg, Stravinsky, Verdi, Webern and others. While historical and social contexts will be discussed, the emphasis is on the music.

5. *World Music Cultures (Oceania, Africa, Indians of the Americas and Modern Syncretic Forms)*

Mr. KOETTING.

A survey of these areas including: 1) historical, social and cultural context; 2) theoretical systems, form and aesthetics; 3) major representative musical and dance genres.

6. *World Music Cultures (Near East and Asia)*

Ms. KLEEMAN.

A survey of North Africa, Iran, India, Indonesia, China and Japan, including: 1) historical, social and cultural contexts; 2) major genres of music and their use in dance and theater; 3) theoretical systems, form in composition and improvisation; 4) musical instruments.

7. *Folk Music of Europe and America*

Mr. KOETTING.

An introduction to music as folklore. The history and function of traditional music in European peasant society; its transformation by cultural change and transplantation in America; the effects of urbanization, mass media, acculturation, and commercialization upon folk music. Music theory, aesthetics, and musical instruments are considered where relevant.

11. *The Fundamentals of Music*

MESSRS. BAKER and SHAPIRO

Elementary written and keyboard studies in rhythm, melody, harmony, tonality, and form. Two classes plus one additional piano laboratory session and a minimum of five practice hours per week are required. For students with no musical training. Limited enrollment. Written permission.

12. *Elementary Music Theory*

Messrs. BAKER, BALZER and ERMEY.

An introduction to musical terms, elements and techniques. Deals with notation, intervals, scales and modes, triads and seventh chords, modulation, part-writing, analysis, and composition. Ear training and sight-singing are included. For students with some musical training. Limited enrollment. Written permission.

12A. *Theory of Music with Keyboard.*

Mr. NELSON.

An introduction to musical terms, elements and techniques for students with keyboard training. Deals with scales and modes, triads and seventh chords, secondary dominants and modulation, part-writing, analysis, clefs, 2-part counterpoint, and composition. Ear training, sight singing, keyboard exercises, and listening assignments are included. Limited enrollment. Written permission.

13-14. *Music Theory*

Mr. NELSON.

For students with keyboard ability and knowledge of the rudiments of music. The course is prerequisite to a music concentration, and must be taken by concentrators in freshman or sophomore year. It is an intensive study of the elements of tonal music, including melody, harmony, counterpoint, figured bass, and form. Analysis, ear training, sight singing, keyboard exercises, listening assignments, and score reading are included. Limited enrollment. Written permission.

15. *Advanced Music Theory I*

Mr. BAKER.

A study of 19th-century musical styles, including melody, periodicity, rhythm, harmony, chromaticism, tonality, counterpoint form. Analysis, ear training, sight singing, keyboard exercises, and score reading are included. Prerequisites: 14 with grade of B or equivalent.

16. *Advanced Music Theory II*

Mr. BAKER.

A study of 20th-century musical styles, forms, and theory. Analysis, ear training, sight singing, keyboard exercises, and score reading are included. Prerequisite: 15 with grade of B or equivalent.

30. *Major Masters of Music*

Messrs. JOSEPHSON and WALDBAUER and Ms. LEWIS.

The study of the life and work of a major composer. Tutorials in fundamental theory and score reading are offered to students requiring them. Composers recently studied: Beethoven, Brahms, Haydn, Mozart. Two-hour listening session per week.

31. *The Concerto*

Mr. WALDBAUER.

A study of the concerto from the end of the seventeenth century to ca. 1950. Tutorials in fundamental theory and score reading are offered to students requiring them. Two-hour listening session per week.

33. *The Symphony*

Mr. JOSEPHSON.

A study of the symphony from Haydn to Mahler. Tutorials in fundamental literary theory and score reading will be offered to students requiring them. Two-hour listening session per week.

34. *Chamber Music*

Ms. LEWIS.

A study of masterpieces of chamber music from Haydn to the present, assisted by the International String Quartet. Tutorials in fundamental theory and score reading will be offered to students requiring them.

35. *History and Development of the Wind Instruments*

Mr. CHRISTIE.

A study of the evolution of wind instruments from early forms to the present, with emphasis on the correlation between physical and mechanical developments and the music written for the instruments.

36. *Music Literature for Ensembles of Wind Instruments*

Mr. CHRISTIE.

A study of music for wind ensemble and band from the Renaissance to the present with discussion of national traditions in instrumentation and sound and emphasis on the modern trend away from functionalism in wind music.

37. *Opera*

Mr. LAURENT.

A study of opera from Monteverdi to the present. Also examines the concepts of opera as drama, the literary and dramatic scores for librettos, and writings on the changing aesthetic principles underlying opera during the past four centuries.

38. *Choral Music*

Mr. ERMEY.

A study of cantatas, mass, oratoria, and passion from the 15th-century to the present, with emphasis on orchestra accompanied composition. Major works studied include Handel's *Messiah*, the passions of Bach, the masses of Mozart and Haydn, Beethoven's *Missa Solemnis*, Brahms *Requiem*, Orff's *Carmina Burana*, and Bernstein's *Mass*. Tutorials in fundamental theory and score reading are offered to students requiring them.

51, 52. *Applied Music Program: Instruction in Vocal or Instrumental Music* The STAFF. Half course each semester. Restricted to skilled musicians. Openings are limited. Enrollments and re-enrollment are by audition and jury. Lessons are given by consultants to the Applied Music Program. Written permission is required, and a fee charged for enrollment. Copies of the Applied Music Program Handbook giving detailed information are available at the Department.

53, 54. *Applied Music Program: Instruction in Vocal or Instrumental Music* The STAFF. Half course each semester. Restricted to skilled musicians. Openings are limited. Enrollments and re-enrollment are by audition and jury. Lessons are given by consultants to the Applied Music Program. Music 51, 52 is prerequisite to 53, 54. Copies of the Applied Music Program Handbook giving detailed information are available at the Department.

61-62. *Chorus*

Mr. ERMEY.

Half-course each semester. A practical study of choral literature, techniques, and performance practice from Gregorian chant to the present, offered through rehearsal, sectionals, and performance. Seminars, reading assignments, and written essays and reports are required. Enrollment by audition, based on voice quality, experience, and music-reading ability. Written permission. May be repeated for credit.

63-64. *Orchestra*

Mr. BALZER.

Half-course each semester. A practical study of the orchestra repertory from Bach to the present, offered through coaching, rehearsal, and performances. Seminars, reading assignments, and written essays and reports are required. Enrollment by audition and written permission. Restricted to skilled instrumentalists. May be repeated for credit.

65-66. *Wind Ensemble*

Mr. CHRISTIE.

Half-course each semester. A practical study of the wind ensemble literature from Gabrieli to the present, offered through coaching, rehearsal, and performance. Seminars, reading assignments, and written essays and reports are required. Enrollment by audition and written permission. Restricted to skilled instrumentalists. May be repeated for credit.

91, 92. *The History of Western Music*

Mr. LEWIS.

An intensive survey of western music from the middle ages to the 20th-century designed to provide musicians with the tools of style analysis and music historical research. Limited to students with music reading ability. Required for music concentration, these courses should be taken with or after Music 13-14. Concentrators should complete them by the sophomore year.

II. FOR UNDERGRADUATES AND GRADUATES

113. *Modal Counterpoint*

Mr. SHAPIRO.

An introduction to the contrapuntal technique of the sixteenth-century choral literature, with particular attention to the styles of Josquin, Lassus, and Palestrina. Written permission required.

114. *Seminar in Composition*

Messrs. NELSON and SHAPIRO.

Written permission.

115-116. *Introduction to Electronic Music*

Mr. SHAPIRO.

For students interested in composition using electronic means. The first semester is mainly concerned with learning to manipulate the synthesizer, tape recorders, mixing console, and other apparatus in the studio to produce a series of assignments and a short piece. The second semester continues the study with problems in studio recording, live performance, and larger compositional forms. Written permission.

117. *Tonal Counterpoint*

Mr. SHAPIRO.

The contrapuntal techniques of the 18th-century with emphasis on music of Bach and Haydn. Written exercises in and analysis of all styles including fugue. One hour per week of ear training and sight singing. Written permission.

118. *The Technique of Orchestration*

Mr. NELSON.

Introduction to standard instrumentation; exercises in basic principles; analysis of styles of scoring. Written permission required.

119. *Seminar in Form and Analysis*

Messrs. BAKER and WALDBAUER.

A study of formal principles developed in western music since ca. 1300, and of critical and analytical methods, including those of Schenker.

120. *Conducting*

Messrs. BALZER and ERMEY.

Theoretical and technical studies in choral and instrumental conducting, including approach to the score, performance practice and physical gesture. Written permission required.

125. *Seminar in Electronic Music*

Mr. SHAPIRO.

A study of advanced techniques of composition employing electronic media including composition in larger forms, use of the recording studio, mixed media, and live electronic performance. Prerequisite: Music 116. Written permission.

130. *Major Masters and Repertories of Music*

Messrs. LAURENT and WALDBAUER and Ms. LEWIS.

The advanced study of a selected composer or genre of western music. Composers recently studied: Bach, Bartok, Stravinsky, Verdi, Wagner.

135. *Theory and Method in Ethnomusicology*

Ms. KLEEMAN.

History and Philosophy of the discipline; bibliography; organology; current field theories; perspectives on ethnomusicology from related disciplines.

136. *Field Research in Ethnomusicology*

Mr. KOETTING.

Problems and techniques of ethnomusicological field and laboratory work; project design; data-logging techniques; field ethics; equipment and recording techniques. Each student will prepare and carry out a guided fieldwork project.

142. *American Popular Music*

Ms. KLEEMAN.

The development of contemporary Pop music from 19th- and early 20th-century popular music genres. Anglo- and Afro-American folk music genres. Melodic, rhythmic, and textual analysis. Problems of function, transmission, authenticity, acculturation, and aesthetics will be considered.

143. *Music of Sub-Saharan Africa*

Mr. KOETTING.

A survey of Sub-Saharan musics investigating the relationships of music and society, form and structure, functions and uses of music, musical change and syncretic forms, the urban situation, organology and music and the related arts.

144. *Music of Mexico*

Mr. KOETTING.

A study of the major mestizo styles of the past and present, pre- and post-Spanish Indian music, the nationalistic movement in art music, and related Central and South American genres.

145. *Richard Wagner: Strategies of Aesthetic Revolution* (German 145

Special Themes and Topics 145)

Messrs. LAURENT and LOVE.

Interested students should register for Special Themes and Topics 145.

155-156. *Applied Music Program: Advanced Instruction in Vocal or Instrumental Music*

The STAFF.

Half-course each semester. Restricted to musicians demonstrating mastery of an advanced repertory in their fields. Openings are limited. Enrollment is by successful participation in a qualifying recital; re-enrollment is by audition and jury. Lessons are given by consultants to the Applied Music Program. Written permission required and a fee is charged. Copies of Applied Music Program Handbook available at the Department.

157-158. *Applied Music Program: Advanced Instruction in Vocal or Instrumental Music*

The STAFF.

Half-course each semester. Restricted to musicians demonstrating mastery of an advanced repertory in their fields. Openings are limited. Enrollment and re-enrollment are by audition and jury. Lessons are given by consultants to the Applied Music Program. 155, 156 is prerequisite to 157, 158. Written permission required and a fee is charged. Copies of the Applied Music Program Handbook available at the Department.

191, 192. *Special Topics*

The STAFF.

Elective for qualified students by permission of the Chairman of the Department. Required of Honors students in Music in the senior year. Available for Honors students in related fields by arrangement with Honors counselors.

195. *Seminar: Topics in Classic-Romantic Music.*

Mr. WALDBAUER.

Prerequisite: 14 and 92 or written permission.

196. *Seminar: Topics in 20th Century Music*

Ms. LEWIS.

Prerequisite: 14 and 92 or written permission.

198. *Seminar: Historical and Analytical Studies in the Literature of Music*

Mr. JOSEPHSON.

Structural, critical, and stylistic analysis of selected works from various periods. Prerequisite: 14 and 92 or written permission.

III. PRIMARILY FOR GRADUATES

235. *Seminar in Ethnomusicology*

Mr. KOETTING.

Transcription and notation. Written permission for undergraduates.

236. *Seminar in Ethnomusicology*

Ms. KLEEMAN.

An intensive study of the cultural, aesthetic, and technical aspects of a single topic in ethnomusicology. Written permission for undergraduates.

Thesis Preparation

For Graduate students who have met the tuition requirement and are paying the Registration Fee to continue active enrollment while preparing a thesis.

Preliminary Examination Preparation

For graduate students who have met the tuition requirement and are paying the Registration Fee to continue active enrollment while preparing for a preliminary examination.

291, 292. *Individual Work in Research or Composition*

Balinese Gamelan Angklung Students interested in non-Western culture and music may gain first-hand experience in this Balinese orchestra. Students will rehearse and perform in the Balinese style. No prior musical experience required, but preference will be given to students enrolled in ethnomusicology courses. For more information contact ethnomusicology staff.

African Drum and Dance Ensemble Instruction in drumming and dance techniques of West Africa leading to performance on and off the Brown campus. No prior experience required. For information contact the ethnomusicology staff.

Neural Sciences

The program in Neural Sciences is administered by an executive committee of the Center for Neural Sciences composed of Professor LEON COOPER (Co-director) (Physics); Professor FORD EBNER (Co-director) (Biology and Medicine); Professor CHARLES ELBAUM (Physics); Professor WALTER FREIBERGER (Applied Mathematics); Professor ULF GRENANDER (Applied Mathematics); Professor HENRY KUCERA (Slavic Languages); Professor JAMES MCILWAIN (Biology and Medicine). The faculty related to the Center for Neural Sciences consists of individuals from various departments within the University whose research and teaching interests are focused on the neural mechanisms underlying brain functions and behavior. The research interests of affiliated faculty include both theoretical and experimental approaches to understanding the function of the nervous system.

UNDERGRADUATE PROGRAM

An undergraduate concentration in the Neural Sciences offers students at Brown a science-oriented program in the fields of knowledge that are important to an understanding of brain function. The pursuit requires a general science background, a number of courses especially devoted to the brain sciences and an in-depth experience that clearly defines the limits of knowledge in at least one aspect of the neural sciences. The third phase of the concentration allows considerable flexibility for students to develop the last two years along lines of individual preference. They may focus in areas of biology, psychology, applied mathematics and modeling theory, bioengineering, or combinations of these.

The general science courses for the Sc.B. include Mathematics 9, 10; Physics 3, 4; Chemistry 3, 11; Biology 11, 12, plus a computer course, or their equivalent. The Neural Science core-courses are NS 1, 2 and 100. One seminar course and electives complete the concentration. Honors programs and independent studies are encouraged and projects are arranged with individual faculty members.

I. PRIMARILY FOR UNDERGRADUATES

1. *Nervous System* (Biomed 91)

Ms. SMITH and STAFF.

Designed as a systematic introduction to the structure and function of the central nervous system of mammals. The lectures assume some background in animal biology and chemistry, although no formal prerequisites are required. The main topics are: 1) structure and function of neurons; 2) neural integration underlying sensory and motor function; 3) neuronal mechanisms related to complex functions such as learning and memory.

2. *Integrative and Organismal Neurobiology* (Biomed 92)

Mr. EBNER.

Intermediate level lectures on the anatomy, physiology and pharmacology of the central nervous system of vertebrates, emphasizing many of the current research strategies used in these subdisciplines. Prerequisite: Neural Sciences 1.

II. FOR UNDERGRADUATES AND GRADUATES

100. *Experimental Neurobiology* (Biomed 161)

Mr. LENT.

Intended to provide an introductory laboratory experience in the neural sciences with an emphasis on neurophysiological techniques. Laboratory experience will be supplemented by informal lectures to introduce the topics, discuss the experiments, and emphasize important concepts that are derived from the results. Prerequisites: Neural Sciences 1 and 2, Biology 11-12, Physics 3-4, Chemistry 3 and 11 and written permission.

101. *Understanding the Brain* (University 129)

Mr. ANDERSON.

Factual background is provided for discussing the neurosciences and one neural system (e.g. visual, auditory...) is analyzed in some detail. Simple mathematical models for learning and memory are introduced and some results from experimental and cognitive psychology are compared with the behavior of such models.

102. *Understanding the Brain* (University 130)

Mr. ELBAUM.

Basic features of information processing and communications in living systems are discussed. Several models of distributed memory are studied and their behavior with regard to information storage, retrieval and association is discussed. Consistency of the models with known neurophysiology is examined throughout.

Center for Old World Archeology and Art

The Center for Old World Archaeology and Art exists to bring together faculty and students in this field at Brown University. While retaining departmental affiliation (in Classics or Art) and following departmental degree programs, students benefit from unified curricula planning, daily contact and office space in common with others working in the same field, and participation in coordinated research. The Center sponsors a series of colloquia throughout the year, and publishes monographs and collected papers in its own series *Archaeologia Transatlantica*. It occupies its own facilities including a professional dark room on three floors of a building on the main campus near the John D. Rockefeller Library, which houses one of the most important library collections in classical archaeology in North America. At the Museum of Art, Rhode Island School of Design, there is one of the major collections of Greek and Roman art in the United States. Providence is located within one hour of Boston and four hours of New York City, which places further important resources within reach of the members of the Center.

Since 1966 Brown University has conducted field excavations at Satriano, Buccino, Trentinara and Licata in southern Italy and Sicily while students have also participated, with university support, in excavations at Polla (Salerno), Pompeii, Ortona and Cavallino (Lecce) in Italy, at Aphrodisias in Turkey, and at the Athenian Agora. Since 1978 the Center has benefited from the George S. and Nancy B. Parker Endowment for Classical Archaeology, which provides for two distinguished visiting scholars annually. Further endowment and gift support, including funding of graduate fellowships, has been provided by the Joukowsky family and the Joukowsky Family Foundation. In addition the Center has benefited from a three year grant from the Fruehauf Foundation. The current research interests of the faculty members of the Center lie in field methodology, prehistoric and early historic Italy, early Anatolia, Greek epigraphy, Greek numismatics, Greek sculpture, Roman sculpture and Roman painting. Encouragement of student research is a primary object of the Center.

Pembroke Center

The Pembroke Center for Teaching and Research on Women brings together faculty and students interested in questions relating to sex roles and the status of women and men in society. It works with departments, programs, and other centers to encourage the development of new women's studies courses and the inclusion of material on women in existing courses. Faculty associated with the Center are available to advise students, who may concentrate in women's studies or who may develop a cluster of women's studies courses to enrich a standard concentration. In addition to its curricular interests, the Pembroke Center develops and encourages research projects through its auspices, and works with the John Hay Library to expand the existing Pembroke Archive. The Pembroke Center sponsors colloquia and other opportunities for scholarly exchange and, with the Sarah Doyle Women's Center, provides a wide range of programs on the changing social, political, and cultural roles of women.

Philosophy

Professors BROCK (Chairman), CHISHOLM, LADD, LENZ, QUINN, SCHMITT, SOSA; Associate Professors ACKERMAN, LUSCHEI, NUSSBAUM, VAN CLEVE; Assistant Professors BOWEN, PITOWSKY, ZIMMERMAN; Visiting Professors HOHM, STEVENSON.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Standard Concentration: Eight semester courses in philosophy, which may not include elementary courses. They must include Philosophy 180; one of the following: 181, 182A, 182B, 183, 184, 186, 187; one of the following: 166, 175, 177; one of the following: 55, 163, 188; and one of the following: 158, 164. At least six of the course must be at the advanced level (i.e. 155 or above), and one must be done above 190. Advisor: Mr. QUINN.

Ethics and Political Philosophy: Eight semester courses, which may not include elementary courses. They must include at least two of the following: 158, 164, 165. Others are to be chosen from among the following: 143, 160, 180, 182A, 182B, Sociology 140; Political Science 101, 104, 105, 116, 117. Other courses in social science, independent study projects or graduate seminars may be substituted for the non-philosophy courses with the approval of the concentration advisor. Advisor: Mr. ZIMMERMAN.

Logic and Philosophy of Science: Either Philosophy 163 or Philosophy 188 and at least four and as many as seven courses from among the following: 159, 161, 166, 175, 181, 183, 184, 185, 186, 187, 198. At most three courses among the eight required may be selected from among the appropriate non-elementary offerings of the mathematics and science departments with the approval of the concentration advisor. Examples of appropriate courses are the following: Applied Mathematics 116, Biology 147, Chemistry 114, Computer Science 152, Geology 161; Mathematics 153, 154; Physics 151; Psychology 108. Independent study projects or graduate seminars may be substituted for the non-philosophy courses with the approval of the concentration advisor. Advisor: Mr. SOSA.

GRADUATE PROGRAMS

MASTER OF ARTS. This degree will be conferred upon the completion of eight courses and a satisfactory thesis or upon the fulfillment of the preliminary requirements for the Ph.D.

DOCTOR OF PHILOSOPHY. The preliminary requirements may be satisfied by demonstrating competence in logic, philosophy of science, ethics, epistemology, metaphysics, and history of philosophy. This may be done either by passing examinations or by passing prescribed courses with a quality grade. Alternatively, the preliminary requirements may be satisfied through satisfactory completion of an individually tailored major-minors program, one initially composed in consultation with several department members and submitted to the department, through the chairman, for approval.

In the Final Examination considerable importance will be attached to the student's ability to present and defend the results of his or her investigation in a clear and resourceful manner.

I. PRIMARILY FOR UNDERGRADUATES

1. *Problems of Philosophy*

Mr. BOWEN.

Survey of some of the traditional problems of philosophy: perception, our knowledge of the external world, our knowledge of other minds, freedom and determinism, relativism, our knowledge of good and evil, etc.

3. *Skepticism and Knowledge*

Ms. ACKERMAN.

At the outset, two great systems of modern philosophy will be presented: the Rationalism of René Descartes, and the Empiricism of David Hume. These diametrically opposed systems (and the extensive class discussion of them) will define a sphere of questions for further discussion. Among these are questions concerning: knowledge and true opinion; perception and the external world; dreaming and scepticism; knowledge of other minds; induction and knowledge in the sciences; religious knowledge; self-knowledge. The main purpose of the course is to help students elaborate a framework of their own within which they can better understand and answer such questions. The method to be used will include lecturing by the instructor, outside reading in modern and contemporary philosophy, and class discussion.

4. *Reason and Religion*

Mr. HOHM.

An introduction to philosophical thinking about our abilities to utilize our natural human faculties in coming to conclusions about matters of religious speculation. Topics for discussion will be selected from the following: Reason, Faith, and Natural Theology; the Existence of God; Miracles; Religious Experience; God and Evil; Immortality; Religious Alternatives to Theism. Emphasis will be given to the development of critical abilities to utilize philosophical and logical tools in discussing these matters.

5. *Ideals of Human Freedom in the Modern World*

An introduction to philosophy through a study of the new moralities and the new conceptions of man emerging from the impact of modern science and technology. The discussion will focus on the key concept of man's freedom. Topics to be explored will include: relativism, situation ethics, utilitarianism, the philosophies of Nietzsche, Marx, and existentialism, the analysis of ideologies in general, the free will controversy in the light of Freudian psycho-analysis and contemporary linguistic analysis, Wittgenstein's theory of language games, and the relevance of other recent developments in the philosophy of mind for the understanding of the ethics of human freedom. The subjects will be treated philosophically with a view to introducing the student to rigorous and exact methods of logical analysis.

6. *Modern Science and Human Values*

Mr. PITOWSKY.

The course is intended to introduce the student to philosophical thinking through consideration of certain problems at the interface between science and ethics. By way of historical introduction, the views of some of the founders of modern science, such as Galileo, Kepler, Newton, and Hobbes, on the relation between science and values will be examined. The philosophical distinctions among facts, theories and values will be explored. Using the writings of various contemporary philosophers and scientists some substantive questions will be discussed; for example, Is science or ought it to be value-free? Can there be a scientific basis for ethics? What is and what ought to be the role of the scientific community in formulating public policy?

7. *On Ideology*

Mr. SCHMITT.

The concept of ideology became important when it was observed that changes in social conditions were accompanied by changes in theories about social and individual conduct. We shall get some examples of ideological conceptions from different periods in American history and then test different definitions of ideology against the data derived from history.

8. *Existentialism*

An introduction to philosophical questions and modes of discourse through the study of a particular movement in recent philosophy. The properly philosophical, as contrasted with the popular or literary, writings of the Existentialists will be read and discussed. Camus, Kierkegaard, Nietzsche, Sartre, etc.

9. *Philosophy East and West*

Mr. VAN CLEVE.

Comparison of the views of classical Eastern and Western thinkers on issues of perennial philosophical concern. Topics for discussion will be chosen from the following: monism and pluralism; theism, atheism, and pantheism; immortality and reincarnation; the nature of the self; spiritualism and materialism; free will and determinism; the nature of time; the concepts of substance and causation; perception and illusion; the cognitive status of mystical experience; rational versus intuitive modes of knowing; theories of truth. Readings will be drawn from the Upanishads, works of major Hindu and Buddhist thinkers, and writings of Plato, Descartes, Hume, Schopenhauer, Russell, and others.

10. *Critical Reasoning*

A study of the techniques and principles of correct reasoning and clear communication. Topics to be covered include the following: uses of language, informal fallacies, definition, deduction and induction, syllogistic logic, Venn diagrams, propositional logic, and essentials of scientific method.

12. *Freedom, Responsibility, and Punishment*

Mr. ZIMMERMAN.

An introduction to philosophy by way of consideration of such issues as: whether or not we are, can be, or ought to be free to think and act as we choose; whether or not we are or can be responsible (morally or legally) for any of our thoughts, actions, or the consequences of these; whether or not we ought to be punished for any of our thoughts, actions, or the consequences of these. Readings from both classical and contemporary sources.

20. *Ethics of Professionalism*

Mr. LADD.

The professions exercise an enormous power in modern society. Their power is based on claims to exclusive authority in decision-making of certain kinds. Are these claims justified? If so, what is their ethical basis and what are the limits to professional authority? Individual professions have their specific professional ethics, explicit or implicit, defining the goals of the profession, setting forth the constraints under which its members should operate, and prescribing standards governing their relationships to clients (patients), colleagues and others. Do these professional ethics have any moral basis and are they morally adequate? The purpose of the course is to scrutinize critically the basis, limits and adequacy of professional ethics in general and of the professional ethics of specific professions such as medicine, law and engineering. There will be readings in the sociological literature on professionalism, in the professional journals, in writings critical of professionalism, and in the philosophical background of claims and counterclaims about professionalism. Students will be encouraged to focus on the ethical problems connected with a particular profession that interests them.

55. *Logic*

Mr. LUSCHEI.

Introduction to deductive logic, developing a system of natural deduction, beginning with the basic propositional logic and proceeding through the elementary logic of quantification and predication (including the logic of identity and descriptions). Opens with a brief historical survey of the development of logic, from Aristotle to Frege and Russell and their successors; ends with a preview of ontology, foundations of mathematics, metalogic, and applications of logic, together with an examination of problems in critical reasoning.

II. FOR UNDERGRADUATES AND GRADUATES

143. *Moral Problems*

Mr. ZIMMERMAN.

A careful study of a few selected moral problems such as abortion, euthanasia, legislation of morality, war, violence, and pacifism, civil disobedience, criminal punishment, etc. Emphasis will be given both to the substantive problems themselves and to the structures of moral reasoning and argument they exemplify.

151. *Classical Philosophy of Religion*

Mr. QUINN.

A critical examination of some classical philosophical theories of religion. The course will begin with a discussion of the role of natural theology in justifying religious beliefs and of the traditional proofs for the existence of God as found, for example, in the writings of Anselm, Aquinas, Descartes, Spinoza, and Leibniz. The force of the destructive critique of the results of natural theology elaborated by Hume and Kant will then be evaluated. Two types of response to this critique by later philosophical thinkers will be considered in some detail: constructive but non-speculative justifications of religion (Kant, Hegel), and reductionistic naturalistic explanations of religion (Feuerback, Freud, Durkheim). The central focus of the course will be issues concerning justification and explanation in religion, and the most important question will be whether religious beliefs have rational justifications or only scientific explanations. Offered every other year, alternating with Philosophy 152.

152. *Contemporary Philosophy of Religion*

Mr. QUINN.

A critical examination of the philosophical import of some contemporary theories of religion. Particular topics to be discussed include the following: the phenomenology of religious experience (Otto, van der Leeuw); existential theology (Buber, Tillich); the positivistic attack on religion (Ayer); death-of-God theology (Bonhoeffer); the problem of the meaning of religious language (Wittgenstein, Hick); recent analytical work in philosophical theology (Plantinga); recent continental philosophy of religion (Duméry). The course will be organized around the attempt to discover a meaningful place for religious forms of life in a secular culture. Offered every other year, alternating with Philosophy 151.

155. *Philosophy of Language*

Ms. ACKERMAN.

Discussion of philosophical problems pertaining to the nature of language, meaning, and communication, and of the relations of language to logic and philosophy.

158. *Moral Theories*

Mr. BROCK.

A systematic critical study of the principle alternative moral theories: consequentialism (including its prominent variant, utilitarianism); moral right; moral duties. Theories will be examined for the kind of moral reasoning they employ, and for their implications on specific moral issues such as killing, privacy, distributive justice, etc. The final section of the course will take up the questions—why be moral?—and examine rational egoism as an alternative to morality.

159. *Philosophy of Science*

Mr. LUSCHEI.

The main purpose of this course is to provide both science concentrators and others with a philosophical perspective on the structure of science and some of its results. Topics for discussion will be chosen from the following: scientific explanation, theoretical constructs and systems, probability and confirmation, laws of nature and determinism, the nature of mathematical truths, concept formation in the empirical sciences.

160. *Philosophy of Law*

Mr. LADD.

A critical examination from the philosophical point of view of the chief classical and contemporary theories of the nature and function of law. Particular topics to be considered are: the definition of law, the nature of a legal system, the logic of legal reasoning, the analysis of basic legal conceptions (e.g. of right and duty), legal rules and principles, law

and justice, law and morality. Special stress will be placed on the problems raised by the analytical jurisprudential tradition as represented by Austin, Gray, Holmes, Hohfeld, Kelsen, and Hart. Criticisms and revisions of tradition as represented by natural law tradition and other modern writers (e.g. Fuller) will also be studied. Prerequisite: one course in philosophy, preferably 7 or 158, or Political Science 115 and 116.

161. *Introduction to the Philosophy of Physics*

Mr. PITOWSKY.

This course will consider some of the philosophical topics that are related to substantive results in the physical sciences. Among the issues to be discussed are the philosophical problems about space and time that arise in the context of the Special Theory of Relativity, the conflict between determinism and indeterminism in classical and quantum physics and its relation to the traditional philosophical problem of human freedom, and the role of models, metaphors and analogies in physical theory.

163. *Logic*

Mr. LUSCHEI.

Deductive logic developed beyond the introduction given in Philosophy 55 (briefly reviewed at the beginning) into the higher logic of predication, ontology, and the foundations of mathematics. Includes the logic of existence and identity, descriptions, functions, relations, equivalence classes, structures, numbers, etc; also elements of logical grammar, theory of definition, resolution of logical and semantic paradoxes, logical reconstruction of arithmetic, and glimpses of metatheory. Sequel to Philosophy 55 which is a prerequisite.

164. *Theoretical Ethics*

Mr. ZIMMERMAN.

This course will consider some philosophical problems about ethics such as the nature, analysis, and justification of moral judgments, the relation of facts and values, the possibility of moral knowledge, the structure of moral reasoning, the role of rules and consequences in moral reasoning, ethical relativism and subjectivism, and rational egoism and the justification of morality. Prerequisite: one course in philosophy or written permission.

165. *Political Philosophy*

Mr. BROCK.

An analytical investigation of certain central problems and topics in political philosophy. Among topics to be studied are different theories of democracy, distributive justice, freedom or liberty, equality, human rights, the public interest, and political obligation and civil disobedience. Readings will be drawn from recent work in the field.

166. *Metaphysics*

Mr. CHISHOLM.

This course involves a critical consideration of the fundamental problems of ontology. The emphasis will be upon philosophical problems and the ways in which they might be solved. Philosophical systems will not be stressed. The topics to be considered include the following: the problem of universals; the distinction between abstract and concrete objects; the nature of identity; necessity; possibility; becoming; parts and wholes; and identity through time. There will be reading in contemporary sources. Prerequisite for the course: at least one course in logic.

175. *Theory of Knowledge*

Mr. VAN CLEVE.

Knowledge and its relation to thought, experience, truth, and inference. Perception, memory and reason. Induction. Self-knowledge and knowledge of others.

177. *Philosophy of Mind*

Ms. ACKERMAN.

A selection from the following topics: dualism and behaviorism, the mind-brain identity theory, thought and language, perception and sensation, the unconscious, human action, the nature of experience, types of experience, distinguishing marks of the mental, emotions and their objects, epistemic problems about mental phenomena. Introduction to the above topics through reading and discussing the work of classical and contemporary philosophers.

180. *Greek and Medieval Philosophy*

Mr. LENZ.

Main emphasis is upon Socrates, Plato and Aristotle, and their subsequent influence upon Judaeo-Christian thought (particularly St. Thomas Aquinas) in the medieval period. Also, the Pre-Socratics, Neo-Platonism and Stoic and Epicurean ethics.

181. *Modern Philosophy*

Mr. LENZ.

The ethical, political, metaphysical and epistemological thought of Hobbes, Descartes, Spinoza, Locke, Leibniz, Berkeley, Hume and Kant. Their continuing debate concerning problems arising from the scientific and cultural revolution of the Renaissance will be emphasized.

182A. *Marxism*

Mr. SCHMITT.

This course will deal with topics like Marx' relation to Hegel, specifically: the meaning of "materialism" and "dialectic," as Marx uses those terms; Marx' conception of science, including the sense in which Marx thought that he was formulating 'laws' and making 'predictions'; Marx' notion of alienation and the controversies about the centrality of that notion to the entire body of Marx' writings; Marx' conception of the unity of theory and practice; Marx' concept of 'value' and his labor theory of value; the controversy between Lenin and Luxemburg about the role of a 'vanguard party'; the controversy in the German Social Democratic Party about the need for revolution; the controversies about the proper basis for revolution, whether it should be industrial or agricultural; controversies about the role and nature of art in a socialist society. Offered every other year, alternating with 182B.

182B. *Marxism After Marx*

Mr. SCHMITT.

Reading and discussion of major writers in the Marxist tradition to examine ongoing controversies about such issues as the nature of the state, classes, social change and culture. Offered every other year, alternating with 182A. Prerequisite: Philosophy 7 or Philosophy 182A.

183. *Recent and Contemporary Philosophy*

Mr. SOSA.

Some main currents distinctive of recent and contemporary philosophy: e.g., Pragmatism, Analytic Philosophy, Existentialism. Selections from the writings of major figures.

184. *British Empiricism*

Mr. VAN CLEVE.

A study of specific themes from selected writings of one or more of the major British Empiricists, e.g. Locke, Berkeley, and Hume. This study will combine historical and critical approaches. Readings will include contemporary discussions of these philosophers. Offered every third year. Prerequisite: one course in philosophy.

185. *Intentional Logic*

Mr. BOWEN.

A survey of approaches and techniques in formal intentional logic. Various meanings of the words 'intentionality' and 'extensionality'. Contextual approaches (including possible worlds). *De dicto* versus *de re* approaches. Intentional entities and doing without them. Truth-conditional approaches. Formalizable criteria for intentionality. Quantifying in. Contrast between modal, temporal, psychological, attributive, and temporal intentionality.

186. *Continental Rationalism*

Mr. VAN CLEVE.

A study of specific themes from selected writings of one or more of the major continental rationalists of the Seventeenth Century, e.g. Descartes, Spinoza, and Leibniz. Readings will include contemporary discussions of these philosophers. This study will combine historical and critical approaches. Offered every third year. Prerequisite: one course in philosophy.

187. *Kant: The Critique of Pure Reason*

Mr. VAN CLEVE.

A detailed textual study, both historical and critical in nature, of the text of Kant's first *Critique*. Offered every third year. Prerequisite: 175, 181, 184, 186, or written permission.

188. *Intermediate Logic*

Mr. PITOWSKY.

A general introduction to mathematical logic, including such topics as proof theory, set theory, recursion theory, and possibly some topics in the philosophy of mathematics such as constructivity. Prerequisite: no formal prerequisite, but 163 or some mathematical background is advisable.

191. *Topical Investigations*

The STAFF.

Tutorial course designed primarily for Honors students. Independent study under individual guidance. Problems or topics for study are assigned to each student who will report in writing and orally. Elective by written consent of the Department for seniors who have credit for not less than two years of philosophy.

196. *Undergraduate Seminar in History of Philosophy*

Mr. LENZ.

Topic for 1982-1983: The Ethics of Aristotle and Kant.

198. *Undergraduate Seminar in Metaphysics and Epistemology*

Mr. VAN CLEVE.

Topic for 1983-1984: Necessary Truth and *a priori* Knowledge.

III. PRIMARILY FOR GRADUATES

Advanced graduate instruction is carried on mainly in seminars which vary in subject matter from year to year to meet the particular needs of the students concerned, and by independent individual investigations of special topics under the supervision and guidance of members of the Department. There are frequent colloquia addressed by staff members and by speakers from other institutions.

201. *Research in Philosophy*

The STAFF.

203. *Seminar*

Mr. CHISHOLM.

Topic for 1982-1983: Parts and Wholes. Topic for 1983-1984: The Mind-Body Problem.

204. *Seminar*

Mr. VAN CLEVE.

Topic for 1982-1983: Personal Identity. Topic for 1983-1984: Realism and Bivalence.

205. *Seminar*

Mr. SOSA.

Topic for 1982-1983: Perception and Intentionality.

206. *Seminar*

Mr. BROCK.

Topic for 1982-1983: Moral Rights. Topic for 1983-1984: Utilitarianism.

207. *Seminar*

Mr. ZIMMERMAN.

Topic for 1982-1983: Responsibility. Topic for 1983-1984: Theoretical Ethics.

209. *Seminar*

Mr. LENZ.

Topic for 1982-1983: Contractarian Theories of Ethics: their concepts of Morality and of a Person. Topic for 1983-1984: Hume.

210. *Seminar*

Mr. LUSCHEL.

Topic for 1982-1983: Logic and Ontology: Frege, Russell, Lesniewski.

211. *Seminar*

Mr. CHISHOLM.

Topic for 1982-1983: Problems in the Philosophy of Mind. Topic for 1983-1984: Epistemic Justification.

212. *Seminar*

Mr. QUINN.

Topic for 1982-1983: Philosophy of Space and Time.

216. *Seminar*

Mr. STEVENSON.

Topic for 1982-1983: Wittgenstein

217. *Seminar*

Mr. BOWEN.

Topic for 1982-1983: Modal Logic

Physics

Professors BAIRD, BEYER,¹ (Executive Officer), BRAY, COOPER, ELBAUM (Chairman), ESTRUP, FALLIEROS,² FARNSWORTH³ FELDMAN,¹ FRIED, GERRITSEN, GURALNIK, HELLER, HOUGHTON, KANG,¹ KOLSKY, KOSTERLITZ, LANOU,⁴ LEVIN, LINDSAY,³ MARIS, MASSIMO, MAXSON, PECK, QUINN, SEIDEL, SHAPIRO,⁵ STILES,⁴ TAN,² TAUC, WEINER, WESTERVELT, WIDGOFF, WILLIAMS,³ YING;² Associate Professors CUTTS, JEVICKI; Assistant Professor PELCOVITS; Assistant Professors (Research) BRICK, GIULIANI, LIBBY, PETERSEN, REILLY; Adjunct Assistant Professor LEVINE; Visiting Professor WEINGARTEN; Visiting Associate Professors LIU, MYUNG, XU; Visiting Assistant Professor H-C. FAN; Visiting Assistant Professors (Research) J-D. FAN, SUZUKI; Research Associates NINOMIYA, SHINKAWA; Visiting Research Associates DA CUNHA LIMA, HU, QIN; Visiting Lecturer SILBERMAN.

The Department aims to develop in its students a comprehensive grasp of the principles of physics, together with a productive capacity in research. The courses of study are flexible in subject matter and are conducted by means of lectures, seminars, laboratories, and colloquia. Undergraduate as well as graduate students have opportunities to carry out research in fields of current interest.

The principal research fields of the Department are physical acoustics, low-temperature physics, optics, surface physics, radio-frequency and microwave spectroscopy, solid-state physics, classical nuclear physics, and high-energy physics. There are also opportunities in the Metals Research Laboratory, in which several staff members collaborate with members of other departments. Interdepartmental study with the Departments of Chemistry and Geology and with the Divisions of Applied Mathematics, Biological and Medical Sciences, and Engineering is encouraged for students interested in such subjects as physical metallurgy, high-polymer physics and chemistry, surface physics and chemistry, semiconductor physics, properties of solid continua, geophysics, and biophysics. A center for Biophysical Sciences and Biomedical Engineering has been formed within the University. An interdisciplinary center for Neural Studies has been established.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE

Physics: Prerequisites: Physics 7, 8; 5, 6; (or 3, 4). Courses: Physics 47, 50, 56, 141, 142, and two additional 100-level courses (excepting Physics 110), or one additional 100-level course (excepting Physics 110) and Mathematics 18 or 29 or approved equivalent.

¹ On Leave, Semester I, 1983-84.

² On Leave, Semester II, 1983-84.

³ Emeritus.

⁴ On Sabbatical, 1983-84.

⁵ On Leave, 1983-84.

Interdepartmental Programs. See also the interdepartmental programs in Mathematics and Physics, page 121.

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF SCIENCE DEGREE

Physics: Prerequisites: Physics 7, 8 (or 5, 6) Mathematics 9, 10; Courses: Physics 47, 50, 56, 141, 142, 151, 152, 198. Two additional science courses, chosen from Physics 26, 118, 125, 162, 241, or upper level courses in related fields of science chosen by the student with adviser. Mathematics: 4 courses beyond 9, 10, including choices from Applied Mathematics. In addition, a course in computer programming is recommended.

A senior thesis is required. This is to be prepared in connection with Physics 198 under the direction of a faculty supervisor. The topic may be in experimental or theoretical physics. By arrangement with the department adviser and thesis supervisor, it may be in a related department or of interdisciplinary nature. In any event, a dissertation must be submitted.

Honors. Candidates for Honors in Physics will be expected to pursue a more rigorous and extensive program than those merely concentrating in the subject. In addition they will be required to begin an Honors thesis during the seventh semester and to complete it (as part of Physics 198) during the eighth semester. Honors candidates are also expected to take a special oral examination on the thesis at the end of the eighth semester. Further details about the program may be obtained from the Chairman of the Department or the departmental Honors adviser.

PREPARATION FOR SPECIAL FIELDS. Students planning to study medicine may satisfy the requirements in physics for most medical schools by taking Physics 3, 4 or 5, 6 or 7, 8.

ASTRONOMY

Astronomy. Members of the Physics Department, other departments, and members of the Ladd Observatory Staff compose the staff. Facilities are those of the Physics Department and those of Ladd Observatory and its associated equipment. For courses in Astronomy, see Physics 21, 22, 24, 26, 125; Geological Sciences 5, and courses in the history of astronomy in the department of History of Mathematics.

Standard concentration programs do not now exist; however, it is possible to arrange an independent concentration in astronomy. For advice on such a program, see Professor Stiles, Department of Physics. For those students desiring an excellent undergraduate preparation for graduate work in astronomy, the recommended courses listed below, or their equivalents, should be taken.

Suggested program for the A.B. degree

Prerequisites: As in Sc.B. program below. Courses: Physics 26, 47, 50, 118, 125, 141, 152, 142 or 162; Mathematics 18 or 29. Recommended: Physics 21, 22 or 24.

Suggested program for the Sc.B. degree

Prerequisites: Physics 7, 8 (or 5, 6 or 3, 4); Mathematics 17 or 9, 10. Courses: Physics 24, 26, 47, 50, 56, 118, 125, 141, 151, 152, 142 or 162, and one other upper level course in the physical sciences; Mathematics 52, 111 following upon 17, 18 or 9, 10, 18 or 35; or Mathematics 24, 26, 111 following upon 9, 10, and one other course in Mathematics or Applied Mathematics. Applied Mathematics 33, 34 may replace Mathematics 52, 111.

GRADUATE PROGRAMS

MASTER OF SCIENCE. The minimum requirements for this degree consist of eight courses or equivalent. These would normally be 200-level physics courses, e.g., the core courses Physics 201, 205, 206, 209, 214, 217, 241, and Applied Mathematics 205, 206. Other courses outside the department or 100-level courses can be substituted by permission of the Physics Department. No more than two courses can be research courses. The

usual program for a half-time assistant is the same as Semesters 1-3 of the Doctor of Philosophy program described below. These courses and the general requirements of the Graduate School lead to the Master's degree.

DOCTOR OF PHILOSOPHY. The usual program for a half-time assistant is shown below; other arrangements are possible, depending on the student's background, interests and special requirements.

Semester 1: Physics 205, Applied Mathematics 204 or 213, and one elective (or Physics 201). Semester 2: Physics 201 (or one elective), 206 and Applied Mathematics 206 or 214. Semester 3: Physics 207, 209, and 217 or 241. Semester 4: Physics 214 and one or two electives. Semester 5: Physics 241, or 217 if not taken earlier, and one or two electives. A Qualifying Examination is given at the beginning of Semester 3, and the Preliminary Examination is given during Semester 5. These examinations may be taken earlier, by permission of the department. These courses and examinations, together with the general requirements of the Graduate School, including a research thesis, lead to the Ph.D.

Students with insufficient preparation in certain subjects may postpone some of the usual first-year programs and take courses on the 100-level.

All new graduate students take a diagnostic examination during the registration period preceding their first semester. The results of this examination are used solely as an aid to the selection of suitable courses.

I. PRIMARILY FOR UNDERGRADUATES

1, 2. *An Introduction to the Meaning and Structure of Physics*

The aim of this course is to introduce students, whose primary interest is not in the sciences, to such topics in classical and modern physics as Newtonian mechanics, relativity, and the quantum theory. Through an examination of twentieth century, classical, and ancient theories such as those of Aristotle and Euclid, the so-called scientific view of the world will be explored. A fear of or even an aversion to the sciences or an absence of previous instruction in physics is not an obstacle. The principal requirements are an interest in ideas and a willingness to analyze and develop them. The course will be organized around lectures, outside reading, class discussion, and a laboratory. This course is not designed to satisfy medical school admission requirements.

3, 4. *Basic Physics*

Intended for concentrators in sciences other than physics who take the course as juniors or seniors, or without prior exposure to physics, and require a less rigorous course than Physics 5, 6. This is a quantitative course, employing the elementary concepts of calculus but very little of its technique. The subject matter is as specified above (unchanged). Changes contemplated are in emphasis (more on applications, less on derivations) and in pace (closer adherence to topics covered by MCAT tests, more study time per topic). Six hours of attendance. Corequisites: Mathematics 9, 10 or written permission.

5. *Foundations of Mechanics*

Covers the mechanics of particles and systems, emphasizing principles and using elementary calculus freely. Intended for freshman or sophomore science majors having some prior knowledge of physics or who (regardless of background) are motivated for a strong course. The level of treatment is defined by the classic concentrator's text, *Physics Part I* by Resnick and Halliday. The course presupposes no background but operates well above the most rigorous high school course. *Lectures, conferences and laboratory.* Six hours of attendance. Corequisite: Mathematics 9.

6. *Foundations of Electromagnetism and Electromagnetic Radiation*

This course covers the fundamentals of electro-magnetism and optics, and introduces the basic concepts of modern physics, in the same style and at the same level as Physics 5. It is intended for those non-physics science concentrators who, having taken Physics 5, will limit their college physics to two semesters and require the subject matter of this course in preference to that of Physics 8 (q.v.). The course may also enroll a few physics majors; see below. The text is *Part 2* of the Physics 5 text. Lectures, conferences and laboratory. Six hours of attendance. Corequisite: Mathematics 10.

7. *Analytical Mechanics*

This is a course in classical mechanics taught well above the Halliday-Resnick level. It is intended for concentrators in science, including but not limited to physics, having a year each of high school physics and calculus. Physics 7 is a faster and mathematically more sophisticated alternative to Physics 5, passing quickly through the basics to which Physics 5 is devoted and concentrating upon more challenging problems and more advanced applications of basic theory.

8. *Physics of Waves, Relativity and Quantum Mechanics*

This course is the former Physics 6, unchanged in level and content. It deals with wave phenomena (including optics), relativity and quantum mechanics at a level substantially higher than Physics 5, 6. This is the second course in the three-semester introductory sequence for physics majors, Physics 47 (Electricity and Magnetism) being the third, a sequence intended as well for those non-physics concentrators able to invest the time for the strongest available foundation. Physics 8 is also suitable for those students who, while choosing to limit their college physics to two semesters, will be better served by an in-depth introduction to modern physics than by classical electromagnetism.

21, 22. *Beginning Astronomy*

For the student who has little exposure to physics and mathematics. Emphasis on why we believe certain statements to be true, how we acquired our knowledge, and why we attempt certain new observations. Semester I: historical and conceptual developments, and the study of the solar system. Semester II: stars and their evolution, our galaxy, and the universe at large. The role of pulsars, quasars, neutron stars, and black holes in modern views of the universe is covered. Will acquaint the student with celestial events by eye and by aids such as telescopes and cameras. Three hours of attendance. Conference sections, as well as numerous laboratory experiments on the sun, stars, and planets, are offered. See also Physics 24. Either semester may be taken independently.

24. *Introduction to Astronomy*

For students interested in studying basic astronomy in a more rigorous manner than is offered in Physics 21, 22. Conferences and laboratory work will be required. This course or an equivalent will be required for students taking an independent concentration in astronomy. Six hours of attendance.

26. *Introduction to the Physics of Stars and Stellar Groups*

A survey of astrophysical phenomenology and the application of physical theory to its interpretation. Prerequisite: Physics 4, 6, 8, or written permission.

47. *Electricity and Magnetism*

Electric and magnetic fields. Motion of charged particles in fields. Electric and magnetic properties of matter. Direct and alternating currents. Maxwell's equations. Laboratory is provided. Prerequisites: Physics 4, 6, or 8, and Mathematics 9, 10 or approved equivalents.

50. *Advanced Classical Mechanics*

Dynamics of particles, rigid bodies, and elastic continua. Normal modes. Lagrangian and Hamiltonian formulations. Prerequisites: 5, 6, and Mathematics 18 or 29, or approved equivalents.

56. *Sophomore Laboratory*

A program of experiments and measurements chosen to broaden the student's understanding of DC and AC circuitry, the electronics of basic laboratory equipment, and techniques of data and error analysis. Required of all physics concentrators. Prerequisites: 5, 6, 47.

60. *Elements of Modern Physics*

Fundamentals of wave physics. Elements of optics. Kinetic theory; origin of quantum theory; structure and spectra of atoms. Molecules and solids. Four hours of attendance. Primarily for engineering students at the second-semester level, but open to others with these prerequisites: Physics 3 and Mathematics 10, or approved equivalents.

79. *Physics of Matter*

Selected topics from the modern physics of matter: Kinetic theory of gases; Origin of quantum physics, including black-body radiation, particle and wave phenomena; Schrödinger's equation; Structure and spectra of atoms and molecules; Crystal structure and diffraction; Electronic, optical and thermal properties of solids. Four hours of attendance. Primarily for engineering students in the junior or senior year as an Advanced Science Course in the Engineering Curriculum. Open to other qualified students by permission. Prerequisites: Engineering 4 (or equivalent), Applied Math 34A (or equivalent).

II. FOR UNDERGRADUATES AND GRADUATES

114. *Biomedical Radiation Physics*

A survey of the nature, origins and byproducts of ionizing particles and radiations; technology of production and use; physical and biological phenomena underlying effects on living matter; and an overview of biological response at various levels of organization. Applications relate to radiation biology, nuclear medicine, cancer therapy, environmental and industrial problems. Lectures and independent study projects; no laboratory. Acceptable for concentration credit for Sc.B. in Biomedical Sciences. Prerequisites: Biomed 1, Chemistry 3; corequisite, Physics 4; prerequisites may be waived with instructor's permission. Interested students who have schedule conflicts should see the instructor.

118. *Optics and Wave Theory*

Elements of applied optics; analogous topics in ion topics. Propagation, interference, diffraction, absorption, and polarization of waves, with particular reference to light and acoustics. The wave properties of matter; Schrödinger's equation. Laboratory work is provided. Six hours of attendance. Prerequisites: Physics 47 and Mathematics 18 or 29, or approved equivalents.

125. *Stellar Interiors*

The physical state of the stellar interior with emphasis on models for hydrogen-burning and degenerate stars. Topics will include hydrostatic and thermal equilibrium, chemical composition, equation of state, energy transport mechanisms, opacity, and nuclear reactions. Prerequisites: Physics 26 and 152, or written permission.

141, 142. *Modern Physics A, B*

A unified treatment of quanta, photons, electrons, atoms, molecules, matter, nuclei, and particles. Quantum mechanics will be developed at the start and used to link and explain both the older and the newer experimental phenomena of modern physics. Laboratory work is provided. Six hours of attendance. Prerequisites: Physics 47, 50, 56, or approved equivalents.

151. *Advanced Electromagnetic Theory*

Maxwell's laws and electromagnetic theory. Electromagnetic waves and radiation. Special relativity. Prerequisites: Physics 47 and Mathematics 18 or 29 or approved equivalents.

152. *Thermodynamics and Statistical Mechanics*

The laws of thermodynamics and heat transfer. Atomic interpretation in terms of kinetic theory and elementary statistical mechanics. Applications to physical problems. Prerequisites: Physics 141 and Mathematics 18 or 29. Corequisite: Physics 142.

162. *Nuclear and Elementary Particle Physics*

A study of modern nuclear and particle physics, with emphasis on the theory and the interpretation of experimental results. Topics will include symmetry principles and conservation laws, properties of nuclei, nuclear forces, shell and collective models, scattering and reactions, weak interactions, pion physics, and the systematics of elementary particles. Prerequisites: Physics 141, 142, or written permission.

198. *Senior Conference*

Offered either semester. Preparation of thesis project. Required of candidates for the degree of Bachelor of Science with concentration in Physics. Elective for other undergraduates with written permission of the department.

199. *Special Topics in Experimental and Theoretical Physics*

Topics in special areas of physics, offered from time to time upon sufficient demand from qualified students. Elective by special permission of the department. Open also to students in the Master of Arts in Teaching program.

199A. *The Physics of Music*

The physical basis of the sounds of music; how they are produced and perceived.

III. PRIMARILY FOR GRADUATES

210. *Techniques in Experimental Physics*

Introduction to modern experimental techniques. Projects in nuclear physics, particle physics, solid state, low-temperature physics, spectroscopy (radio-frequency, microwave, optical and x-ray) and acoustics. Offered every year. May be taken either semester.

205. *Introduction to Quantum Mechanics*

Hamilton's equations. Uncertainty principle, Schrödinger equation, potential well and barrier problems. Harmonic oscillator, angular momentum, hydrogen atom. Matrix mechanics. Offered every year.

206. *Intermediate Quantum Mechanics*

Scattering theory. Approximation methods. Identical particles and spin. Semi-classical theory of radiation. Application to atomic and molecular problems. Offered every year.

207. *Advanced Quantum Mechanics*

Relativistic wave equations for spin 0 and 1/2. Dirac solution of hydrogen atom. Relativistic potential scattering. Elementary quantization of fields. Offered every year.

209. *Electrodynamics and Relativity*

Maxwell equations and electromagnetic potentials. Radiation fields; multipole expansions. Electrodynamics in material media; dispersion, absorption, scattering. Lorentz transformation, relativistic mechanics, covariant electrodynamics. Radiation by moving charges, bremsstrahlung, radiation damping. Offered every year.

210. *Relativity and Cosmology*

Review of special relativity. Principle of equivalence and fundamental precision experiments. Introduction to differential geometry; Einstein field equations. Simple solutions and comparison with experiment. Relativistic cosmology.

214. *Statistical Mechanics*

Fundamentals of classical and quantum statistical mechanics. Ensemble theory, density matrix, Ideal Fermi and Bose gases. Imperfect gases, molecular distribution functions. Phase transitions, critical phenomena, renormalization group. Offered every year.

217. *Introduction to Nuclear and High Energy Physics*

Symmetry principles and conservation laws. Nucleon-nucleon forces and the deuteron. Analysis of scattering experiments, interaction of nucleons with radiation. Systematics of elementary particles. Classical pion physics. Weak interactions. Offered every year.

218. *Physics of the Nucleus*

Properties of bound and continuum nuclear states and their interpretation. Shell and collective models. Electromagnetic decays. Resonance reactions. Optical model for elastic and inelastic scattering. Particle-transfer reactions.

220. *Elementary Particle Physics I*

Phenomenological study of elementary particles and their strong, electromagnetic and weak interactions. Structure of particles. Invariance and symmetry principles. Introduction to current algebras and gauge theories. Offered every year.

221. *Elementary Particle Physics II*

Applications of modern techniques such as dispersion relations, gauge theories, current and field algebras to problems of interest in particle physics. Offered every year.

230. *Quantum Theory of Fields I*

Lagrangian field theory. Free and interacting fields. Soluble and semi-soluble models; renormalization. Level shift, bremsstrahlung and scattering calculations in quantum electrodynamics. Either 230 or 232 offered every year.

232. *Quantum Theory of Fields II*

Functional methods, gauge fields, renormalization group, special expansion techniques, semi-classical methods, asymptotic properties, critical phenomena. Either 230 or 232 offered every year.

234. *Group Theory I*

Abstract groups. Theory of group representations; the symmetric group and the many-electron problem. Point and space groups with applications to solid state physics. Rotation groups. Either 234 or 236 offered every other year.

236. *Group Theory II*

Lie groups and Lie algebra. Classification of semi-simple Lie algebras and their representations. Non-compact groups, the Poincaré group. Applications to elementary particle physics (unitary symmetry). Either 234 or 236 offered every other year.

237. *Ultrasonics*

Generation, propagation and detection of high-frequency sound in solids, liquids and gases. Theories of ultrasonic absorption and dispersion. Use of ultrasound in studying the structure of matter.

238. *Nonlinear Acoustics*

Generation of sound by turbulence; radiation pressure; scattering of sound by sound; generation of rotational flow by sound; absorption of high-amplitude sound waves.

241. *Solid State Physics I*

Introduction to the solid state. Crystal structures and lattice vibrations. Dielectric, magnetic and optical properties of solids. Free electron theory of metals; energy bands. Semiconductors. Offered every year.

242. *Solid State Physics II*

The solid view as a collection of nearly independent excitations. Lattice dynamics, and phonon spectra. Band structure, symmetry considerations and calculational schemes. Scattering processes and transport theory. Electron correlations. Offered every year.

243. *Solid State Physics III*

The study of solids as many-particle systems. The formalism of Green's functions applied to problems such as the electron gas, the normal Fermi liquid, superconductivity and ferromagnetism. Offered every year.

246. *Magnetism*

Topics may vary from year to year. Ions in crystals, ligand field theory. Electron spin resonance. Nuclear magnetism, resonance and relaxation. Ferromagnetism, spin waves, antiferromagnetism. Magnetic properties of metals.

248. *Interaction of Radiation with Matter*

Topics may vary from year to year. Optical properties of metals, semiconductors and insulators. Nonlinear optics. Resonance phenomena. Propagation of electromagnetic radiation in plasmas.

249. *Theory of Quantum Fields*

Phenomenological and microscopic theories of liquid helium-three, liquid helium-four, and type I and type II superconductivity.

261, 262. *Special Topics in Physics*

Upon sufficient demand, advanced instruction in special areas is available, including the following topics: Atomic Physics; Nuclear Physics; Reactor Physics; Physics of Metals; Surface Physics; Lattice Imperfections; Theory of Liquids; Topics in Advanced Statistical Mechanics; X-rays.

271, 272. *Seminar in Research Topics*

The STAFF.

Instruction via reading assignments and seminars is frequently provided for graduate students on research projects. The speed of instruction may vary, but will normally be such as to offer one semester-course credit for work extending over two semesters. Half-course.

291, 292. *Research in Physics*

The STAFF.

Offered every year. Credit varied.

RELATED COURSES

Attention is called to the following closely related courses offered in other departments. Applied Mathematics 205, 206, *Mathematical Methods of Applied Science*; Applied Mathematics 213, 214, *Methods of Applied Mathematics*; Chemistry 201, *Advanced Thermodynamics*; Engineering 203, *Advanced Dynamics*; Engineering 263, 264, *Electromagnetic Theory*. Consult the appropriate portions of the catalogue for further details, as well as for other courses in these departments and in the Department of Mathematics.

Political Science

A. Alfred Taubman Professor of American Institutions, THOMAS J. ANTON, Professors BEISER,¹ COBB, CORNWELL, GOODMAN, KAU, NORDLINGER (Chairman), PERKINS, STULTZ, ZUCKERMAN; Associate Professor ROSENBLUM;¹ Assistant Professors MORONE, WEST, WHITING, WINTFELD.

¹ On leave. Semesters I and II, 1983-84.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Eight courses in Political Science are required for concentration. Students must choose two from among the following courses: Political Science 1, 10, 11, 40 and 50, with Political Science 50 being strongly recommended, and one research seminar (Political Science 182) from the dozen or so offered each year. At least one departmental offering must be completed from three of the following four sub-fields of the discipline: political theory, American politics and government, comparative politics, and international relations. In addition to the eight courses required for concentration, it is recommended that students take a minimum of two courses (numbered 100 and above) in at least one other Social Science Department.

Honors. As above, except that ten courses are required, including Political Science 172 (the honors seminar) which must be taken before the student's seventh semester, and Political Science 191 and 192 (Senior Honors Thesis Preparation). Political Science 172 may be substituted for the required departmental research seminar. Students who have given evidence of superior work in Political Science may be admitted to Honors candidacy at the beginning of the sixth semester. A written application must be submitted to the Chairman of the Undergraduate Studies Committee no later than the preceding January 20. The application should include a grade transcript, a list of courses in progress, a copy of one or two papers written for any Social Science course, and a short statement (100 to 300 words) setting out the reason for wanting to pursue an Honors degree. The Undergraduate Studies Committee will announce its decisions by the end of the first semester.

GRADUATE PROGRAMS

MASTER OF ARTS. Master of Arts degrees are awarded to students who have completed eight approved courses with a grade of B or better, passed an oral examination, and submitted an approved A.M. thesis.

I. PRIMARILY FOR UNDERGRADUATES

1. *Introduction to the American Political Process*

Mr. COBB.

10. *Introduction to Public Policy*

Mr. WINTFELD.

Consideration of three major areas of public policy: environmental policy, welfare policy, and criminal justice policy. Underscores three major issues: the content of current policies, the theoretical perspectives underlying the definition of these policies, and the impact of changing theoretical perspectives.

11. *On Political Philosophy*

Ms. ROSENBLUM.

The political theory of four regimes. Thucydides and Aristotle on the Greek polis. Bacon and Hobbes on monarchical absolutism. Rousseau and Robespierre on revolutionary government, and American constitutionalism. Two lectures and one discussion section weekly.

14. *American Legislative Politics*

Mr. CORNWELL.

The internal politics of Congress and the role that Congress plays in government policy-making. Consideration will be given to legislative recruitment and elections, socialization and informal folkways, leadership styles, the Committee system and how these affect Congress' role in foreign and domestic policymaking. State legislature will also be discussed in comparison with Congress, in connection with each of these headings.

22. *City Politics*

Mr. MORONE.

Bosses, reformers, states, bureaucrats, politicians, the poor, the homeless, and the citizen. An introduction to the major themes of urban politics.

26. *The Bonds of Politics: Social and Political Groups in Different Cultures*

Mr. ZUCKERMAN.

Deals with the formation of political groups. The cases studied vary: revolutionary movements, neighborhood associations, social class organizations, political machines, and lobbies. The tools of political science will be used to explain why political groups emerge, stay together, and collapse.

40. *International Politics*

Mr. PERKINS.

The political consequences of distributed power, from the perspectives both of the international system and major states within it. Significant issues relating to the control and use of force and the possibilities for international law and organization.

50. *Foundations of Political Analysis*

Mr. ZUCKERMAN.

Examination of various modes of thought taken from the different social sciences and used in systematic political analysis. Comparison of different ways of thinking about politics as complementary and competing approaches to political knowledge. Testing of hypotheses, the selection of cases for analysis, and their effects on the understanding of politics will be studied. Individuals, groups, villages, governments, and states will be studied from perspectives such as personality theory, Marxian and Weberian analyses of social class, power analysis, and rational economic action. The varied cases include villages in France, political elites in less developed areas, conflict between nations, and bargaining situations in cabinets, factories, and families. Limited to freshmen and sophomores.

60. *Political Research Methods*

Mr. WEST.

An introduction to basic research methods in political science. Topics include measurement, research design, data collection, data analysis, and introductory statistics. Will cover the use of the computer. Students will have a chance to attempt some original data analysis.

II. FOR UNDERGRADUATES AND GRADUATES

104. *Radical Political Thought*

Ms. ROSENBLUM.

A survey of varieties of radical political thought. Topics include Marxism, non-Marxist socialism, types of anarchism, radical individualism, modern utopianism. This is mainly a discussion course, with occasional lectures.

105. *Ethics and Public Policy.*

Mr. WINTFELD.

Consideration of different ways to think about "good" public policies and the application of these perspectives in three policy areas: health policy, education policy, and issues surrounding affirmative action. Will emphasize both a thorough understanding of the different ethical perspectives and the differing implications of these perspectives in the three policy areas.

106. *Psychological Approaches to the Study of Politics*

Mr. COBB.

Review of various psychological approaches to the study of attitudes and behavior in political contexts. The approaches include personality theory, alienation, authoritarianism, and symbolism. Prerequisite: 50.

110. *Political Parties and Interest Groups*

Mr. WEST.

Analysis of national political parties and interest groups in the American setting. Topics include history of parties, the role of parties in elections and government, party reform, history of groups, the role of groups in elections and government, and future prospects for political organizations.

111. *Party Organizations and Machines*

Mr. CORNWELL.

Focusing largely on parties at the state and local levels. This course is designed to acquaint the student with the development, staffing and functions of political party organization in the United States, with special attention to the political machine. Topics: the development (and the current decline) of parties as organizations, the roles that such organizations play, especially in the electoral process, and the development of alternative mechanisms and technologies for doing the things that party organizations once did.

112. *Political Campaigns and Elections*

Mr. WEST.

Analysis of campaigns and elections in the contemporary political process. Topics include the changing nature of campaigns, role of media, money, and issues in recent elections, and the significance of elections for the democratic process.

113. *The American Presidency*

Mr. CORNWELL.

The origins and evolution of the current Presidency, the role of the President and the presidential institution in the American political and policymaking system. Evaluation of the proper role of the office, and critical examination of recent administrations.

115. *Government and Business*

Mr. MORONE.

Government efforts to regulate and deregulate business placed in the larger context of the relationship between the state and the economy. Not open to freshmen.

116, 117. *Politics of the Legal System*

Mr. BEISER.

A study of the American legal system, from both behavioral and normative perspectives. Topics covered: the nature of judicial decision making, in common law, statutory and constitutional contexts; the nature of judicial review, the phenomenon of interpretation, a comparison of the judiciary with other political institutions; law as symbol. A sustained consideration of the proper role of the judiciary, and of other components of the legal system, provides the basis for a discussion of significant epistemological and political philosophical questions.

118. *The Problems of American Cities*

Mr. MORONE.

The politics of urban dilemmas in health care, poverty, pollution, housing, crime, finance, and planning placed in the context of individual American cities. Prerequisite: 22, or written permission.

119. *Federalism and Public Policy*

Mr. ANTON.

Federalism as a structure of influence upon American public policies. Beginning with a review of legal, political, and economic perspectives on federalism, the course proceeds to examine structural characteristics of American intergovernmental relations. Major policy instruments needed to implement federal policies—especially grants in aid—are considered in depth. The consequences of policy making in American federalism and national governmental systems in Western Europe will be compared.

120. *Analysis and Assessment of Public Policies*

Mr. WINTFELD.

Focuses on the process of evaluating the success or failure of public policies. Includes discussions of hypothesis formation, measurement problems, and research designs. Applications of the technique form the bulk of the last half of the course.

121. *Latin American Politics*

Mr. WHITING.

Introduction to the politics of Latin America. Country cases will be introduced historically and then evaluated in light of theoretical debates about democracy, authoritarianism, and socialism. Will consider the characteristics of political regimes as well as the political role of groups and classes under different regimes. Particular emphasis given to political institutions (parties, presidency, court and congress); to political participation and its limits (by workers, peasants, marginals, minorities, and businessmen), and briefly to the impact of international factors, especially the relationship of Latin American countries with the United States.

125. *Politics of European Democracies*

Mr. ZUCKERMAN.

What are the inter-relationships between social and political structures in the European democracies? How have these regimes responded to the demands of industrial societies? These, and questions relating to political parties and elections, will provide the focus for the course.

126. *The Political Economy of Development in Latin America*

Mr. WHITING.

Will focus on the interaction of politics and economics in the process of development in Latin America. First, arguments about the necessity of state intervention in the economy will be considered. In the agrarian sector, land reform has been a central issue. In industry, nationalization has been a recurrent source of political controversy. Next, we will ask if certain kinds of development require certain types of government. In particular, the thesis that advanced development in Latin America requires authoritarian government will be critically examined.

127. *Marxism-Leninism and The Soviet State*

Mr. GOODMAN.

A study of the historical and ideological foundations, the organization, and the power structure of the Soviet system.

129. *Chinese Politics and Government*

Mr. KAU.

An examination of the process of Communist revolution in China followed by a structural functional analysis of the Chinese political system with particular emphasis on the Party, bureaucracy, army, and mass organizations. Major policies and reforms will be closely examined to clarify the unique features of the Chinese model of revolutionary change.

130. *The Japanese Political System*

Mr. KAU.

An in-depth analysis of the politics of the Japanese model of stable democracy and high-growth economy. Special attention given to the pattern of political development, major political institutions, governmental performance, the process of agenda building, and the characteristics of social and economic policy. The Japanese "success story" will be examined and evaluated in comparison with experiences of Asian authoritarian systems and Western industrial democracies.

135. *Modern African Political Systems*

Mr. STULTZ.

Comparative study of the politics of representative African states. Emphasis placed on alternative methods of analyzing political systems.

136. *Politics in Southern Africa*

Mr. STULTZ.

Examination of major political questions within and among countries in Africa from Zambia southward.

138. *Politics of Divided Societies*

Mr. STULTZ.

Consideration of the difficulties of maintaining "open" regimes in societies wherein deep divisions of ethnicity confound the search for political consensus and institutional legitimacy. Countries to be considered include (among others) Canada, Northern Ireland, Cyprus, and Nigeria.

141. *Contemporary International Politics*

Mr. NORDLINGER.

Major aspects of international politics since 1945: the origin of the cold war, American, Soviet and Chinese foreign policy, nuclear deterrence, limited wars, collective security, and arms control. Most of the subjects are related to American foreign policy and national security.

142. *Problems for International Policy*

Mr. PERKINS.

Open to seniors who have taken 40 or 141 or with written permission.

143. *World Communism*

Mr. GOODMAN.

A study of the impact of Soviet society and Communist theory on the world outside the Soviet Union.

145. *International Political Economy: North-South Relations*

Mr. WHITING

Examines some of the most important political and economic issues that link the developing countries with the developed world. Theories that emphasize dependency and exploitation, free markets and comparative advantage, and bargaining, learning, and political power will be compared. Issues such as foreign investment, technology transfer, foreign aid, and trade will be considered, as well as national policies such as import substitution and expropriation. U.S. foreign aid policies will be included as well. By the end of the course students should have an appreciation of the institutions, actors, and alternative policies involved in these issues, and the ability to evaluate competing theories of the interaction of North and South in the world economy.

146. *Arms Control and Disarmament*. (University Course 170)

Interested students should register for University Course 170.

147. *The Dynamics of Community Formation*

Mr. COBB.

What factors produce viable political communities? Four major explanations will be considered: common values, interaction levels, threat of violence, and formal collaboration through new organizational units.

150. *East Asian Security and U.S. Policy*

Mr. KAU.

A study of the geopolitics and security relations of the Asian-Pacific Basin. Special attention will be given to China's changing foreign policy, Japan as an industrial superpower, the security of Taiwan, and the evolution of the two Koreas. The effectiveness of U. S. policy for sustaining the stability and security of the region will be critically assessed.

172. *Honors Seminar*

Mr. NORDLINGER.

Required for all Honors concentrators in the junior year. Other with written permission. Please see the relevant parts of the concentration requirements.

182. *Research Seminars*

The STAFF.

Open to junior and senior concentrators and to non-concentrators with written permission. The seminar will be divided each year into section taught individually by various members of the staff. Most sections will focus on a specific topic relating to the field of interest of the instructor. The size of each section is limited to 15 students.

191, 192. *Senior Honors Thesis Preparation*

The STAFF.

193, 194. *Individual Reading and Research Project*

The STAFF.

III. PRIMARILY FOR GRADUATES

291, 292. *Thesis Research and Preparation*

The STAFF.

293, 294. *Independent Reading and Research*

The STAFF.

Population Studies and Training Center

EXECUTIVE COMMITTEE

SIDNEY GOLDSTEIN, PH.D., *George Hazard Crooker University Professor and Professor of Sociology, Director*; BARBARA ANDERSON, PH.D., *Associate Professor of Sociology*; HOWARD P. CHUDACOFF, PH.D., *Professor of History*; PETER EVANS, PH.D., *Professor of Sociology*; EDWIN GOLD, M.D., *Professor of Bio-medical Science*; PHILIP E. LEIS, PH.D., *Professor of Anthropology*; LUCILLE F. NEWMAN, PH.D., *Assistant Professor of*

Bio-medical Science; ALDEN SPEARE, JR., PH.D., Professor of Sociology, Associate Director

The Population Studies and Training Center is a multidisciplinary unit associated with the Department of Sociology. The Center is organized to facilitate and strengthen research and graduate training in demography at Brown. In addition to sociology faculty, its members include faculty from history, bio-medical science, mathematics, economics, and anthropology whose interests focus on population problems.

The Center provides logistic support to and promotes the population training program within the Department of Sociology which leads to the M.A. and Ph.D. degrees in Sociology with major specialization in population. Ph.D. students also select a minor from among comparative development, medical sociology, anthropology, urban studies, social organization, or another field of particular relevance to the individual student. The degree requirements are described under the departmental listing. Demography trainees in Sociology are encouraged to take relevant courses in other departments, and students in other departments are encouraged to enroll in population courses in Sociology, to offer population studies as a minor field, to write their dissertations on population related topics, and to make use of the Center's staff and research and training facilities. Dissertation projects which integrate demographic interests with related areas of specialization, such as population change and modernization, or population and community health, are welcomed.

Fellowship and traineeship awards for both American and foreign students are available through grants from the National Institutes of Health, the Ford Foundation, General Electric, and the Hewlett Foundation. The training provided students is designed to enable them to carry on scholarly research whether they enter universities or take positions in state, national, or international organizations, or with private firms. A small number of post-doctoral fellowships are awarded by the Center. Visiting research appointments are also made to allow both young scholars and established faculty to make use of the facilities and training opportunities available through the Center.

The Center maintains a wide range of facilities, some in cooperation with other social science groups, to aid the research and training activities of its program. It also provides liaison with various population and health research organizations and agencies in the community, nationally, and overseas. At Brown, the Center partially supports the Social Science Data Center, which is a central repository of data tapes; it maintains a comparative data bank which includes information for countries around the world to facilitate cooperative research on the interrelations of demographic, economic, social, and cultural variables. The Social Science Data Center also maintains a bank of computer terminals and provides seminars and workshops on the use of computers in demographic and social research. The Population Studies and Training Center also sponsors a series of sample survey studies in less developed countries, which provides field experiences and dissertation materials on migration, fertility, urbanization, and development. Training, and experience in survey research as well as access to data are also available through the Population Research Laboratory, which undertakes sample surveys of the Rhode Island population. The Center also maintains a Demography Library, which has an extensive collection of census and vital statistics reports as well as books, monographs, periodicals, and unpublished papers covering all facets of population studies.

Current research activities of Center faculty encompass a wide range of topics, including studies of natural and regulated fertility; interrelations among modernization, urbanization, fertility, and migration; migration and household change; social mobility and fertility; health status and its effects; the aged and demographic change; morbidity and mortality; nuptiality and divorce; family life cycle; demographic transition; methodologi-

cal innovations in demographic survey research; mathematical modelling; and population policy formation and evaluation. As part of the ongoing research and training, the Center sponsors colloquia and pro-seminars which bring to campus a number of visiting scholars and which also allow resident faculty and students to discuss innovative methods and ideas as well as research findings.

Portuguese and Brazilian Studies

Center for Portuguese and Brazilian Studies

Professors MONTEIRO and PADDEN; Associate Professor VIEIRA (Chairman); Visiting Professor GARCIA; Assistant Professors ALMEIDA and DZIDZIENYO; Adjunct Assistant Professor PINSORF; Visiting Lecturer, Mr. VALENTE; Lecturer, Mr. Botelho. THE UNDERGRADUATE Program in Portuguese and Brazilian Studies is advised by a cooperating committee including the above and the following: Associate Professors EVANS (Sociology) and L. MONTEIRO (Biological and Medical Sciences) and Assistant Professor VAN WHITING (Political Science).

The Center for Portuguese and Brazilian Studies offers four degree programs: (1) A.M. degree in Portuguese Studies and Bilingual Education, (2) A.M. degree in Brazilian Studies, (3) A.B. degree in Portuguese and Brazilian Studies (interdisciplinary) and (4) A.B. degree in Portuguese Studies (with the possibility of specializing in Bilingual Education). Besides its academic programs, the Center coordinates literary activities, lecture series and community services. Along with its primary goal of offering strong academic programs in Portuguese language, Portuguese and Brazilian literature and culture, and Bilingual Studies, the Center has become an integral part of the surrounding Portuguese bilingual communities. Organizing cultural and artistic exhibits in addition to providing educational counseling to non-native speakers of English, the Center actively extends its resources beyond the immediate academic community. Cooperation with the University of the Azores, consultation in bilingual curricular and technical assistance exemplify the Center's broader social and educational contributions. It is the Center's philosophy that these activities contribute to each student's total experience of his or her work at the Center.

UNDERGRADUATE PROGRAMS

The Nature of the Concentration: Using the Portuguese language as a basis, this interdisciplinary concentration program in Portuguese and Brazilian Studies allows the student to develop his interests in the areas of language, literature, linguistics, education, history, anthropology, and the other social sciences. In arranging his program, the student can choose either a combination of four courses in two of these disciplines or a combination of four courses in one discipline plus the interdisciplinary core courses listed below. Each program requires one seminar or special project.

The core for this concentration will usually consist of enrollment in:

Program A: (1) seminar in Portuguese and Brazilian studies; (2) Portuguese language course(s), Portuguese 1-2 is a prerequisite, Portuguese 19; (3) Portuguese 11; (4) Portuguese 12; (5) Portuguese 150, 160, or 198; (6) plus four courses in a related discipline.

Program B: (1) seminar; (2) Portuguese language course(s), Portuguese 1-2 is a prerequisite, Portuguese 19; (3) either History 121, 122 or 153; (4) Sociology 60; (5) either Anthropology 2, 122 or 142, plus four related courses in one discipline.

GRADUATE PROGRAMS

A.M. DEGREE PROGRAM IN PORTUGUESE STUDIES AND BILINGUAL EDUCATION

This interdisciplinary program will offer graduate level study, conducted in Portuguese and English, in advanced language, literature, civilization, and bilingual education for the native or near-native speakers of Portuguese. Candidates with an A.B. degree will apply for admission to this graduate program with the aim of completing eight graduate-level courses in Portuguese and Bilingual Studies (this is the required number for fulfillment of the Master's program.)

Other Requirements:

- Candidates will successfully complete at least 3/4's of their required course work (six graduate courses) in courses conducted in Portuguese.
- Candidates will select and successfully complete at least *one* course from each of the following disciplines: (a) Advanced Portuguese Language, (b) Portuguese Literature and (c) Portuguese Civilization.
- Candidates will develop and complete a special project related to bilingual materials, curriculum or Portuguese Studies. This project is subject to the staff's prior approval.
- As partial fulfillment of their requirements for the A.M. degree, candidates will successfully pass an advanced oral and written proficiency exam in Portuguese, at the beginning of their last semester of graduate study.
- Candidates may be part-time or full-time. In case of the former, candidates will be required to complete at least two courses per semester thereby enabling them to complete their requirements in two years.

This interdisciplinary Master's Degree program is an advanced course of study that follows the format of the existing A.B. concentration in Portuguese and Brazilian Studies. The emphasis on Bilingual Education is designed for those educators who need graduate level courses in this field conducted in Portuguese. If a candidate is well prepared in bilingual pedagogy he or she may complete his or her program with specialization in a related field. In other words, given the fulfillment of the prerequisites listed above, a candidate could follow a program with a minimum of four graduate courses in a related area; i.e., literature, anthropology or history. With sufficient preparation in a related area, such a candidate could prepare an individual interdisciplinary program with the guidance of the faculty which comprises the Executive and Advisory Committees of the Program in Portuguese and Brazilian Studies.

A.M. DEGREE PROGRAM IN BRAZILIAN STUDIES

This interdisciplinary degree program is designed to provide students as well as mature professionals holding an A.B. degree and possessing a reading and conversational knowledge of Portuguese, with a social science/humanities curriculum in Brazilian. The program offers graduate level training with special focus upon Brazil for students at the prespecialization phase for careers in academia, foreign service, and international organizations including transnational business and foundations. Drawing upon a candidate's knowledge of Portuguese, this program will develop a unique combination of linguistic and interdisciplinary skills via course offerings in English and Portuguese. Areas of special focus from the social science/humanities components are:

- Social Structure and Social Change in Contemporary Brazil
- Counterpoints in Brazil's National History
- A Sociological and Historical Economic View of Brazil
- The Modern Brazilian Novel
- Social Change and Criticism in Modern Brazilian Drama

Core Program: Candidates will complete a program of 8 graduate courses. Each candidate will take an introductory seminar ("Brazil-New Patterns of Development and Prog-

ress") in addition to two required courses in the social sciences, and two in the humanities component. Besides these 5 required courses, students will complete one 292 course as a culminating in-depth experience in their area of focus (social science or humanities). Students will thus round out their program with at least two electives in their field of interest. Consequently, for a student focussing upon the social sciences it is conceivable that, in addition to the introductory seminar, he/she will be able to complete 5 courses in a field of interest. Students will be expected to complete at least 3 of their courses via the Portuguese language.

RELATED COURSES

Attention is called to the following courses related to the Portuguese and Brazilian Studies curriculum and offered by other Departments:

- Anthropology 112—Peoples of Latin America. Mr. Heath.
- Political Science 182K—The State and Public Policy: Mexico and Brazil. Mr. Whiting.
- Sociology 187J—Social Structure and Social Change in Contemporary Brazil. Mr. Evans.

PRIMARILY FOR UNDERGRADUATES

1, 2. *Intensive Portuguese*

Mr. VIEIRA and STAFF.

A highly intensive course for students with little or no preparation in the language. Stress will be placed upon acquiring the fundamental language skills of understanding, speaking, reading, and writing. The course also presents aspects of Portuguese and Brazilian culture. A two-semester sequence in one semester with ten meetings each week. Elective for students who have not presented Portuguese for admission, course carries double credit and a common grade will be assigned for 1 and 2.

11, 12. *Modern Luso-Brazilian Literature*

Mr. VALENTE.

Reading and textual analysis of selected Portuguese and Brazilian writers of the nineteenth and twentieth centuries: Eça de Queiroz, Fernando Pessoa, Machado de Assis, Jorge Amado, Guimaraes Rosa, Carlos Drummond de Andrade, and others. Various literary genres will be studied and discussed. A two-semester sequence. Special permission of the instructor is required to elect 12 before 11. Prerequisite: 4 or placement. Conducted in Portuguese.

19. *Conversational Portuguese*

Mr. VIEIRA and STAFF.

Primarily designed to improve the student's ability to speak Portuguese, this course will develop conversation, i.e., colloquial language, via current works and events that reveal socio-cultural aspects of the Luso-Brazilian world. Using anecdotes, proverbs, political and social ballads, puns, slang, grafitti, popular verse, idioms, articles, short stories, plays, students will discuss contemporary topics with the aim of assuring good communication skills. Attention will be placed upon developing student's knowledge of syntax and writing ability. Four hours weekly. Prerequisite: 1-2 or placement. Conducted in Portuguese.

72. *In Search of the Melting Pot: A Global Perspective on Multi-Ethnic Societies* (Special Themes and Topics 72)

Interested students should register for Special Themes and Topics 72.

90. *Development and Modernization in a Colonial Society: Origins of the Third World in Brazil*

Mr. PADDEN.

Over the past decade development studies of the Third World have been concerned primarily with the political, social, and economic changes that industrialization has wrought in less developed societies in the twentieth century. This course seeks to extend our depth of understanding by examining in a disciplined way the impact upon pre-literate societies in America of European development and modernization programs that were conceived and carved out some 200 years before the Industrial Revolution. Brazil, with its long historical experience serves admirably the purposes of the course. The approach is comparative in nature although centering in Brazil. Course work will include comparative analysis between the regions of Brazil and between Brazil and the Spanish and English colonies of North America. This course presents the discipline of history as a dynamic and useful mode of inquiry into human behavior in addition to reading and analyzing historical materials and interpretations. Students will learn how to analyze and study relevant writings of ethnologists, sociologists, economists, and political scientists that simultaneously illuminate historical sources and provide insight into the problem of causation in historical sources and provide insight into the problem of causation in historical thinking. By the end of the semester students can be expected to have confronted the major theoretical problems of knowing the Third World and to have acquired an extensive interdisciplinary foundation for future thought about the Third World and its problems. Conducted in English.

FOR UNDERGRADUATES AND GRADUATES

103. *Portuguese Stylistics: Advanced Language Study and Creative Writing*

Mr. ALMEIDA.

Introduction to : (1) Portuguese structural forms, (2) various writing styles (literary, colloquial, expository, anecdotal, epistolary, etc.) and genres (short story, poetry, novel, drama, (3) various texts for purposes of stylistic analysis and practice in writing. Conducted in Portuguese.

121. *Afro-Brazilians and the Brazilian Polity*

Mr. DZIDZIENYO.

The participation of Afro-Brazilians in Brazilian Society and politics of the 20th century is explored. Not a chronologically oriented course but rather a thematic examination of political movements and organizations with specific reference to Brazilian blacks. Topics include: the uses and exploitation of the "African Heritage," a comparison of race and politics in Brazil and the USA, and the Afro-Brazilian role in Brazil's contemporary relations with Africa. While reading knowledge of Portuguese is not required, students with such a background should immediately apprise the instructor of the fact.

150. *Topics and Themes*

150A. *Machado de Assis*

Mr. VIEIRA.

The major novels and short stories of Brazil's master realist will be studied with focus on narrative technique, theme and style. Aimed at critically evaluating the realist elements in these psychological works, the course will deal with textual analysis and Machado's contribution to the Realist School. Conducted in Portuguese.

150B. *Modern Brazilian Prose Fiction*

Mr. VIEIRA.

The major novels and short stories of twentieth-century writers. Attention will be given also to the analysis of Brazil's cultural development and nationalist image vis-a-vis the burgeoning awareness of the dynamics of the modern Brazilian novel. Authors to be studied are: Jorge Amado, Antonio Callado, Autran Dourado, Fernando Sabino, Guimarães Rosa, Clarice Lispector, and Dalton Trevisan.

150C. *Theories and Practice of Written Discourse*

Mr. ALMEIDA.

Intensive course designed for students who possess basic writing skills in Portuguese but who want to improve them particularly in the more demanding genres including fiction and the essay.

150D. *The Modern Brazilian Short Story*

Mr. VIEIRA.

Readings, lectures and class discussions will center upon such twentieth-century short story writers as Monteiro Lobato, Mano de Andrade, Anibal Machado, Guimaraes Rosa, Rubem Fonseca, Clarice Lispector, Luiz Vilela and Murito Rubiso. With the aim of studying the aesthetics of the short form, this course will trace the development of the regional, psychological and fantastic short story and its remarkable vitality and florescence in modern Brazil. Conducted in Portuguese.

150E. *God is Brazilian—The Fictional World of Jorge Amado*

Mr. VIEIRA.

The major novels of Jorge Amado will be studied with the aim of analyzing this author's interpretation of Brazil's Human Comedy. From his early socio-political and naturalist works to the classic *Jubiaba* and *Mar Morto*, down to such modern and acclaimed novels as *Gabriels* and *Teresa Batista*, the lectures and class discussions will focus upon Amado's lyrical realism, character development, narrative form, as well as his depiction of class struggle, masculine/feminine roles, social injustice, and racial diversity. Conducted in Portuguese.

160. *Topics and Themes in Portuguese and Brazilian Literatures and Civilizations*

160A. *Introduction to Portuguese Literature*

Mr. M. GARCIA.

The study of literary theory and criticism for analysis of the most significant periods of Portuguese Literature. Attention given to such literary currents as structuralism and the New Criticism. Conducted in Portuguese.

160B. *The Social-Political Novel of Contemporary Portugal*

Mr. M. GARCIA.

Focusing upon the pre-revolutionary writers who criticized the *modus vivendi* of dictatorial and imperialistic Portugal, course will discuss elements such as class struggle between the upper and middle bourgeoisie, Marxist dialectics vis-a-vis the proletariat, and the complicated network of social views among all classes. Conducted in Portuguese.

160D. *Eça de Queiroz*

Mr. M. GARCIA.

The realism, naturalism and impressionism of Eca de Queiroz along with the objectives and programs of the Generation of 1870. Works under study will be *O Crime do Padre Amaro*, *Os Maias* and *A Cidade e as Serras* as examples of the various stages of the author's production. Conducted in Portuguese.

160E. *Twentieth-Century Portuguese Prose*

Mr. M. GARCIA.

Critical Realism as seen in the works of Aquilino Ribeiro, Vitorino Nemésio, José Régio, Miguel Torga, J. Rodrigues Migueis e Jorge de Sena. Conducted in Portuguese.

160F. *Counterpoints in Brazil's National History, 1824-1981.*

Ms. PINSORF

Course integrates Brazil's role within world events of the 19th and 20th centuries; blends Brazilian aspects of other disciplines, such as economics, literature and Afro-Brazilian relations; stresses the analytic, dynamic nature of the historical method. Included are an historical overview from empire through old and new republics to the present military governments and the role of empire and army as the moderating power.

160G. *Research in Luso-Brazilian Studies*

Mr. DZIDZIENYO.

Topic: "The Afro-Luso-Brazilian Triangle. Socioracial and Political Perspectives, 1945-1982" Focuses on recent political developments in the historical triangular relations between continental Africa, Brazil and Portugal. Topics to be included: "Luso-Brazilian relations and independence movements in Luso-phone Africa." "Afro-Brazilians and Brazil's African Relations" and "Post-colonial bilateral or multi-lateral relations within the Portuguese-speaking world" Conducted in English. Written permission.

160L. *Iberian and Latin American Value System: A Comparative Analysis* Mr. ALMEIDA.

Analysis of the liberian value systems (Portuguese and Spanish) and a comparison of their transformation in Brazil and Spanish-speaking Latin America. Readings from Gilberto

Freyre, Sergio Buarque de Hollanda. Unamuno Octavio Paz, John Dos Passos, and others. Conducted in English.

160M. *Portugal and Brazil: Satire, Irony and Parody*

Mr. ALMEIDA.

Portuguese and Brazilian societies seen through a critical analysis of the representative and humorous fictional writings of Cardoso Pires, Alexandre O'Neill, Millor Fernandes, Paulo Francis, Carlos Eduardo Novaes, and Luis Veriasimo. Conducted in Portuguese.

198. *Reading and Guided Study. S/NC*

Mr. VIEIRA.

PRIMARILY FOR GRADUATES

201. *Bilingual Education*

Mrs. BECKER.

Will analyze and stress definition of bilingualism, the relationship between bilingualism and ethnicity; a history of bilingual schooling, the psychology of the bilingual child. Lectures and discussions as well as group study projects will guide the students toward research and analysis for their final papers or projects. Conducted in English.

202. *Problems in Bilingual Education*

Section 1. Language Arts for the Bilingual Curriculum

Section 2. Bilingual/Bicultural Education in Social and Cultural Contexts: A Comparative Approach

Mrs. BECKER.

The relationship of culture to educational practices is explored through investigation of the teaching/learning process in diverse cultural settings. Field work in the Portuguese community is encouraged as a means of interpreting the effectiveness of bilingual education within specific social contexts. Conducted in English.

212. *Methods and Materials for Portuguese-English Bilingual Programs*

Will aim at student's mastering language learning theory for the first and second languages; the differences between the cognitive and behavioral schools, the basic phonological and structural differences between the two languages, the various approaches and activities dealing with language teaching; the adaptation and creation of bilingual teaching materials, as well as the measurements for the bilingual course of study. Students will also develop special study projects in resource materials for various teaching grade levels. Conducted in English.

291, 292. *Reading and Guided Study*

Reading in Portuguese language, literature, civilization, and bilingual studies. Conducted via Portuguese readings and discussions.

Psychology

Professors D. BLOUGH, CHURCH, DAVIDS, EIMAS, ENGEN, JONES, KLING, LIPSITT, MILLWARD, POVAR, RIGGS (Emeritus), SCHRIER, SHEPP (Chairman), SORRENTINO; Associate Professors ANDERSON, P. BLOUGH (Research), SIQUELAND, SPOEHR, WINCZE, WOOTEN; Assistant Professors HAIR, GARCIA-COLL, LEHMKUHLE, MEGELA, MURPHY, WALKER, WARREN, WRIGHT; Adjunct Associate Professor HAYDEN; Assistant Professors MOORE, SESTOKAS (Research); Visiting Professor (Research) VOLKMANN; Visiting Associate Professors (Research) MILLER; Academic Department Manager, Mrs. DEVINE; Research Associate, MECK; Post-Doctoral Research Teaching Fellow, PETRY.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Psychology 1 or placement by examination (given at the beginning of each semester); Psychology 9 or 17 (Statistics); an advanced laboratory course, i.e., Psychology 103, 119, 120, or 153, an advanced course numbered from 170 through 196; five additional courses, which may include any of the above not used to satisfy the above requirements for a minimum total of eight Psychology courses beyond Psychology 1; Biomed 6 or Neural Sciences 1 to be taken before Semester VI. Applied Mathematics 165 or an alternative approved by the concentration advisor may replace Psychology 9. Another Biology course may replace Biomed 6 or Neural Sciences, with permission of concentration advisor.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE DEGREE

The Sc.B. program in Psychology provides a framework within which students with scientific interest and abilities may concentrate in the behavioral sciences. Satisfactory completion of this program will provide the background needed for graduate study in any field of psychology.

A. Nine Courses to be taken in the Department of Psychology:

1. Psychology 1; 9 or 17; and 199.
2. One course to be selected from each of the following groups: Psychology 103, 119, 120 or 153. An advanced seminar course numbered from 170 through 196.
3. Four additional courses may include any of the above not taken to satisfy the above requirements. If the Psychology 1 requirement is satisfied by the placement examination (given at the beginning of each semester) the student should take five additional psychology courses in this category. A research sponsor for Psychology 199 must be selected not later than the first week of Semester VII, preferably by the end of Semester VI. Graduate courses may be substituted for some of these required courses upon approval of the Sc.B. advisor.

B. Eight supporting science courses selected from at least three of the following areas, with the approval of the Sc.B. Advisor: Applied Mathematics, Biomedical Sciences, Chemistry, Computer Sciences, Engineering, Linguistics, Mathematics, Neural Sciences, Physics. At least one course must be from either Biomedical Sciences or Neural Sciences. (Some courses offered by science departments, such as those intended for non-science concentrators may not meet this requirement).

Honors. The Honors program in psychology offers A.B. and Sc.B. candidates an opportunity to perform semi-independent research on topics of their own choosing. This research starts as independent reading during the junior year and culminates in a Senior Honors Thesis. Any member of the Staff may direct this research. Honors candidates must enroll in Psychology 199 during Semester VII or VIII.

The Honors program normally will consist of ten semester courses beyond the introductory course. In addition to the standard concentration program, A.B. candidates typically include two or more courses in other sciences or mathematics related to the Honors Thesis. Attendance at the weekly Psychology Colloquium is open to all candidates and it is expected that they will attend regularly.

At the end of the Senior year, honors candidates will take an oral examination on the special and general aspects of the Honors Thesis. (For information concerning eligibility and requirements, consult the Departmental Honors Advisor.)

GRADUATE PROGRAMS

DOCTOR OF PHILOSOPHY. Admission to the Graduate Program usually is limited to candidates for the doctoral degree. In addition to the general University requirements, candidates for the degree of Doctor of Philosophy must include in their programs Psychology 165, 200, 201, 202, 207, 208. Candidates for the Ph.D. will normally take, in addition, eight substantive courses or seminars (i.e. not research and teaching practicum). A master's degree (M.A. or Sc.M.) must be taken during the first two years of study. Potential applicants should write to the chairman for a brochure describing the areas of specialization in which graduate study is possible.

I. PRIMARILY FOR UNDERGRADUATES

1. *Elementary Psychology* The STAFF.
The major methods, theories, and principles of psychology with emphasis on human behavior. Lectures, laboratory, discussions and demonstrations.
9. *Quantitative Methods in Psychology* Messrs. SCHRIER and WARREN.
Prerequisite: Psychology 1. A survey of statistical methods and their application to behavioral data. Topics to be covered include elements of probability theory, correlational techniques, and principles of hypothesis testing and computer programming.
17. *Quantitative Methods* Mr. MILLWARD.
Probability and statistical theory are important tools of science. They are contrasted to human intuition noting where they are needed and where they do not apply. Fundamentals are carefully presented and illustrated with computer programming examples. Students will be taught BASIC to work on their assignments. (Calculus is not required, but one semester is recommended. This course is recommended for all A.B. concentrators in Cognitive Science.)
18. *Quantitative Methods II* (Cognitive Science 18). Mr. MILLWARD.
Interested students should register for Cognitive Science 18.
21. *Social Psychology* Mr. WRIGHT.
The extension of general psychological principles and methods to the study of social behavior.
23. *Gender Issues in Psychology* Ms. P. M. BLOUGH.
Gender issues from biological, developmental, social psychological and educational perspectives. Topics will include gender differences in various areas of behavior, but the emphasis will be on attempts to understand these differences. Will examine research and theory that focuses on gender variables in normal behavior. Prerequisite: 1.
27. *Perception* Mr. WOOTEN.
The experimental and theoretical literature dealing with all aspects of the perceptual process. Emphasis on physiological mechanisms. Specific topics include the perception of color, form, motion and depth. Demonstrations used to illustrate phenomena. Prerequisite: 1.
30. *Personality* Messrs. SIQUELAND and HAYDEN.
A survey of the psychology of personality. Such topics as conflict, anxiety, defense mechanisms, and aggression will be emphasized. Relationships between data and theory will be stressed.
33. *Abnormal Psychology* Mr. DAVIDS.
The study of anxiety, stress, and neurotic disorders, psychosomatic disorders, deviant social behavior, affective disorders, and schizophrenia. Theories of etiology (causes) and

methods of therapeutic treatment are considered. Case studies, experimental research and clinical research are presented, with the emphasis on controversial issues in contemporary psychopathology. Prerequisite: 30.

50. *Animal Behavior*

Mr. SCHRIER.

A study of the similarities and differences in the behavior of animals, ranging from the unicellular forms to the nonhuman primates. Topics to be covered include: the concept of evolution as it applies to behavior, and, very broadly considered, the evolution of the central nervous system; sensory capacities; species specific behavior (including instinctive behavior); learning and intelligence; and selected topics in the area of social behavior, such as animal communication.

74. *Physiological Psychology*

Mr. WALKER.

Goal is to explain behavior in terms of what we currently know about how neurons communicate and about how the nervous system in general interprets and transmits these nerve signals into behavior such as sensing, feeding, moving, sleeping, and remembering. Prerequisite: 1.

75. *Brain and Behavior*

Ms. MEGELA.

An analysis of the relation between structure and function in the central nervous system, designed to introduce students to the interface between biology and psychology. Emphasis will be on the biological bases of human behavior, with special focus on the neural mechanisms of learning, motivation and emotion. Prerequisite: 1.

81. *Child Psychology*

Mr. LIPSITT.

The study of behavior and development in childhood including adolescence. Emphasis is on such basic psychological processes as motivation, perception, and learning. Social events and processes that affect the child's development are also studied. Attention is devoted especially to empirical research and theories relevant to child psychology. Prerequisite: 1.

II. FOR UNDERGRADUATES AND GRADUATES

100. *Cognitive Development*

Mr. EIMAS.

A study of some major aspects of cognitive development with an emphasis on the very early acquisition of knowledge. Prerequisite: 1 and 9.

103. *Techniques in Physiological Psychology*

Mr. LEHMKUHLE.

Laboratory course for advanced students in physiological psychology. Its purpose is to provide an opportunity for students to observe the behavior of the nervous system with the use of several techniques. Students in this course will observe prepared brain sections through a microscope, record the responses of isolated neurons in the visual system, map areas of motor cortex by electrical stimulation, observe behavioral changes following removal of certain areas of the brain, measure eye movements, and record gross electrical potentials from the human scalp. Prerequisite: 74 or Neural Science.

104. *Psychological Assessment*

Mr. DAVIDS.

A comprehensive survey of the tests, techniques and procedures used for psychological assessment of children and adults. Topics include measurement of intelligence, aptitude, and achievement; objective and projective methods of personality assessment; behavioral assessment; and diagnostic interviews. The emphasis is on contemporary concerns and legal, ethical, and practical issues in the use of psychological assessment procedures. Prerequisite: 1, 9.

119. *The Psychology of the Senses.*

Mr. ENGEN.

The senses, primarily vision, hearing, touch, taste, smell, and pain with emphasis on psychophysics and physiology. The application of such knowledge on practical perceptual

problems. Lecture plus laboratory one afternoon per week. The laboratory will teach psychophysics, such as audiometry, necessary for basic sensory assessment. Prerequisites: 1 and 9.

120. *Simple Learning and Conditioning*

Mr. BLOUGH.

Theories and principles of conditioning understood in the context of genetic, physiological and cognitive factors. This field is based largely on animal experimentation, but applications to human behavior and pathology will be discussed. Laboratory, involving animal subjects, meets one afternoon per week. Prerequisites: 1, 9.

128. *History of Modern Psychology*

Mr. KLING.

An inquiry into the historical development of modern psychology. Prerequisite: 1.

130. *Behavioral Medicine.*

Mr. CHURCH.

Many health problems are essentially behavioral problems that are markedly affected by dietary habits, smoking, drinking, drugs and exercise. In each case, evidence from original studies will be evaluated and general explanations for the relationship between behavior and health will be developed. Prerequisites: 1, 9.

152. *Human Information Processing and Cognition*

Mr. EIMAS.

Presents a broad introduction to the field of human information processing and cognition, organized around the topics of information processing, memory, and language. Prerequisite: 9.

153. *Laboratory in Cognitive Processes*

Mr. MURPHY.

Laboratory course for advanced students in human information processing and cognition. Will introduce techniques necessary to perform experiments in perception, memory, problem-solving and psycholinguistics, and will present advanced topics that were introduced in 152. In addition to learning how to operate experimental equipment (tachistoscopes, timers and microprocessors), students will be instructed in the principles of experimental design. At the end of the course, students will design and perform their own experiment using the techniques learned in the course. Prerequisite: 9, 152.

165. *Advanced Quantitative Methods in Psychology.* Messrs. ANDERSON and CHURCH. Advanced quantitative methods in Psychology, with special emphasis on exploratory data analysis, nonparametric statistics, and complete applications. Prerequisites: 9 and written permission.

171. *Principles of Behavior Modification.*

Mr. WINCZE.

Issues involved in the application of principles of general experimental and social psychology to human behavior disorders. Principles of learning and conditioning will be emphasized in the modification of problems from simple emotional and sexual disorders through complex "psychotic" syndromes. Measurement and experimental design questions in evaluating the effectiveness of interventions, as well as ethical issues in the modification of human behavior disorders. Prerequisites: 33 and written permission.

173. *Seminar in Social Psychology.*

Mr. WRIGHT.

An advanced undergraduate seminar, with lectures and discussion dealing each year with a special topic in social Psychology. Prerequisites: 21 and written permission.

174. *Psychology and the Study of "Self"*

Mr. SIQUELAND.

Contemporary approaches to the study of self-concept. Current humanistic and cognitive-social approaches to the study of "self-theory" offer contrasting solutions to the central paradox in personality theories as to how man can be both the cause and consequence of his society, as well as concepts of psychological health, pathology, and therapeutic models. Issues of theory, research and clinical practice that arise in the study of man's self-perception and his identity in contemporary society, within frames of reference that have variously been labelled "phenomenological," "existential," "interactional,"

"cognitive-social." or "humanistics." Prerequisites: 1, 30. Enrollment limited. Written permission required.

175. *Human Neuropsychology*

Ms. MEGELA.

An advanced undergraduate seminar on the relationship of brain structures and behavior. We will focus on the study of higher cortical functions in humans, especially as related to language, communication, memory, and cognition. Of particular concern will be what disruptions of normal brain processes by injury and disease reveal about the neural organization of behavior. Both clinical and experimental approaches will be stressed. Prerequisites: 1, 75.

176. *Sociocultural Aspects of Development*

Ms. COLL.

To examine social and cultural influences on human development. The literature on cross-cultural and social class differences in cognitive and socio-emotional development from infancy to adulthood will be reviewed. Basic areas of development as attachment, emotions, social relations, perception, cognition and intelligence will be approached from a cross-cultural framework. Emphasis will be placed on research that elucidates the process behind cross-cultural and social class differences in development. Methodological and research issues in cross-cultural psychological studies will be explored by carrying out a small project in the Providence area. Prerequisite: 81. Written permission required.

177. *An Ecological Approach to Perception*

Mr. WARREN.

How is it possible for us to act successfully and survive, moment by moment, within the natural world? Focus on the fundamental 'epistemic' function of visual and auditory perception for survival: to inform and guide the activity of an organism in its natural environment. The problem requires a reciprocal account of the organism and the environment it perceives, as well as formal analyses of the optic and acoustic information for perception. This 'ecological' view will be contrasted with the approaches of information-processing and artificial intelligence that tend to model the organism in isolation. Topics will include perception of the layout of environmental surfaces, the perception of objects and events (change), and the visual control of movement and locomotion. Lecture and discussion format, with computer demonstrations of perceptual phenomena. Prerequisites: 1; 27 or 152 suggested.

178. *Issues and Research in Personality and Social Psychology*

Mr. HAIER.

Examination of experimental work in personality and social psychology. Topics include altruism, violence, criminality, conformity, and drug abuse. Reviews and critiques of these areas. Emphasis on how these areas are studied empirically. Written permission. Prerequisites: 1 and 21 or 30.

181. *Artificial Intelligence/Human Intelligence*

Mr. MILLWARD.

What is the IQ of AI? AI work in vision, thinking, and language is reviewed and results compared to human capacities and theories. The role AI has and will play in theoretical psychology and cognitive science will be discussed. The programming language LISP will be taught. Prerequisite: a good knowledge of a programming language and advanced standing or written permission.

182. *Topics in Cognitive Science*

Mr. MILLWARD.

Project oriented. Each year a special topic will be considered. Students will be expected to work individually on background material and in groups developing special computer systems related to Cognitive Science. Examples of topics to be considered are: natural language understanding, models of semantic memory, image processing and vision, and intelligent computer assisted instruction. Prerequisite: 181 or Computer Science 141 or written permission.

183. *Current Issues in Cognitive Development*

Mr. SHEPP.

Specific topics may vary from year to year. Topics are chosen to reflect significant progress in research and/or social impact. In past years the seminar has examined research in attention and memory, psychological sex differences, and the Jensen controversy. Prerequisites: 9, 81, and 152 and written permission.

184. *Infant Learning and Development*

Mr. LIPSITT.

Behavior in the first two years of life is studied, with particular attention to sensory and learning processes, and affect development. Smiling, walking, talking, and fear development are of special interest. The pleasures and annoyances of sensation are emphasized as cornerstones of social development. Each student conducts a relevant research project or does a critical synthesis of knowledge about some aspect of infant behavior. Prerequisites: 9, 81.

185. *Language and Communication*

Mr. MURPHY.

A study of human communication as a function of psychological, linguistic and social factors. Topics covered include language comprehension and production, language acquisition by children, discourse, language and reasoning, and language as a social activity. Approaches from cognitive psychology, linguistics and artificial intelligence will be considered.

187. *Topics in Physiological Psychology*

Mr. WALKER.

An advanced undergraduate seminar, with lectures and discussion dealing each year with a special topic in physiological psychology. Permission of instructor required. Prerequisite: 103.

189. *Current Research in Personality Theory*

Mr. HAYDEN.

A critical review of the current contributions to personality theory and these contributions' relationship to past and present personality theories. Emphasis is upon problems in personality assessment, anxiety, cognitive variables, social learning theory, and notions of self. Formulation of research ideas toward clinical application and an integration of existent findings with theoretical constructs in personality theory are stressed. Prerequisites: 9 and 33.

190. *Advanced Abnormal Child Psychology*

Mr. DAVIDS.

Determinants and effects of psychopathology in children and families. Emphasis is on personality dynamics, motivation, learning, and interpersonal relations of children suffering from various emotional, neurological, behavioral and social disorders. Field trips to local institutions. Enrollment limited to senior concentrators in psychology. Written permission required.

192. *Seminar in Psychological Measurement*

Mr. ENGEN.

Psychological testing (both clinical and educational) and the nature of the attributes it purports to measure. Essentially theoretical but will have practical implications for testing minority populations such as hearing-impaired children. In addition to basic statistical principles in describing individual differences, the discussion will include such topics as the IQ and its limitation, age levels whereby children are classified as delayed or not, performance (or "nonlanguage") versus verbal tests, normative versus criterion-referenced tests, and the meaning of test validity. Students will choose topics within this framework for class discussion and a paper. Prerequisites: 1 and 9 (or similar). Courses in child, personality, and assessment will also be helpful.

195. *Hearing and Deafness*

Ms. SORRENTINO.

An examination of hearing and hearing loss. Topics will include: the perception of pitch, loudness, noise, music and the location of sounds in space. The relations between hearing loss and aging, noise, and drugs will be explored. The current status of theories of audi-

tion will be evaluated. Lectures, seminar reports, and demonstrations. Prerequisites: 119, 174 or written permission.

197. *Special Topics in Psychology*

Enrollment limited to Psychology concentrators who receive written permission of a Psychology department sponsor. Junior or senior standing and Psychology 1 plus at least three other Psychology courses are required. Apply through departmental advisor.

199. *Experimental Problems*

The STAFF.

Provides an opportunity for advanced students to engage in directed research. With the guidance of their sponsor, students develop research plans, carry out a project, and analyze the data. The course may not be used to provide credit solely for assisting in an ongoing research project. Students should seek out a sponsor and arrange for the course before the beginning of the term in which the course is to be taken. Psychology 199 is required of senior Honors and Sc.B. candidates, who must work under the direction of a member of the Psychology Department staff. May be taken by others with written permission of the Psychology Department. May not be taken more than once for concentration credit.

Psychological Colloquium

A weekly meeting for the discussion of research problems presented by visiting scholars and members of the Department. Attendance is required of graduate students and seniors who are candidates for Honors.

III. PRIMARILY FOR GRADUATES

200, 201. *Introduction to Psychological Research*

Mr. SIQUELAND and STAFF.

Required of and restricted to first-year graduate students.

202. *Quantitative Methods in Psychology*

Messrs. EIMAS and ANDERSON.

A study of quantitative methods in psychology, including psychological applications of mathematical techniques, and analysis of variance.

203. *Research in Experimental Psychology*

The STAFF.

205. *Practicum in Teaching*

The STAFF.

Each student will be assigned to one or two laboratory sections, with increasing responsibility for supervision of the laboratory work, giving lectures under supervision, and for reading reports. This course is repeated with progression from elementary to advanced courses.

207, 208. *Proseminar in Psychology*

Mr. CHURCH and STAFF.

A study of selected topics in sensory and physiological psychology, learning, animal behavior, human cognition, information processing, and developmental psychology. Offered every year. S/NC.

210. *Seminar in Perception*

Mr. WOOTEN.

A seminar in the basic processes of vision.

232. *Seminar in Animal Behavior*

The STAFF.

Offered every year. May be repeated for credit. For current topics, see Course Announcement.

233. *Seminar in Cognition*

The STAFF.

offered every year. May be repeated for credit. For current topics, see Course Announcement.

234. *Seminar in Child Psychology.*

The STAFF.

Offered every year. May be repeated for credit. For current topics, see Course Announcement.

Religious Studies

Professors DIETRICH, FRERICHs,¹ MILHAVEN, MOEHRING, REEDER (Chairman), TWISS;² Assistant Professors GOOD,³ STOWERS, WULFF;⁴ Visiting Professors BASHAM,³ LIEBMAN⁵

The Department offers instruction in the academic study of religion (undergraduate and graduate) and preparation for college and university teaching. Descriptions of the graduate programs are available from the administrative assistant of the Department.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

Requirements: Religious Studies 11 and seven other courses. Each student, in consultation with appropriate faculty members, devises a concentration program, which may include courses given outside the department. The student presents for approval by the concentration advisor a written statement of the objectives of his or her concentration program and a list of the component courses. The program is expected to encompass the study of at least two religious traditions. It will take account of more than one approach to the study of religions, e.g., philosophical, historical. A Religious Studies concentration with Honors requires, in addition, an Honors thesis (Religious Studies 192, during both semesters of the senior year). Students interested in graduate work in Religious Studies should include the study of French and German in their programs. In some fields a knowledge of the appropriate classical languages is also essential for advanced work. Students should start work in these languages as early as possible.

RELATED COURSES OR PROGRAMS. The study of religion can be related to literature, art, the human and social sciences, philosophy, the study of antiquity, and other areas. In addition to the courses offered in the Department, students should be aware of the possibilities which the University offers in such departments as Anthropology, Art, Classics, Comparative Literature, Egyptology, English, History, History of Mathematics, Linguistics, Philosophy, and Sociology and in such programs as Afro-American Studies, American Civilization, Bio-Medical Ethics, Judaic Studies, and Renaissance Studies.

GRADUATE PROGRAMS

The focus of departmental graduate work is on the doctoral program. The Ph.D. program is open to both college graduates and persons holding the M.Div. or its equivalent. The A.M. program is open to college graduates; the Department does not admit students holding the M.Div. or its equivalent to this program. Students whose previous study of religion is considered by the Department as too limited in scope may be directed to take undergraduate courses in addition to those usually required for the degree.

MASTER OF ARTS. The Master of Arts in Religious Studies will be conferred upon the completion of an approved program of eight semester courses and a thesis. One or two of the required courses may be used for research in connection with the thesis. The candi-

¹ On Sabbatic leave, 1982-83.

² On Sabbatic leave, Semester I, 1982-83.

³ 1982-83.

⁴ On leave, 1982-83.

⁵ Semester II, 1982-83.

date is expected to develop competence in the Theory of Religion through formal course work. The candidate must pass an ETS examination at the appropriate level in either French or German.

DOCTOR OF PHILOSOPHY. The Department offers advanced work in two areas: History of Religions: Early Christianity and Western Religious Thought.¹ Students in both doctoral programs will satisfactorily complete Religious Studies 200 (Theory of Religion). The candidacy of the student for the degree of Doctor of Philosophy shall be certified no later than the end of the seventh semester in the student's program.

HISTORY OF RELIGIONS: EARLY CHRISTIANITY

Qualifying examinations

1. History, literature, and cults of the Graeco-Roman age from the death of Alexander till the reign of Constantine the Great.
2. History, literature, and religion of ancient Israel and of Judaism during the second commonwealth (including the writings of Flavius Josephus).

Preliminary examination

The preliminary examination must be completed by the end of the first semester of the year in which the student expects to receive the degree. This examination is comprehensive in character. In addition to the central issues called for in the questions, the responses should reflect the student's understanding of the following: theories of religion; history of scholarship, including the philosophical and theological presuppositions of selected researchers in the field.

1. History, literature, and religion of Christianity till the end of the second century, with special emphasis upon the New Testament.
2. Christianity till the Council of Nicaea.
3. Area of dissertation.

Language requirements

Applicants for admission to the program must have done *at least* one year of formal work at college level in Greek; preference will be given to applicants with a second year of Greek and one year of a modern language, preferably German.

1. Ability to read Greek and Latin texts, to be tested by annual written examinations administered by the department, until the student is excused.
2. Area of specialization may require further languages (especially Hebrew and Aramaic); appropriate competence in such languages must be demonstrated by examination administered by the Department before the student may take the preliminary examination in the area of his or her proposed dissertation.
3. French, German: requirement in German to be met by ETS examination during first year of residence; in French, by ETS examination before admission to the preliminary examination.

WESTERN RELIGIOUS THOUGHT

The doctoral program in Western Religious Thought has three major areas of concentration:

1. Philosophy of Religion: religious language and symbol; problems of religious knowledge; theories of religion and methods of religious inquiry.
2. Issues in Theology: methods of theological investigation; classical and contemporary problems in theological discussion.
3. Religious Ethics: methods (including comparative) of religious ethics; issues in theological ethics; contemporary moral problems.

¹ During the Orientation Program preceding the opening of classes in September, entering graduate students will discuss with the faculty a topic submitted in advance by the student. The topic will be selected from the general area in which the student wishes to specialize.

Students will ordinarily focus their work in one of these areas. The candidacy of the student for the degree of Doctor of Philosophy shall normally be certified by the beginning of the seventh semester of the student's program of study.

General Requirements

Students will study a religious tradition in an upper-level course which employs the methods of the history of religions, and will take two advanced courses or pro-seminars in the history of Christian or Judaic thought.

Preliminary Examination

Students will ordinarily take a preliminary examination in one of the three areas of the program. The precise scope and content of the examination will be determined by consultation between each individual student and the faculty in Western Religious Thought. Foci of the preliminary examination for each area of the program may be illustrated as follows:

1. Philosophy of Religion:
 - logical status of religious discourse; verifiability debate; theories of religious symbolism and myth;
 - concepts of faith; status of religious experience; theistic proofs;
 - projectionist theories of religion; phenomenology of religion.
2. Issues in Theology:
 - human experience in theological argument; transcendental method;
 - discussions of divine transcendence; understandings of the human person;
 - comparison of 19th and 20th century Christian and Judaic theological systems.
3. Religious Ethics:
 - relations between religion and morality; comparative religious ethics;
 - love and justice; divine action and human response; natural law; value implications of psychotherapy;
 - abortion and infanticide; sexual values; morality of war; religious critiques of social injustice; issues in bioethics.

Language requirements

The student must demonstrate by ETS examination a reading knowledge of at least two modern foreign languages (ordinarily French and German).

SPECIAL STUDIES

Students after one year of graduate study at Brown University may apply to the Department and the Graduate Council for entrance into a Ph.D. program in Special Studies. The Department of Religious Studies encourages discussion of this program with students whose professional goals, centered in the study of religion, cannot be accommodated within existing departmental or interdepartmental programs.

I. PRIMARILY FOR UNDERGRADUATES

2. *Introduction to Christianity*

Mr. DIETRICH.

"What is the essence of Christianity?": a descriptive and analytical inquiry. What is constant and what is changing in typical forms of religious life and expression developing in the epochs from the first to the twentieth century? Jesus as the Christ and the church as sect of first century Judaism; the social and cultural success of Christianity in the late Roman Empire; papal primacy and the development of Latin Catholicism in the West; Byzantine Christianity as a type; medieval Europe as a Christian culture; the Reformation as medieval and modern; the sense of sin and conversion to Christ in the piety of the mod-

ern individual; secularization as a post-Christian phenomenon; the 20th century modernization of Roman Catholicism; Christianity and the American experiment.

3. *Introduction to Eastern Religions*

Ms. WULFF.

Fundamental forms and structures common to the Hindu and Buddhist religious traditions: 1) the goal of realization or enlightenment and such means to that goal as asceticism, study, meditation, and paradox; 2) ritual forms such as image worship, pilgrimage, and festivals; and 3) the tantric symbolism of mudra (gesture), mantra (mystic syllable), and mandala (sacred diagram). Attention to traditional roles, including those of the Hindu holy man, the Buddhist monk, and the guru, in relation to society.

5. *Judaism and Human Experience*¹

An inquiry into continuing themes and structures in Judaism, with special attention to those kinds of national-religious experiences present in diverse periods and types of Judaism, from biblical to contemporary times. Topic for 1982-83: Nationalism and Religion: The Case of Judaism (Mr. LIEBMAN).

11. *Approaches to the Study of Religion*

Mr. MOEHRING.

An examination in their historical development of the various approaches taken to the study of religion and religions during the past two centuries. Various attempts at a definition of religion and observation on how philosophical and theological presuppositions affected the study of religion both as an abstract entity and in its concrete empirical manifestations. A correlation of the study of religions with the development of intellectual history in general and attention, in particular, to the influence of philosophical systems, the growth of linguistic and ethnographic studies, historiography and historicism, evolutionary thought patterns (from animism to monotheism), anthropology (e.g., Frazer), psychology, sociology (e.g., Max Weber). Discussion of attempts to reduce religion to a function of some other dimension of human experience (e.g., the Marxist critique of religion, psychological reductionism in Freud and Jung) and its classification as a merely human, and thereby misguided, attempt to understand reality (Karl Barth). We shall end by tracing the growth of the study of religions as an integral field within human studies and pay particular attention to the contributions of American scholarship. Readings concentrate on seminal works from the various disciplines under discussion and important religious documents. Students will be guided to apply the insights thus gained to the examination of religions of various types.

15. *Introduction to the Bible: Ancient Israel*

Mr. FRERICHS.

An approach to Ancient Israel with primary focus upon the Hebrew Bible and related readings from Mesopotamia and Egypt. Legal, historical, prophetic and wisdom literature in translation.

16. *Myth and Religious Experience*

Ms. CHANDLER.

Myth as an expression of religious experience. The problem of distinguishing myth from other types of religious literature. Ways of interpreting myth. Reading of selected texts, together with the criticism of such writers as Levi-Strauss, Girard, Ricoeur, Jung.

19. *Contemporary Religious Thought: Judaic and Christian*

Mr. DIETRICH.

God the problem and the death of God; recent attacks on the link between a particular historical event (the death of Jesus) and the salvation of all men; is Christianity in origin and by nature anti-Judaic; evil ("after Auschwitz") and history; secular progress and Judaic and Christian projections of the future. Major representative Judaic and Christian thinkers, e.g., Baeck, Scholem, Rosenzweig; H. R. Niebuhr, Rahner, Moltmann.

¹ After 1982-83, the following courses will be offered in Judaic Studies: Religious Studies 5, 164, 167, 241, 242.

21. *Faith and Reason*

Mr. TWISS.

Critical exploration of understandings of religious faith as expressed in spiritual narratives of believers and as delineated in philosophical writings. The construction of models of faith from spiritual autobiographies and reflective literature in order to examine the adequacy of philosophical accounts of religious faith. Special attention to such topics as: the texture of religious experience; faith and moral emotions; the rational and irrational in religious faith; subjectivity and religious truth. Readings will include selections from, for example, Augustine, Edwards, Kant, Kierkegaard, James, Otto, C. S. Lewis, Burrell.

22. *Religious Ethics and Moral Issues*

Mr. REEDER.

An introduction to the ethics of Judaism and Christianity; the relation of religious ethics to secular morality; the analysis of positions of philosophers and religious thinkers on issues such as sexual ethics, abortion, social justice, revolution and war, and euthanasia.

23. *Religious Thought and Modern Culture*

Mr. MILHAVEN.

Certain groups in modern culture struggle for their freedom and identity in the face of constrictions long imposed on them by the culture and endorsed in part by the Christian tradition. Certain contemporary Christian thinkers argue that Christians should rather support these struggles. The course focuses on some of these Christian arguments for the movements towards greater freedom and self-affirmation of blacks, women, and homosexuals.

24. *Religious Thought and the Human Sciences*

Mr. MILHAVEN.

Certain images of the person formed by psychoanalytic practice and theory and current in contemporary Western culture challenge images of the person affirmed in the Christian tradition. Examination of some of these challenges and some sympathetic responses of Christian thought. Authors studied include Freud, Marcuse, N. Brown, E. Becker, L. O'Donovan.

25. *Religious Thought in Modern Literature and Art*

Mr. MILHAVEN.

Modern literary and artistic works will be studied for the ideas and attitudes concerning religion that the author or artist embodies in the work. The student will discuss and appraise these ideas and attitudes and pursue their further implications and the questions of religious thought that they raise. Works studied will include Fedor Dostoevski, *Crime and Punishment*; Flannery O'Connor, *The Violent Bear It Away*; Georges Bernanos, *The Diary of a Country Priest*; Albert Camus, *The Fall*; Mary Gordon, *Final Payments*; Ingmar Bergman, *Seventh Seal* and *Cries and Whispers*; Annie Dillard, *Holy the Firm*.

51. *Greek and Hellenistic Religions*

Mr. MOEHRING.

An introduction to the religious traditions of the Eastern Mediterranean basin from the Minoan Age to the Greco-Roman period; the interaction of political, social, and cultural factors with religion; the Homeric tradition and the cult of the *poleis*; religious aspects of the great philosophical schools; syncretistic mystery cults; cults of rulers; popular religion, including astrology.

63. *Judaism before A.D. 70*

Mr. MOEHRING.

The religious developments within Judaism during the period from Ezra-Nehemiah to the destruction of the Second Temple; the interaction of Judaism and Hellenistic culture.

71. *Introduction to the Bible: Earliest Christianity*

Mr. STOWERS.

Introduction to earliest Christianity through literary and historical investigation centered on its oldest literature, the New Testament, and including other early Christian writings. How, in historical situations and social contexts, systems of religious concepts were used to form and maintain distinctive human communities. Scope: from Christian origins in Greco-Roman Judaism to the attempt to comprehend various ways of being Christian in the normative self-definition of Catholic Christianity in the second century.

72. *Christianity in Late Antiquity*

Mr. STOWERS.

Soundings in the intellectual and institutional development of early Christianity during a particularly significant period of its existence, from the second century to the middle of the fifth. Special attention to the life and work of selected mainline Christian thinkers of this era such as Jerome and Augustine, and to heterodox movements such as Gnosticism and "Jewish Christianity."

75. *Eastern Christianity*

An introduction to several distinct forms of Christianity, important and interesting from a historical as well as a contemporary perspective, which cannot be subsumed under the familiar categories of "Catholic" and "Protestant." Selected aspects of the history, theology, and liturgy, as well as the contemporary social and political situation, of Orthodox, Nestorian, and Monophysite Christian communities in Eastern Europe, the Soviet Union, the Middle East, India, and China. Particular attention will be devoted to the role of these eastern churches in the religious history of the United States. No prior acquaintance with the history of Christian thought or institutions required.

81. *The Hindu Tradition*

Ms. WULFF.

The development of religious forms in India from the time of the Indus Civilization to the present, including some attention to the Jain and Buddhist reform movements, but focusing on representative texts of the Hindu tradition. These include Rigvedic hymns, Upanishads, the *Bhagavad Gita*, puranic mythology, devotional poetry, and medieval and modern philosophical treatises. Aesthetic materials, both visual and aural, will be employed in order to provide a greater sense of the rich texture of Indian spirituality.

82. *Buddhism in South and Southeast Asia*

Ms. WULFF.

The development of Buddhist thought and practice in India and Southeast Asia. Pre-Aryan and Vedic antecedents; the traditional account of the life of the Buddha and his fundamental teachings; the early monastic community; the emergence of doctrinally divergent sects; the Mahayana; tantric symbols and practices. Emphasis on the reading of primary texts; attention also given to Buddhist sculpture, monastic discipline, and meditation practices.

83. *East Asian Buddhism: China and Japan*

Ms. WULFF.

A survey of the transmission of Buddhist teachings and practices from India through Central Asia to China and Japan, and the development of unique Buddhist forms in the East Asian context. Particular attention to the encounter between the Indian teachings and Taoist and Confucian components of the Chinese religious complex, and the subsequent mingling of Chinese Buddhist teachings and indigenous Chinese elements with the emerging Shinto tradition in Japan. The major Chinese and Japanese Buddhist schools and characteristic artistic embodiments of Buddhist ideals.

88A. *Parables and Paradoxes: The Limits of Language and the Redescription of the Self* (Issues in the History of Religions)

Mr. STOWERS.

A study of literary, philosophical, and religious thinkers; i.e., Jesus, Kierkegaard, Tolstoy, Kafka, and Wittgenstein, who understood themselves to be living in times of acute cultural crisis and who turned to parables to show what could not be said by means of normal discourse. An investigation of forms of language which have been used to challenge accepted boundaries of belief and knowledge and have resulted in new descriptions of the human situation. Approach: social history and literary criticism leading to questions of hermeneutics and philosophy of language.

88B. *Introduction to Islam* (Issues in the History of Religions)

Mr. REINHART.

Introduction to the meaning and significance of the religion of Islam. Islamic scripture, doctrine, ritual, architecture, law, and sects. The origins and early development of Islamic religion, through Abbasid times. The life of Muhammad and the Qu'ran; the cali-

phite and sectarian movements; Islamic theology and law; Sufism and mysticism. Classical and contemporary materials.

88C. *India and the Modern West* (Issues in the History of Religions) Mr. BASHAM.

A survey of the mutual influence of Indian and Western culture, with special reference to developments during the last 200 years. Two broad sections; the impact of Western ideas on India, with special consideration of important reformers from Ram Mohan Roy onwards; and the influence of Indian religions and philosophies on Western culture down to such contemporary phenomena as the "Streamlined Swamis" and the Hare Krishna movement.

88E. *Religion in Ancient and Medieval India* (Issues in the History of Religions)

Mr. BASHAM.

A general survey of the history of Indian religions, with special reference to the history of Hinduism from the earliest times down to the beginning of Western influence. Main emphasis on mythology, theology, and philosophy.

II. FOR UNDERGRADUATES AND GRADUATES

111. *Studies in Biblical Literature* Messrs. FRERICHS and HIRSCH (English).

Intensive reading of biblical and biblically-related texts in translation with emphasis upon their literary and religious significance. Analysis of the structures and styles of biblical texts, their language, imagery, and form. The use of traditional (Rashi) and contemporary (Auerbach, Barthes, Frye, Richards) expressions of literary criticism.

112. *Old Testament Theology*

Mr. FRERICHS.

Historic and systematic analysis of central themes in Old Testament theology. Prerequisite: Religious Studies 15 or written permission.

117. *Studies in Early Christianity*

Mr. STOWERS.

Studies in the history, literature, and doctrinal developments, both Eastern and Western, of the first nine centuries of Christianity. Topic for 1982-83: Paul and His Interpreters; topic for 1983-84: Greco-Roman Society and Early Christian Ethics.

122. *Ethics of Judaism*

Messrs. REEDER and TWISS.

The aim of the course is to analyze the moral elements in the world-view of rabbinic Judaism. After a preliminary inquiry into the structure of moral codes and the nature of religious ethics in particular, the course will examine representative literature from critical periods in the history of Judaism: biblical, classical rabbinic, medieval, and modern. Offered on a cyclical basis.

123. *Ethics of Christianity*

Mr. REEDER.

Critical examination of basic elements of the ethics of Christianity in their scriptural origin, historical development, and contemporary form. Christian ethics as part of a framework of beliefs about the origin and destiny of man. Interpretations of the figure of Jesus and, in particular, views of the relation of the Kingdom of God, seen as present or future, to the demands of social and individual morality. Critical scrutiny of such concepts as sin, grace, and love. Offered on a cyclical basis.

124. *Ethics of Buddhism*

The concept of *sila* (precepts, ethical principles) in Buddhism: its role in Hinayana Buddhism in both lay ethics and monastic regulations (the *Vinaya Pitaka*); the general role of the precepts in the Mahayana—its situational ethics—and a general outline of the position of the precepts in Chinese Mahayana Buddhism; the specifics of the precepts in various strata of the Mahayana canon; the traditional scholastic view of the precepts in the eyes of the Chinese Mahayana. Developments in Japan, in practice and in theory; the decline of Japanese monastic practice; recent scholarship in the field. Prerequisites: Religious Studies 82 or 83, or permission of the instructor. Offered on a cyclical basis.

125. *Religion and Morality* (University Course 125)

Mr. Twiss.

Topic for 1982-83: Virtues and Vices: The Good Life. An examination of fundamental moral and religious forms of life and their expression in human thought and action. Character traits such as conscientiousness (honesty, sincerity, fidelity, devotion), benevolence (love, kindness, compassion, sympathy), physical and spiritual courage (basic trust, self-affirmation, risk-taking), and self-restraint (forbearance, prudence, temperance, justice, courage), their relations—and their opposites (e.g., despair, apathy, cruelty, immoderacy, injustice, cowardice). Such issues as why people need virtues; the nature of human excellence and the qualities of the good life; the roles of desire, motive and reason; human fulfillment in the contexts of morality and religion. Readings from classical and contemporary philosophical and religious sources; selected readings from literature and humanistic psychology where appropriate.

126. *Religion and the Good Society: I. Sex, Children, and Gender Roles* (University Course 132)

Mr. REEDER.

Moral codes (and related legal systems) deal with the goals and norms of sexual intercourse (who, when, where, how, and why), modes of childrearing, and the roles of men and women (e.g., women's place is in the home; *Kinder, Küche, Kirche*). The course will examine religious teachings on these subjects (principally Judaic and Christian) and the views of contemporary philosophers and other writers, e.g., social scientists, historians, and journalists. Concrete social institutions such as *kibbutzim* will be discussed. Written permission required.

127. *Religion and the Good Society: II. Economic Justice* (University Course 133)

Mr. REEDER.

Religious visions of the good society; interpretations of economic and political institutions; comparisons with thinkers such as Marx and Rawls. Connections between views of human nature and history and prescriptions for social change, in particular, the relation between notions of ultimate salvation and responsibility for the alleviation of suffering and injustice; the relation of socio-scientific analysis to normative social thought. Arguments for civil disobedience and violence as methods of social revolution. Written permission required.

128. *Biomedical Ethics*

Mr. Twiss.

Exploration of the moral aspects of what has been called the biological revolution. Of particular concern will be the conceptual, moral, and social issues raised by recent developments in genetics and genetics-related research, including medical genetics, molecular genetics, and evolutionary theory. Broad topics for examination will include: justifications for the practices of applied human genetics (e.g., genetic screening and counseling); issues of social control of applied genetics research (e.g., experimental gene therapy); moral presuppositions and implications of inquiry into the genetic basis of human behavior (e.g., sociobiology). Will attempt to trace how approaches to these topics can affect philosophical and theological thinking about human nature and the human condition (e.g., perfectionism, fabricated man, genetic determinism). Readings from relevant sources in biology and medicine, philosophy of science, ethical theory, religious ethics, philosophical and theological anthropology.

131. *Religious Language and Symbol*

Mr. Twiss.

A critical inquiry into the logic of religious discourse and the nature of religious symbolism. Particular attention will be given to the following topics: meaning and cognitivity in theological discourse; mythic expression and the notion of symbolic meaning; concealed meanings and the problem of hermeneutic. Readings will be drawn from work in philosophical theology, analytical philosophy of religion, and hermeneutical theory. Offered on a cyclical basis.

132. *Problems of Western Religious Thought*

Mr. MILHAVEN.

Perennial themes of the Western religious tradition. Topic for 1983-84: Anger. Study of various understandings and evaluations of anger in Greek sources of the Christian tradition, e.g., Plato and Aristotle; in the Hebraic and Greek Bible; in Christian theologians of the tradition, e.g., Thomas Aquinas, Martin Luther; in contemporary Christian thinkers, e.g., Tillich and Evans; and in contemporary secular thinkers, e.g., Fromm and Lorenz. Students will eventually develop and present their own understanding and evaluation.

135. *History and Hermeneutics*

Mr. TWISS.

An inquiry into the nature of historical interpretation through the analysis of modern descriptions of historiography and their application to historiographic examples from Judaism and Christianity. Particular attention will be given to recent work in analytic philosophy of history and hermeneutical theory. Topics will include: the role of causal analysis in history, the logic of historical explanation, and the epistemology of historical judgment. Offered on a cyclical basis.

137. *Issues in the Philosophy and Theory of Religion*

Mr. TWISS.

Critical examination of current issues in the philosophy and theory of religion. Attention to such issues as: concepts of deity and their coherence; arguments about divine existence; nature of religious faith; status of religious experience; miracles and the modern world view; the self and immortality; theories about the nature, function, and rationality of religious beliefs and practices. Readings from philosophical theology, philosophy of religion, and where relevant, phenomenology and the human sciences. Offered on a cyclical basis.

138. *Topics in Western Religious Thought*

Topics for 1982-83: Augustine, Luther, and the Introspective Conscience of the West (Mr. DIETRICH); The Myth of the Judeo-Christian Tradition (Mr. DIETRICH); Religion and Alienation in Twentieth Century Culture (Mr. DIETRICH). Topic for 1983-84: Freudian Ego and Id from Perspectives of Western Religious Thought (Mr. MILHAVEN).

161. *Israelite Religion in Its Near Eastern Context*

Mr. FRERICHS.

Religion of ancient Israel through an examination of selected literary and archaeological evidence from Mesopotamia, Egypt, and Israel. Primary emphasis upon first-millennium religious life to the period of Ezra. Offered on a cyclical basis.

164. *Judaism in Late Antiquity*

Mr. NEUSNER.

The transformation of Pharisaism from sect to establishment between A.D. 70 and 640. Rabbinic literature and theology; aspects of popular religion; Judaism in the context of the religions in late antiquity.

167. *Jewish Thought in Modern Times*

Analysis of selected theologians and secular thinkers within modern Judaism, e.g., Buber, Heschel, Kaplan, Rosenzweig, Krochmal, Dubnow; selected themes in modern Judaism dealt with by theologians and secular thinkers, e.g. messianism, religious life, nationalism. Topic for 1982-83: Judaism in the State of Israel. (Mr. LIEBMAN).

170. *Biblical Interpretations of Judaism and Christianity*

Mr. FRERICHS.

Major methods of biblical interpretation used in the Jewish and Christian traditions. Attention to the following methods: allegorical, typological, literary-historical, formcritical, traditio-historical, theological. Application of these methods to biblical texts of major doctrinal or historical concern in Judaism and Christianity. Offered on a cyclical basis.

171. *History of Christian Thought: Early*

Mr. STOWERS.

Intellectual developments in the church of the first ten centuries, and their relationship to concomitant developments of Christian life and history. Offered on a cyclical basis.

172. *History of Christian Thought: Medieval*

Theological, metaphysical, and ethical elements of the Christian religious tradition in the church of the medieval Western period. Representative thinkers and movements. The relation of such conceptual and theoretical elements to religious practice, ecclesiastical institutions, and civilization. From the period of theological renewal about 1080 (Anselm) through the fifteenth century. Offered on a cyclical basis.

173. *History of Christian Thought: Reformation and Early Modern*

Theological and ethical elements of the Christian religious tradition in the period of the sixteenth century Protestant and Catholic reformations; development and disintegration of Christian thought during the seventeenth century and the Enlightenment. The varieties of Protestant (Luther, Calvin, the Anabaptists), Anglican, and Roman Catholic (Erasmus, Trent, and Catholic mysticism) reformation. The impact of rationalist metaphysics, empiricism, historical criticism, and the Enlightenment critique of religion. Offered on a cyclical basis.

174. *History of Christian Thought: Nineteenth Century*

Mr. DIETRICH.

Theologies and anti-theologies (Kant, Romantic theology, Hegel; Feuerbach, Nietzsche). Religious belief and critical history (science, belief, and biblical criticism in Britain; Liberal Catholicism and Catholic Modernism; Kantian liberal Protestant theology and the History of Religions School in later nineteenth century Germany). Offered on a cyclical basis.

175. *History of Christian Thought: Twentieth Century*

Mr. DIETRICH.

Late nineteenth and twentieth century interpretations of the Christian theological tradition. Major movements and representative thinkers in European and American Protestantism and Roman Catholicism. Christianity as ethical monotheism; the History of Religions School; Roman Catholic Modernism; Schweitzer and the quest of the historical Jesus; Troeltsch and historical relativism; American religious pragmatism; the Kierkegaard revival; neo-Reformation, neo-orthodox theology, e.g., Barth, Reinhold Niebuhr; existentialist theologies; Tillich; new forms of Roman Catholic thought, e.g., Blondel and the theologians of Vatican II. Offered on a cyclical basis.

176. *Types of Contemporary Christian Thought*

Topics: Theologies of Revolution: Violence and Nonviolence in the Struggle against Social Injustice (Mr. REEDER); Theology of Secularity (Mr. MILHAVEN). Offered on a cyclical basis.

177. *History of Religion in America*

Mr. McLOUGHLIN (History).

Theme for 1983-84: Political Community and Religious Identity in America. When the American colonies were founded, most people assumed that the state had the right to require uniformity of belief and worship from all inhabitants and to lay taxes for support of the prescribed religion of the community. This course traces, in a series of case studies, how the courts, the legislatures, Congress, churches, pressure groups and individual believers have struggled to reconcile humanity's dual allegiance to the public claims of political community and to private claims of religious conscience. To keep the struggle in perspective, students will also grapple with changing religious thought and practices in America from 1609 to the present.

181. *Studies in Indian Buddhist Doctrine*

The development of the *Abhidharma* from within the *agamas* or sermons of the Buddha into a full-fledged systematic philosophy; the textual development of the Sarvastivada, the growth of disparate groups within the Sarvastivada as well as competing Buddhist systems, and the attempt of Vasubandhu to systematize these various theories into one compendium of doctrine, the *Kosha*. Prerequisite: Religious Studies 82 or 83, or permission of the instructor. Offered on a cyclical basis.

182. *Studies in Chinese Buddhist Doctrine*

Readings in Sino-Japanese (*kambun*) texts dealing with Far Eastern Buddhist teachings, the various schools and their history. Prerequisite: Religious Studies 82 and 83 or permission of the instructor. Offered on a cyclical basis.

188. *Topics in the History of Religions*

Topics for 1982-83: Law in Ancient Israel (Mr. GOOD); War and Religion in the Near East (Messrs. GOOD and REEDER); Civilization, Society, and Religion in Classical India (Mr. BASHAM); Indian Heterodoxies (Mr. BASHAM). Topic for 1983-84: Music, Drama, and Religion in India (Ms. WULFF).

191. *Individual Study Project*

The STAFF.

Directed reading, research.

192. *Thesis Preparation*

The STAFF.

Required of seniors in the Honors Program. Open to others only by permission of the chairman of the department.

193. *Topics in Biblical Studies*

Mr. FRERICHs.

194. *Topics in Hellenistic Judaism*

Mr. MOEHRING.

Topic for 1983-84: Philo of Alexandria, with special emphasis on his treatise *De Sacrificiis*.

195. *Topics in Early Christianity*

Mr. STOWERS.

III. PRIMARILY FOR GRADUATES

200. *Theory of Religion*

Mr. MOEHRING.

Critical examination of major approaches to the study of religion, together with disciplined efforts to define and explain religious phenomena. Particular attention to such topics as: psychological and social functions of religion; theories of religious myth and ritual; debates about the rationality of religious beliefs and practices. Readings from the human sciences (including the history of religions), hermeneutical theory, and philosophy of social science.

201. *Interpreting Religion: Theory and Practice.*

Messrs. FRERICHs and TWISS.

Critical examination of contemporary theories and methods of interpretation—phenomenological, psychological, anthropological, historical, literary, semiotic, philosophical—in relation to the academic study of religion. Consideration of different kinds of religious texts and cultural forms and ways of analyzing them, in order to see how theory governs practice, how practice informs theory, and how each can correct the other. Some attention to the problems and issues of articulating a general theory of interpretation as the methodology for the human sciences and the science of religion. Prerequisite: Religious Studies 200 or written permission.

211, 212. *Seminar: Western Religious Thought*

Topics for 1982-83: Development of the Ethics of Dietrich Bonhoeffer, 1939-45 (Mr. MILHAVEN); Theories of Religious Ethics (Mr. TWISS). Topics for 1983-84: Theories of value, virtue, and the moral imagination (Mr. TWISS); Rights, Justice, and Concepts of Community (Mr. REEDER).

221, 222. *Seminar: Biblical Studies*

Mr. FRERICHs.

231, 232. *Seminar: Early Christianity*

Topics for 1982-83: Paul, His Place in the History of Early Christianity (Mr. STOWERS); Origen's *Contra Celsum* (Mr. MOEHRING). Topics for 1983-84: History and Historiography: Hellenistic, Jewish, and Early Christian (Mr. MOEHRING); Early Christian Epistolography (Mr. STOWERS).

241, 242. *Seminar: Judaic Studies*

Mr. NEUSNER.

Topic: Literary and Historical Analysis of Talmudic Traditions.

291. *Independent Research*

The staff is willing to offer independent reading courses in the following areas:

Mr. DIETRICH:

- Sec. 1 Late 19th and Early 20th Century Christian Thought: Protestant and Roman Catholic
- Sec. 2 Comparative Modern Judaic and Christian Theology

Mr. FRERICH:

- Sec. 3 Nineteenth-Century Biblical Interpretation, especially Jewish
- Sec. 4 Contemporary Biblical Hermeneutics and Methods of Interpretation

Mr. MILHAVEN:

- Sec. 5 Issues in Contemporary Christian Ethics
- Sec. 6 Christian and Psychological Understandings of the Human Person
- Sec. 7 Theological Perspectives on Secular Values and Divine Transcendence

Mr. MOEHRING:

- Sec. 8 Hellenistic Judaism: Philo
- Sec. 9 Hellenistic Judaism: Josephus
- Sec. 10 Early Christianity and the Roman Empire
- Sec. 11 Representative Historians of Early Christianity in the 19th and 20th Centuries
- Sec. 12 Current Issues in the Study of Early Christianity
- Sec. 13 Issues in Greek and Hellenistic Religions

Mr. REEDER:

- Sec. 14 Notions of a Religious Source of Moral Obligation
- Sec. 15 Moral Evil and Religious Notions of the Triumph of Goodness
- Sec. 16 Salvation as Transmoral

Mr. STOWERS:

- Sec. 17 Cynicism, Stoicism and Early Christianity
- Sec. 18 The Form and Function of Early Christian Literature
- Sec. 19 Early Christian Ethics

Mr. TWISS:

- Sec. 20 Aesthetics and Moral Theory
- Sec. 21 Axiological Ethics
- Sec. 22 Virtues, Vices, and Moral Agency
- Sec. 23 Comparative Religious Ethics
- Sec. 24 Philosophic and Religious Reason
- Sec. 25 Soren Kierkegaard's Thought
- Sec. 26 Evolutionary Ethics

Ms. WULFF:

- Sec. 27 Interpretations of Myth
- Sec. 28 Hindu Texts
- Sec. 29 Indian Philosophy
- Sec. 30 Religion and Drama
- Sec. 31 Religion and Music
- Sec. 32 Religion and Aesthetics

292. *Preparation of Theses and Dissertations*

The STAFF.

Note: Extended descriptions of all courses open to undergraduates are posted in the Department of Religious Studies, 59 George Street.

Renaissance Studies

PHILIP J. BENEDICT, *Assistant Professor of History*; WALTER DAVIS, *Professor of English: Chairman*; LAURA DURAND, *Associate Professor of French*; STEPHEN FOLEY, *Assistant Professor of English*; ANTHONY MOLHO, *Professor of History*; KAREN A. NEWMAN, *Assistant Professor of Comparative Literature*; ANTHONY J. OLDCORN, *Associate Professor of Hispanic and Italian Studies*; MICHAEL C. PUTNAM, *Professor of Classics*; ANDREW J. SABOL, *Professor of English*; JUERGEN SCHULZ, *Professor of Art*; IVAN F. WALDBAUER, *Associate Professor of Music*; SUSANNE WOODS, *Associate Professor of English*.

UNDERGRADUATE PROGRAM

The concentration in Renaissance Studies is designed to encourage a comprehensive view of a period for which the interdisciplinary approach is especially fruitful. Students will be invited to explore several aspects of the period and several disciplinary approaches to it—e.g. history, literature, thought, art, music. The aim is to enhance the student's understanding of the period itself, and also of the uses, limitations and interrelationships of the methods of particular disciplines. Sponsoring departments are: Art, Music, History, English, French Studies, Hispanic and Italian Studies, Comparative Literature, German, Classics, History of Mathematics.

Requirements:

1. History 107 (Renaissance Italy) and History 108 (Europe in the Age of Charles V).
2. Three courses on Renaissance topics in one field in which the student has primary interest and training. (The Renaissance concentration can easily be combined with standard departmental concentrations.)
3. Three courses related to the Renaissance chosen from two other fields.
4. A project seminar in the final semester, designed to enable students to gain perspective on their concentration programs through the preparation and presentation of an original paper or project. During the first part of the semester, the student will work closely with one or more members of the cooperating faculty in the definition and preparation of his paper. During the final weeks, students will present their papers to the seminar for discussion and criticism, thus contributing to and benefiting from the experience and perspectives of other students and faculty. Credit for the work will be granted through the medium of registration by the concentrator for one course credit of Independent Study (Reading and Research) in the Department in which the topic of research lies.
5. Reading knowledge of a relevant modern or ancient language other than English.

Interested students may discuss the program with any member of the Committee.

Semiotics

The Interdepartmental Program in Semiotic Studies is administered by an Executive Committee consisting of Professors AHEARN (French and Comparative Literature), GOUX (French), HENKLE (English); Associate Professors SCHOR (French), SILVERMAN (English; Director of Film Studies; Acting Program Director), SMITH (German); Assistant Professors BEEMAN (Anthropology), DOANE (English), Lecturer TANNENBAUM (Theatre Arts); Instructor DE LA CARRERA (French) and Ms. WEED (Director, Sarah Doyle). In addition, the following faculty are active in teaching or advising in the Program: Professors SCHOLES (English and Comparative Literature), WILMETH (Theatre Arts); Associate Professor HUGO (French); Assistant Professor GOLOPENTIA-ERETESCU (French); Lecturers DUNBAR (Theatre Arts), KATZ (Semiotics), MARC (Executive Secretary of American Civilization), Dean MCINTOSH (Associate Dean of the College).

UNDERGRADUATE PROGRAMS.

This concentration emphasizes the systems that enable and control the production, transmission, and interpretation of signs. The individual human subject, the specific text, and the surrounding culture are all linked by a network of languages, media, discourses, and genres—which are the main objects of semiotic study. Concentrators are expected to improve their own expressive and interpretive skills in at least one medium, while developing a firm grounding in semiotic theory.

A concentration in Semiotics consists of ten semester-courses, distributed as follows: at least four in theory (one of which must be Semiotics 12, 66, or 112), at least three in analysis, and at least two in production. For Honors in Semiotics a Senior Project must be approved at the beginning of the student's seventh semester. While the concentration has no language requirement as such, work in a foreign language, especially French, German, and Italian is recommended.

I. PRIMARILY FOR UNDERGRADUATES

12. Foundation of the Theory of Signs (Foundations 18)

Messrs. SILVERMAN and SCHOLES.

An introduction to the basic concepts in semiotics and the work of major thinkers in the field. In 1983-84 the emphasis will fall on a reading of a select number of key texts by Marx and Freud, and their subsequent re-reading by Barthes, Levi-Strauss, Derrida, Althusser, Wilden, and others. Films by Hitchcock, Sirk, Godard, Fassbinder, and others will provide supplements and alternative textual instances.

22. Persuasive Communication (Theatre Arts 22)

Ms. TANNENBAUM.

Interested students should register for Theatre Arts 22.

66. Introduction to Cinematic Coding and Narrativity

Ms. DOANE.

Film history, theory, and analysis, with emphasis on the production of meaning in the dominant narrative cinema. Topics include: film technology, genre criticism, auteur theory, language and the cinema, the formalist and realist tendencies in film theory, and the cinema in society.

71. Introduction to Film-Making

Mr. KATZ.

An introduction to the elements of film-making.

72. *Intermediate Film-Making*

Mr. KATZ.

Will enable students to refine skills learned in the introductory course (71) and will provide further preparation for work on honors projects.

73. *Video Production*

Mr. KATZ.

Will provide a basic knowledge and experience in the principles of video technology and electronic image.

81. *Study at R.I.S.D.*

Course in film-making, video production, and semiotics. A list of courses approved for cross-registration will be posted in the Registrar's Office and the Semiotics Office.

II. FOR UNDERGRADUATES AND GRADUATES

112. *History and Theory of Semiotics*

Mr. SCHOLLES.

The evolution of the concept of signs from the Stoics to the present day. Simple sign systems and more complex systems as perceived by contemporary theoreticians in various fields of discourse.

113. *Semiotics and the Arts*

Mr. WOLLEN.

The problem of texts and artistic codes, aesthetic creation and reception, with emphasis on the history of the European avant-garde.

163. *Special Topics in Semiotics*163A. *Film Noir*

Ms. DOANE.

An investigation of the American *film noir* of the 40's and 50's with particular attention to the film's activation of paranoia, the representation of female sexuality, the role of the law and transgression, and the inscription of subjectivity.

163B. *Ambition and Hedonism in American Culture*

Mr. MARC.

Interested students should register for American Civilization 161.

163C. *Socio-Linguistics*

Mr. BEEMAN.

Interested students should register for Anthropology 180.

163D. *Literature and Social Thought*

Mr. GOUX.

Interested students should register for French 75.

163E. *Language and Money: Le Langage et La Monnaie*

Mr. GOUX.

Interested students should register for French 132A.

163F. *The Written Word*

Ms. BARON.

Interested students should register for Linguistics 104.

163G. *Non-Western Theatre and Performance*

Mr. EMIGH.

Interested students should register for Theatre Arts 125A.

163H. *Rhetorical Foundations of Human Communication*

Ms. DUNBAR.

Interested students should register for Theatre Arts 128A.

163I. *The Performance Film: Music and Dance*

Mr. SILVERMAN.

A general trans-generic model of musical performance will be examined in an attempt to assess its effectiveness as a strategy for narrative disruption and as a desire for some alternative textual practice.

163J. *Stylistics*

Mr. MCINTOSH.

Studies in grammar and literary style combining traditional and modern (non-traditional) approaches to parts of speech, nominalization, and discourse structure, with detailed analysis of literary texts from the Renaissance to the present.

163K. *Realism and Cinematic Variations: German Fiction and Film in Contemporary Context* (German 144) Mr. SMITH.

Interested students should register for German 144.

163L. *Linguistic Theory and Practice* (Anthropology 280) Mr. BEEMAN.

Interested students should register for Anthropology 280.

163M. *French in the World: Le Francais Dans Le Monde* (French 131B) Ms. GOLOPENTIA-ERETESCU.

Interested students should register for French 131B.

163N. *The French Press: La Presse Francaise* (French 131C) Mr. HUGOT.

Interested students should register for French 131C.

163O. *French Society: Semiotique De La Vie Quotidienne En France* (French 142) Mr. BAUER.

Interested students should register for French 142.

163P. *Origin and Development of Popular Forms of Entertainment* (Theatre Arts 126) Mr. WILMETH.

Interested students should register for Theatre Arts 126.

166. Senior Seminars

166A. *The Politics of Melodrama: Sirk, Chabrol, Fassbinder* Mr. SILVERMAN.
An examination of form and ideology in relation to a critique of social institutions.

166B. *Aspects of Marxist Aesthetics* (German 148) Mr. SMITH.
The origins of theories of Marxist aesthetics in the works of Marx and Engels; the development into the three present major positions, i.e. Soviet and Eastern European "orthodoxy," Euro-Communist "Revisionism," and Freudian-Marxist syntheses.

166C. *Seminar in Linguistic Anthropology: Performance Theory* (Anthropology 281) Mr. BEEMAN.

Interested students should register for Anthropology 281.

166D. *Feminist Theories of Representation in Literature and Film* (English 287A). Ms. DOANE.

Interested students should register for English 287A.

166E. *History and Memory in the Cinema* Ms. DOANE.
An examination of the cinematic production of history and historical meaning and the place of memory in the cinema.

166F. *American Cinema and the Social Field, 1945-1950* Mr. SILVERMAN.
By concentrating on a suturing moment in American life (the return of the absent male, the return of "femininity," the re-integration of familial production) we will trace the marks of this closure on a number of American films by such directors as Capra, Wyler, Ford, Sturges, etc.

166G. *Broadcast Journalism* (Theatre Arts 128G) Ms. TANNENBAUM.
Interested students should register for Theatre Arts 128G.

166H. *Recent Narrative Theory* Mr. WOLLEN.
Emphasis on Russian formalists, Propp, Barthes and their relationship to the discourse of various works and films.

198. *Senior Conference in Semiotics* The STAFF.
Preparation of Honors Projects under the supervision of the staff.

Slavic Languages

Professors ARANT, DRIVER, KUCERA, TERRAS; Associate Professors CAREY, LEVITSKY, MATHIESEN (Chairman); Visiting Assistant Professor HUNT; Lecturer, Ms. MONAHAN.

PLACEMENT. See page 92.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE

Russian Language and Literature. Prerequisite: A reading knowledge of Russian to be demonstrated by satisfactory completion of Russian 4 or 41, or demonstrating equivalent training by examination. The requirements for concentration are Russian 19, 51, 29, 30, plus any four 100-level Russian or Slavic courses. With the approval of the department, a 200-level course in Russian literature or Slavic linguistics may be substituted for any course in the last group.

Russian Language and Literature—Language-oriented. Prerequisite as in standard program. Requirements: Russian 19, 51, 29 and 30, plus any four 100-level literature or linguistics courses. With the approval of the department, courses in linguistics or 200-level courses in Russian literature may be substituted.

Russian Language and Literature—Literature-oriented. Prerequisite as in standard program. Requirements: Russian 19, 51, 29 and 30, plus any four 100-level literature courses. With the approval of the department, courses in linguistics or 200-level courses in Russian literature may be substituted.

Russian Language and Literature—Comparative Literature-oriented. Prerequisite as in standard program. Requirements: Russian 19, 51, 29 and 30, plus any four 100-level or 200-level Russian literature courses. With the approval of the department, one or two courses in other literatures where directly relevant may be substituted.

Russian Language and Literature—Linguistics-oriented. Prerequisite as in standard program. Requirements: Russian 19, 51, 29 and 30, Linguistics 11, 22 or 52 in consultation with the concentration advisor, any two 100-level or 200-level courses in Slavic or general linguistics.

Honors in Russian Language and Literature. Prerequisites and requirements as in any standard program, plus Russian or Slavic 198 for preparation of an Honors thesis.

Russian Studies. Prerequisite: A reading knowledge of Russian to be demonstrated by satisfactory completion of Russian 4 or 41 or by equivalent examination. Requirements: Russian 19, 29, 30, two 100-level courses in the social sciences (normally History 137, 138), and an appropriate course in Political Science, plus two 100-level courses in Russian or Slavic literatures or languages.

With the approval of the Department, and in consultation with the concentration advisor, one course from the other offerings of the Department, or where appropriate, from other departments, may be substituted for one of the two 100-level courses in Russian or Slavic literatures or languages.

Honors requirements are the same as those for a standard concentration in Russian Studies, plus Russian 198 or Slavic 198 for the preparation of an honors thesis.

RELATED COURSES. Students in Slavic should consider the election of one or more courses in the principal periods of other literatures, in comparative literature, in linguistics, and in related fields such as philosophy, art, history, and political science.

GRADUATE PROGRAMS

The Department of Slavic Languages accepts properly qualified candidates for the degree of Master of Arts and Doctor of Philosophy in Slavic languages and literatures. Students interested primarily in Slavic linguistics should also consult the offerings of the Department of Linguistics. The University Library has good basic holdings in all principal fields. Research materials are particularly strong in most aspects of pre-Soviet and post-Soviet literature and intellectual history, Slavic literary theory, and Slavic linguistics. Excellent exchange connections with libraries in the Soviet Union and other Slavic countries are being maintained.

MASTER OF ARTS. Work for the master's degree may be wholly in Russian or Czech language and literature or in Slavic linguistics, or may include one or two courses in such related fields as a second literature, general linguistics, history, philosophy, or art. A candidate will be required to have a spoken and written command of the Slavic language of specialization. The student will usually demonstrate this knowledge by passing, if the language of specialization is Russian, Russian 171. A candidate whose concentration is in literature is required to have written two substantial course papers which the instructor judged acceptable; a candidate whose concentration is in Slavic linguistics is required to complete satisfactorily two 200-level courses in Slavic linguistics. In addition, one of the following is required of all Master's candidates: (a) a reading knowledge of French or German, (b) a reading knowledge of a second modern Slavic language, (c) a suitable substitute in consultation with the graduate advisor.

DOCTOR OF PHILOSOPHY. Doctoral candidates may select either of two programs of study:

1. Concentration on Russian or Czech literature, with Slavic linguistics as a minor field.
2. Concentration on Slavic linguistics, with Slavic literature as a minor field. Under the latter program, the main language of specialization may be either Russian or Czech.

All candidates in either program are normally required to have a knowledge of a second Slavic language in addition to their main Slavic language, a good acquaintance with Old Church Slavonic, which may be demonstrated by successful completion of Slavic 221, and a reading knowledge of French or German (literature concentrators), French and German (linguistics concentrators). They are usually expected to complete sixteen semester courses, of which at least eight are in the department.

The specific doctoral degree requirements in the two programs are as follows:

1. In the literature program, the candidate is expected to have a command of the Russian (Czech) language, spoken and written, and an awareness of its structure and potentialities for expression; a knowledge of Russian (Czech) literature, consisting of wide acquaintance with the chief movements and writers and a thorough knowledge of selected authors and works, including the historical and intellectual environment; and, in addition to a basic knowledge of Old Church Slavonic, an understanding of the development and structure of modern Russian (Czech). It is recommended that a student take at least two courses in the following areas: approaches to the study of literature, 19th century criticism, 20th century criticism.
2. In the linguistics program, the candidate is expected to have a command of his major Slavic language, spoken and written, and a thorough understanding of its structure, history, and relationship to other Slavic and Indo-European languages. In addition to a knowledge of Old Church Slavonic, a linguistics candidate is expected to have a knowledge of at least one other Slavic language and is encouraged to have an acquaintance with a third. A linguistics candidate is required to have a reading

knowledge of French and German. Furthermore, the candidate in Slavic linguistics is also required to have a sound acquaintance with the main trends and main literary figures of at least one Slavic literature.

The doctoral candidate may satisfy the requirements of proficiency in Russian by passing Russian 171. He may satisfy the requirements in Old Church Slavonic and in the development and structure of modern Russian by passing Slavic 221, 223 and 224.

I. PRIMARILY FOR UNDERGRADUATES

RUSSIAN

1-2. *Elementary Russian*

Mr. DRIVER and Ms. CAREY.

Essentials of Russian. Lectures three hours weekly; intensive oral practice in small sections two hours weekly. Course work geared to preparation time; less common basics deferred to first part of second year. No credit for Russian 1 alone, but with written permission, a qualified student may elect Russian 2.

11-31, 21-41. *Intensive Russian*

Ms. MONAHAN and STAFF.

This course is designed to master two years of Russian in one year and earns double credit. Classes meet 10 hours a week, with equal emphasis given to understanding both the spoken and written language and to achieving facility in reading, writing and speaking. Students can expect about 10 hours a week of outside work.

1R-2R. *Russian for Reading*

Ms. ARANT.

This course is designed to develop reading skills as quickly as possible through a concise introduction to grammar during the first semester. Semester II will be devoted to readings from the life and social sciences as well as the humanities. Readings will conform to the areas of interest of the students.

3. *Intermediate Russian I*

Messrs. TERRAS and LEVITSKY.

Training in oral and written expression and in aural and reading comprehension, including optional work in the language laboratory. Grammar review. Prerequisite: Russian 2 or placement by examination. Four hours a week.

4. *Intermediate Russian II*

Messrs. TERRAS and LEVITSKY.

Readings and discussion of Russian texts related to significant aspects of Russian literature and culture. Prerequisite: Russian 3, or 2 with special written permission, or placement by examination. Four hours per week.

19. *Writing and Speaking Russian I*

Ms. MONAHAN.

Russian 19 is geared to the improvement of communicative skills. Students with a strong preparation in aural-oral skills can take advantage of an informal exchange program with local Soviet emigres to acquire intensive practice in conversation skills. Class hours will include conversation on contemporary controversial topics, grammar review as needed with emphasis on verbs of motion, and selected readings in contemporary emigre publications as an aid in developing vocabulary and assimilating Russian syntax.

29. *Russian Literature in English Translation I*

Messrs. DRIVER and LEVITSKY.

Survey of major works of Russian Literature of the early and middle nineteenth century. All works will be read in English translation. Three hours a week lectures, plus discussion in smaller sections.

30. *Russian Literature in English Translation II*

Messrs. DRIVER and LEVITSKY.

Survey of major works of Russian literature of the late nineteenth and twentieth centuries. All works will be read in English translation. Three hours a week lectures, plus discussion in smaller sections.

51. *Writing and Speaking Russian II*

Ms. MONAHAN.

Russian 51 is a continuation of 19. Content depends more on student input than does 19. As in 19, there is opportunity for intensive conversational practice with local emigres.

SLAVIC

93. *Soviet Dissident Movement*

Ms. CAREY.

The chronological evolution of the Soviet dissident movement. The major ideological categories will be investigated: religious, nationalist, pan-slavist, liberal, radical, and literary avant garde. Open also to students from other fields with an interest in comparative literature, history, and political science who may be permitted to do the reading in translation. Knowledge of Russian is not a prerequisite. Offered in alternate years. Graduate students are required to do extra work to receive credit.

II. FOR UNDERGRADUATES AND GRADUATES

RUSSIAN

101. *Russian Civilization*

Mr. TERRAS.

Russian civilization before Peter the Great. The Slavic roots of Russia and the role of non-Slavic elements in the formation of the Russian nation. The Byzantine element in Russian culture. The Orthodox Church. Russian folk culture. Folk art, folk music, and folk poetry. Pre-Petrine Russian and her culture.

102. *Russian Civilization II*

Mr. TERRAS.

Russia under the Romanovs. The development of Russian cultural life (education, science and scholarship, the arts and literature) from Peter the Great to the Revolution of 1917. Trends, schools, and ideas, as well as major figures of cultural life will be discussed in a socio-historical context.

103. *Russian Civilization III*

Mr. TERRAS.

Russia after 1917. The Revolution of 1917 and its consequences for Russian culture. Soviet literature and émigré literature. Russian cultural life after the Revolution: achievements, ideological struggles, movements and groupings, as well as major figures of cultural life before and after the death of Stalin. A survey of the contemporary scene.

131. *Introduction to Russian Poetry.*

Mr. DRIVER.

Basics of Russian versification; survey of Russian poetry; in-class analysis. Offered in alternate years.

132. *Russian Literature from the Symbolists to the Present*

Ms. CAREY.

Readings in the works of Gorky, Blok, Maykovsky, Sholokhov, Pasternak, and others. Literary schools, movements, and personalities of the revolutionary period. The impact upon literature of the Soviet dictatorship. Open also to students from other fields with an interest in comparative literature, who may be permitted to do the reading in translation. Knowledge of Russian is not a prerequisite. Offered in alternate years.

134. *The Russian Novel*

Mr. TERRAS.

The origins, comparative connections, and development of the 19th century Russian novel. Analysis of several representative works by Goncharov, Saltykov-Shchedrin, Leskov, Pisemsky, and others. Knowledge of Russian not a prerequisite. Offered in alternate years.

150. *Approaches to Russian Literature.*

Mr. LEVITSKY.

Reading in Russian of selected poetry and prose by important authors, among them Lomonosov, Karamzin, Derzhavin, Pushkin, Lermontov, Tiutchev, Gogol, Fet, Dostoyevsky, Chekhov, Briusov, Akhamtova, Sologub, Remizov, Blok, Bely, Zamiatin, Pilnyak and Madelshtam. Lectures in Russian, on literary problems, literary terms, and important aspects of literary history. Designed strictly for concentrators who have passed Russian 19 or equivalent level.

161. *Pushkin*

MR. DRIVER.

The place of Pushkin in the history of Russian literature, his reflection of the rapidly changing esthetic norms in the first half of the nineteenth century. Critical analysis of the works of the lycee years, *Ruslan and Ljudmila*, the "Southern Tales," *Eugene Onegin* and *The Bronze Horseman*; also important prose works. Offered in alternate years.

162. *Russian Drama*

MS. ARANT.

The Russian drama of the nineteenth and twentieth centuries. Analysis of the major dramatic works. Drama as a literary form in Russia. The relationship of the author's dramatic works to his other literary productions. Offered on demand.

170, 171. *Advanced Written and Oral Russian*

MS. CAREY.

Designed to develop skill and accuracy in oral expression and composition. Prerequisite: Russian 51, or written permission of the instructor.

181. *Tolstoy*

MR. TERRAS.

An examination of Tolstoy's art with particular emphasis on the formal aspects of his prose. An examination of the early prose will be followed by a detailed analysis of *War and Peace* and *Anna Karenina*. The discussions will conclude with a consideration of the prose and plays written after the so-called conversion. Open also to students from other fields with an interest in comparative literature, who may be permitted to do the reading in translation. Offered in alternate years.

182. *Dostoevsky*

MR. TERRAS.

An examination of the development of Dostoevsky's art with special emphasis on the evolution of thematic and formal elements. The great novels will be read as well as several of the early works. Open also to students from other fields with an interest in comparative literature, who may be permitted to do the reading in translation. Offered in alternate years.

183. *Gogol*

MR. TERRAS.

Reading and discussion of the works of Nikolai Gogol. Some knowledge of Russian is highly desirable; however, undergraduate students from other fields with an interest in comparative literature may be permitted to do the reading in translation. Offered in alternate years.

184. *The Women's Movement in Russia*

MS. CAREY

A study of the development of the women's movement in Russia from its emergence in 1855 to the present day. Through an analysis of literary works, memoirs, and biographies, this course will study the construction of the Russian women's movement in the broad historical context of the European movement of the 1830's and 1840's, its ideological and structural development over many decades, and its relationship to socialism and other intellectual currents.

185. *Turgenev*

MS. CAREY and MR. TERRAS.

An examination of I.S. Turgenev's fiction in the contexts of (a) the social, political, and ideological development of mid-century-Russia, (b) nineteenth-century Realism and its aesthetic foundations (with emphasis on Turgenev's ties with other Russian writers of the period). All of Turgenev's major works will be read and their structure discussed. Open also to students from other fields with an interest in comparative literature who may be permitted to do the reading in translation. Offered in alternate years.

186. *Chekhov*

The STAFF.

Chekhov's short stories and plays will be examined from the standpoint of their formal and thematic characteristics and from the perspective of their position within the development of Russian and world literature. Topics will include: Chekhov as a formal innovator in prose and dramaturgy; Chekhov and the state of the theater; Chekhov and Stanislavsky; Chekhov and Tolstoy, Ibsen, Strindberg, and Maupassant. Open also to students from other fields with an interest in comparative literature who may be permitted to do the readings in translation.

187. *Women Poets of Russia*

Ms. CAREY.

The woman poet in Russian literature: a comparative study of major men and women poets of the nineteenth and twentieth centuries. In this course, the theoretical framework for analysis will be based on the critical comparisons developed by Claudine Herrmann and Mary Hiatt. Prerequisites: either Russian 51 or 170. The prerequisites imply a reading knowledge of Russian. Reading mostly in Russian.

198. *Senior Conference*

The STAFF.

SLAVIC

105. *The Theory of Slavic Standard Languages*

Mr. MATHIESEN.

A survey of the history and present status of Slavic standard languages, compared and contrasted with that of selected non-Slavic standard languages. Outlines of a general theory of standard languages. Offered on demand.

111. *The Oral Epic and Other Forms of Folklore*

Ms. ARANT.

A study of the meaning and form of oral traditional literature in the Slavic countries. Special attention will be given to the relation of the narrative and non-narrative forms to ritual and myth. Among the narrative forms to be studied will be epic poetry, the ballad, and the folk tale; the study of non-narrative forms will include the lament, ritual and lyric songs, proverbs, and riddles. Open also to students from other fields with an interest in comparative literature who may be permitted to do the reading of the Slavic material in translation. Offered in alternate years.

115, 116. *Serbo-Croatian*

The STAFF.

117, 118. *Serbo-Croatian*

The STAFF.

119, 120. *Polish*

Mr. TERRAS.

121, 122. *Bulgarian Literature of the Nineteenth and Twentieth Century*

Ms. CAREY.

This course will serve as an introduction to Bulgarian literature. Bulgarian literature of the nineteenth and twentieth century can be divided into four periods: first, preceding the political liberation of Bulgaria; second, from 1877 to 1912; third, from the Balkan wars to the second World War; fourth, contemporary. The readings for this course will be done in Bulgarian, Russian, English and French.

175. *Introduction to Russian Folklore*

Ms. ARANT.

The types and meaning of oral-traditional narrative literature (epic, folktale, ballad) and non-narrative literature (incantation, lament, lyric and ritual song, proverb and riddle), primarily in Russian, with systematic references to the traditional literatures of other countries. Special attention to the relation of these oral forms to ritual and myth. Open also to students in other fields with an interest in comparative literature, who may do the reading in translation. Offered in alternate years.

198. *Senior Conference*

The STAFF.

Special topics in Slavic literatures, linguistics, and civilization. Intensive language tutorial in Czech, Polish, and Serbo-Croatian.

III. PRIMARILY FOR GRADUATES

RUSSIAN

201. *Eighteenth Century Literature* Ms. ARANT.
The most important literary currents from neo-classicism to sentimentalism. Study of style and genre and the development of the literary language. Offered in alternate years.

202. *Russian Poetry* Mr. DRIVER.
A practical approach to the analysis of Russian poetry, using texts drawn from the early period to the present. Offered in alternate years.

203. *Russian Prose of the Early Twentieth Century* Mr. LEVITSKY.
Selected Russian Prose of the post-Symbolist period. Prerequisite: Russian 51. Offered in alternate years.

204. *Russian Symbolism* Mr. DRIVER.
The origins and character of the Russian Symbolist movement, the poetry of Aleksandr Blok and a brief survey of other Symbolist poets; directions in Russian poetry in the Post-Symbolist period. Offered in alternate years.

205. *Russian Poetry of the Twentieth Century* Mr. TERRAS.
The philosophic and aesthetic premises of Symbolism, Acmeism, Futurism, Imagism, Constructivism and Socialist Realism. Offered in alternate years.

232. *Old Russian Literature* Ms. ARANT.
Russian literature from the Kievan period to the end of the seventeenth century. Offered in alternate years.

241. *Movements and Genres in Russian Literary Culture* Mr. LEVITSKY.
Seminar. Critical reading of selected texts from the Baroque Period through the first half of the Nineteenth Century. The analysis will be based on a study of the infrastructure of each work and the external influences of the period. Course will be given mainly in Russian, with focus on Russian critical terminology and approaches. Open to qualified undergraduates with permission of instructor.

261, 262. *Seminar in Russian Literature* The STAFF.

271, 272. *Seminar in Russian Literature* The STAFF.

277. *Seminar in Russian Literature* The STAFF.

291, 292. *Advanced Reading and Research* The STAFF.
Work with individual students in connection with special readings, problems of research, or preparation of dissertations.

SLAVIC

221. *Old Church Slavonic* Mr. MATHIESEN.
Introduction to Church Slavonic philology. Structural analysis of Old Church Slavonic. Readings in Old Church Slavonic texts (prose and poetry). Introduction to comparative Slavic phonology and grammar.

222. *Readings in Church Slavonic* Mr. MATHIESEN.
Selected texts from the eleventh century to the twentieth will be read in order to develop facility in reading the language.

223. *History of the Russian Language* Mr. KUCERA or Mr. MATHIESEN.
Outline of the historical development of East Slavic dialects and standard languages, with emphasis on the history of standard Russian. Readings in East Slavic texts. Some acquaintance with Old Church Slavonic is desirable. Offered in alternate years.
224. *Structure of Modern Standard Russian* Mr. KUCERA or Mr. MATHIESEN.
Descriptive analysis of the phonology and morphology of Modern Standard Russian and a survey of Russian dialects. Offered in alternate years.
225. *Introduction to West Slavic Linguistics* Mr. KUCERA.
A comparative outline of the structure of Czech, Slovak, and Polish, with some attention to Western Slavic dialectology.
226. *A Comparative Analysis of Ukrainian and Russian* Mr. MATHIESEN.
A contrastive study of the phonology, morphology and syntax of present-day Ukrainian and Russian. Reading and analysis of Ukrainian texts. A knowledge of Russian or of one other Slavic language is required. Offered on demand.
- 227, 228. *A Comparative Analysis of Czech and Russian* Mr. KUCERA.
A comparative study of the phonology, morphology and syntax of present-day Czech and Russian, emphasizing the structural description of modern standard Czech with some attention to the colloquial language. Reading and analysis of selections from Czech linguistic works as well as from modern Czech literature. Knowledge of Russian is required. Offered in alternate years.
- 229, 230. *A Comparative Analysis of Bulgarian and Russian* Mr. MATHIESEN.
A contrastive study of the phonology, morphology, and syntax of present-day Bulgarian and Russian. The history of the literary languages in Bulgaria and Russia. Reading and analysis of Bulgarian prose. A knowledge of Russian or of one other Slavic language is required. Offered on demand.
232. *Russian Syntax* Mr. MATHIESEN.
The theory of syntax and the syntax of Russian. Approaches to syntax over the centuries. The study of syntagms without and with predication in Russian. Prerequisite: Russian 51 (or equivalent command of the language). Offered on demand.
236. *Modern Czech Literature* The STAFF.
Will consist of a survey of modern Czech prose, poetry, and drama. The texts will be read partly in translation, partly in the original. Open to students without knowledge of Czech.
245. *Linguistic Theory and Models of Language* Mr. KUCERA.
Contemporary issues in linguistics. (Also listed as Linguistics 245).
251. *Seminar* The STAFF.
Topic to be announced. (Comparative Literature 251).
262. *Topics in Comparative Slavic Linguistics* Mr. MATHIESEN.
Special topics in historical and comparative Slavic phonology, morphology, and syntax.
- 271, 272. *Advanced Czech Studies* Mr. KUCERA.
Aspects of Czech literature (old and modern). Phonology, morphology, and syntax of present day standard and colloquial Czech. History of the Czech language. The historical development of standard Czech. Readings in Old Czech texts. Czech dialects.
273. *Proseminar in Slavic Linguistics* Mr. KUCERA.
Basic concepts of linguistics and their application to language teaching and to the analysis of literary texts. Slavic examples (primarily Russian) and some aspects of the contrastive analysis of Russian and English will serve as the basis of the discussion of several problems such as: phonetics and phonology; generative morphology, transformational grammar; functional sentence perspective; principles of comparative and historical linguistics.

Recommended for graduate students in Slavic languages and literatures. Undergraduates will be admitted with the permission of the instructor.

275. *The Poetics of Folklore*

Ms. ARANT.

This course will study the morphology and meaning of oral traditional narrative and non-narrative literature in the Slavic countries, primarily Russia. Special attention will be given to the relation of oral forms to ritual and myth. Offered in alternate years.

291, 292. *Advanced Reading and Research*

The STAFF.

Work with individual students in connection with special readings, problems of research, or preparation of dissertations.

Social Science Data Center

The Social Science Data Center is an interdepartmental research and training facility for the social sciences at Brown. The Center provides a number of services to the social science departments. Included among these are (1) maintenance of a data archive which currently includes over 200 social science data sets; (2) acquisition of data sets for use by social science departments (the Center is a member of the Inter-University Consortium for Political and Social Research and can acquire data sets at no charge); (3) workshops on computing techniques for the social sciences; (4) availability of consultants to help social science users; (5) development of computer-based systems of social science data management and statistical analysis which offer a wide range of opportunities for maximizing the use of the archives.

Sociology

Professors EVANS, GOLDSTEIN, MARSH, MARTEL, MORRIS, RUESCHEMEYER, SPEARE (Chairman), WESSEN, ZIMMER; Associate Professors ANDERSON, KOBRIN;¹ Assistant Professors BROWN, ELLIOTT, MEYER, MILLMAN, SILVER, STEPHENS,¹ TEACHMAN;¹ Adjunct Professors GOLDSCHIEDER, POTTER, M. RUESCHEMEYER.

The Sociology Program offers many ways of gaining a better understanding of the modern social world. It also offers essential background for many careers and professions. In recent years students have developed special programs in the sociology of administration, arts and literature, communications, the community, crime and deviance, ecology and environment, the family and marriage, health and medicine, knowledge and ideology, law and its enforcement, modernization, organizations, political behavior, population, racial and ethnic relations, social movements, social psychology, sex roles and urbanization. The Department also offers introductory and advanced courses in research methods, demographic techniques, social statistics and computer approaches in social research. Faculty advisers, campus resources and special programs in these and other areas are listed in the detailed Department Guide, available from the departmental secretary.

¹ On leave 1983-84.

UNDERGRADUATE PROGRAM

The concentration program in sociology takes into account that students have in the past used it as the core of a broad liberal arts education, as preparation for graduate study in sociology, and as the basis for future professional study in such fields as administration, law, and social services.

STANDARD CONCENTRATION PLAN:

Eight courses are required, including one introductory course (Sociology 1, 3, 5, or 7), three courses in methods and theory (Sociology 101, 102, and 110), one undergraduate seminar (or one graduate seminar, with permission), any two 100-level Sociology courses, and one independent study (Sociology 198 or 199). The independent study serves as an individual integration of the student's concentration and may be extended to two semesters. Concentrators should work out their program with an advisor and submit a concentration plan by the fourth semester.

CONCENTRATION PLAN WITH INTERDISCIPLINARY OPTIONS:

Students wishing to focus on a special field of interest for which sociological studies are particularly useful will take at least ten courses of which seven must be in sociology. The seven courses normally will include an introductory course (Sociology 1-7); 101; and 102 or 110. Students must choose a faculty member in the Department as their concentration adviser, and submit a plan of study by the fourth semester. The Department Guide provides details of the six special fields of interest: education, law, management, population studies, public health, social services, and social research methods.

Honors results from an exceptional commitment to the discipline of sociology, as reflected in the student's program of study. This commitment will be evidenced by excellence in a coherent group of sociology courses and by an honors thesis based on a major research project. A four-year combined BA/MA program can be pursued with special permission.

GRADUATE PROGRAMS

The Department accepts qualified students for both the Master of Arts and the Doctor of Philosophy degrees in Sociology. On the graduate level, its major objective is the education and development of professional sociologists for academic careers and for nonacademic careers in government and private agencies. To this end, emphasis is placed on the mastery of sociological fundamentals - concepts, theories, and research methods - together with a thorough knowledge of significant substantive fields. The Master's program is available in all major areas of Sociology. At the Doctoral level emphasis is placed on the fields of (1) Population, (2) Social Organization, (3) the Comparative Study of Development and (4) Urban Studies and Ecology. Concentration of staff appointments and research programs in these fields permits intensive training for prospective teachers and researchers in these areas of specialization.

The University has established a Population Studies and Training Center which facilitates and strengthens the graduate training and research program in demography. The Center coordinates the population research activities of the Department and those of members of other departments at the University, including economists, historians, biomedical scientists, anthropologists, and mathematicians. It also provides liaison with various health, population, and urban research organizations and action agencies in the community. The Center sponsors a number of sample survey studies in less developed countries; these focus on changing fertility, health, migration, and urbanization patterns. It also maintains a Population Research Laboratory for conducting cross-sectional and longitudinal surveys of the Rhode Island population. These surveys provide graduate students with opportunities for research experience and with data for theses and dissertations.

In 1983, the Center for the Comparative Study of Development was established under the directorship of the Henry R. Luce Professor for the Comparative Study of Development. The Center, which is housed in the Sociology Department, supports research efforts on the socioeconomic analysis of development by faculty and graduate students from sociology, economics, anthropology, political science, and history. It oversees and supports the undergraduate concentration in Development Studies and facilitates linkages between undergraduate instruction and faculty research. The Center also promotes graduate training relevant to issues of development by strengthening graduate programs in departments providing such training and fostering cooperation among these departments.

The Department offers its own program of research and training in the utilization of electronic computers in sociological, demographic, and health studies. The Facilities of the University Computing Center, including an advanced design highspeed computer, are available for statistical work and programming problems. The Department of Sociology also houses Brown University's Social Science Data Center. This is described on page of this catalogue.

Faculty interest, library holdings, and the availability of international and cross-cultural data banks make it possible for students to carry out cross-societal comparative research at Brown, either as a prelude to research abroad or as an end in itself.

Departmental colloquia are held throughout the year for outstanding scholars from other universities and research centers to present and discuss their work. In addition, regular and informal seminars are conducted by the staff and by graduate students in which research and other topics of current interest are discussed. Graduate enrollment is limited to ensure the opportunity for individual and close contacts between students and faculty.

MASTER OF ARTS PROGRAM. All candidates for the M.A. or Ph.D. are expected to offer evidence of adequate preparation in general Sociology or in a related field of social science. All candidates for the M.A. or Ph.D. degree are expected to have had previous work in Social Theory (equivalent to Sociology 101) and Elementary Statistics (Sociology 110). Students who have not taken a previous course in Social Theory will be expected to take Sociology 101. Students who have had a previous course in statistics or otherwise feel qualified in statistics will be expected to take an examination covering content equivalent to Sociology 110. Those failing the exam and those without a background in statistics will be expected to take Sociology 110. Entering students are also expected to have had some undergraduate training in research methods, but this is not required.

Each candidate for the degree will arrange a program in consultation with the Department in terms of his or her specific needs and interests. A minimum of eight semester courses must be completed, including six Sociology courses at the 200 level. Although no specific courses are required, the student should have a balanced program in theory, methods, and substantive courses. With the approval of the Department, two of the eight courses may be in other departments which are related to the student's program of study.

Candidates for the degree of Master of Arts are required to complete a Master's paper related to the program of study and satisfactory to the Department. Students enrolled in the Ph.D. program must complete their Master's paper by the end of their third semester of graduate study.

DOCTOR OF PHILOSOPHY PROGRAM. Three full years of graduate study are required for the Ph.D. degree. The equivalent of up to one full year of credit may be transferred from another institution upon petition to the Graduate Committee and approval by the Dean of the Graduate School. All students are expected to gain proficiency in theory, methods, and statistics by taking Sociology 204 (Classical Theory), Sociology 205 (Contemporary Theory), Sociology 201 (Multivariate Analysis), and Sociology 200 (Research Design and Measurement). Students who have taken advanced courses in methods and theory at other universities may, on submission of syllabi or other summaries of the content of these

courses, petition the graduate committee for an exemption from one or more of the required theory and methods courses. Students who have not had sufficient course work to be granted an exemption may be exempted by passing an examination covering the content of the course or courses.

Graduate students are evaluated by the faculty early in their Ph.D. work. This evaluation is based on letter grades and on evaluations by faculty who have had academic contact with the student. A student who is not considered qualified for Ph.D. work after the third semester cannot enroll in Sociology at Brown University beyond the Master's degree.

Special Skills. Students are strongly encouraged to obtain training in foreign languages, computer programming, or methodological areas which are appropriate to their program of study and research. Students are encouraged to take courses inside or outside the department which will provide them with such skills.

Publication: Students are strongly encouraged to prepare at least one paper for publication in a professional journal during their first three years of graduate study. This can be accomplished in several ways; by rewriting the M. A. paper into journal form, by choosing a topic for a seminar paper which has potential for publication, or by working jointly with a faculty member.

Teaching Practicum: Teaching experience is required of all Ph.D. students. This requirement will be satisfied by a year's Teaching Practicum in Sociology (Sociology 250, 251) ordinarily during the second or third years of the graduate program. Each student will normally serve as an apprentice teacher in two undergraduate Sociology courses. During the year the student will assume increasing responsibilities in all phases of course work, including direction of section meetings, giving lectures under supervision, preparing examinations, reading reports and examinations, and participating in a Teaching Proseminar. Students may propose to meet this requirement by teaching a Modes of Thought course, or by being an assistant in the Social Science Data Center.

Research Practicum: Since most Ph.D.'s in Sociology combine careers in teaching with research appointments, they are frequently called upon to initiate, fund, and execute major research projects. In addition, skills necessary for proposing and executing research for a Ph.D. dissertation can be considerably improved by supplementing formal course training with personal participation in an on-going research project. For these several reasons, guided experience in research is considered an important part of the graduate training program in Sociology. This is not a requirement, but each student is encouraged during his or her second or third year to work with a faculty member(s) engaged in an on-going research project as a researcher assistant or collaborator on the project. Students may participate in this by registering for Sociology 291, 292 in lieu of taking a regular graduate course.

Preliminary Examination: All students are required to pass a preliminary examination in one major and one minor field of specialized inquiry.

The Department offers the following three areas of specialization:

- I. Population, including population theory, demographic methods, area studies, manpower, vital processes, migration, population growth, economic development, and population policy.
- II. Social Organization, social stratification, complex organizations, medical sociology, the sociology of knowledge, social psychology, or another area selected with approval of the Department.
- III. Urban Studies and Ecology, including general human ecology, ecological methods, community studies, metropolitan development, social and political organization of cities, and urbanization.
- IV. Comparative Study of Development including theories of comparative development

and modernization, the socio-economic analysis of development, industrialization and political change, the state in the third world and population and economic development.

Students may select their two fields of specialized inquiry from among these four areas, or they may choose one of the above fields and a second specialty which cuts across the four fields or across disciplinary lines. The fields of specialization chosen should stand in a meaningful relation of balance and complementation to each other, taking into account the course offerings of the Department and University. Students are expected to take their Preliminary Examination, covering the substantive material and relevant theory and methods in their two areas of specialization, not later than the end of their third year of graduate work. Before taking these examinations, the student must have completed a Master's paper, met the theory, methods and statistics requirements, and have adequately prepared for the examination through course work and/or independent study and reading. The Preliminary Examination will be both written and oral. The oral portion of the exam will focus on a brief research proposal submitted by the student.

A dissertation is required, ordinarily in the student's major substantive field. At an early stage in the project, the student should develop a written dissertation proposal and present it orally before faculty and students of the Department. The dissertation is written under the supervision of a three-member dissertation committee. Following acceptance of the dissertation by the committee, a Final Oral Examination is conducted covering the dissertation and related fields.

1. PRIMARILY FOR UNDERGRADUATES

1. *Sociological Perspectives*

Mr. TAPLIN.

An introduction to basic concepts and major perspectives of sociology. As the title implies the emphasis of the course will be on giving the beginning student a sense of the goals, perspectives and methods that characterise sociological studies in a variety of substantive areas. The latter includes socialization, language and culture, social classes, political processes in the community, work, health care, and the natural environment.

3. *American Society*

Mr. MARTEL.

Future possibilities will be explored against the background of a systematic analysis of recent trends in population, racial and ethnic groups, family and marriage, sex roles, economic and political organization, social classes, education, science, religion, the arts and popular culture. The approach will examine the links between changes in the various areas listed, and their implications for individuals in various sectors of this country and other countries. Intensive seminar-sections are planned on changes in ethnic groups, sex roles, higher education, health and welfare services, and the law and property.

5. *Deviant Behavior*

Mr. BROWN.

An introduction to the sociological study of deviant behavior. Primary emphasis is given to a critical evaluation of sociological theories of deviance. Also some time will be devoted to the sociological study of the criminal justice system.

7. *The Family*

Ms. KOBRIN and Mr. ROCKETT.

An examination of American family patterns by social class and ethnic group, looking at both external influences on the family and internal processes of the family. Contemporary alternatives to the traditional nuclear family will be examined.

10. *Social Psychology: Dynamics of Social Interaction*

Mr. ELLIOTT.

An investigation of some of the personal, situational and structural influences on social behavior. Topics include making sense of the world and our place in it, affiliation and interpersonal attraction, helping and hurting and conformity and nonconformity.

15. *Economic Development and Social Change*

Mr. EVANS.

Emphasis will be on trying to understand the interrelations among economic, political and cultural aspects of change in developing countries. The experience of currently developing nations will be contrasted to that of nations which industrialized in the nineteenth century. Will also compare the different developmental strategies which have been adopted by currently developing nations and their consequences for social change.

20. *Population and Society*

Mr. GOLDSCHIEDER and Ms. MILLMAN.

A treatment of the causes and consequences of major population trends throughout the world; of changes in birth and death rates, and in the mobility and migration of persons. Attention is given to population in relation to socio-economic, religious, and social-psychological factors to economic development, and to current issues such as teenage pregnancy and the movement out of urban areas.

21. *An Introduction to the City* (Urban Studies 21)

Mr. ZIMMER.

This course will examine the growth of cities and the development of metropolitan areas in the 20th century. The social, economic, and political consequences of the urbanization process will be emphasized. Interested students should register for Urban Studies 21.

II. FOR UNDERGRADUATES AND GRADUATES

101. *Development of Sociological Theory*

Mr. MARTEL.

A study of major theoretical approaches to man and society in the Western world since the French Revolution. Emphasis on the works of Saint-Simon, Comte, Spencer, Marx and Engels, Weber, Durkheim, Park, Mead, Simmel and Freud. The course will begin with a systematic approach to the problem of how to analyze the logical structure and empirical claims of complex theories. Special discussion groups are planned on the works of Marx, Weber, and Freud.

102. *Methods of Social Research*

Mr. ELLIOTT.

The process of social research with emphasis on field methods, survey research, content analysis and analysis of existing data, experimental design, and evaluation research. Goals include providing an introduction for future social researchers, fostering an ability to critically evaluate the research of others, and providing a basis for assessing the current status of sociology.

110. *Introductory Statistics for Social Research*

Messrs. ELLIOTT, SPEARE and Ms. MILLMAN.

Descriptions and inferential statistics usually covered in beginning applied statistics courses: measures of central tendencies and variability, probability, binomial and normal distributions, tests of significance, difference between proportions and means, chi square, correlation and regression, simple analysis of variance, nonparametric methods. Also included is the use of computers in data analysis based on SPSS (Statistical Package for the Social Sciences). Only a knowledge of elementary algebra is assumed.

116. *The Modern Corporation and Metropolitan America*

Mr. MEYER.

Interested students should register for Urban Studies 116.

120. *Population Growth and the Environment*

Ms. ANDERSON and Ms. MILLMAN.

Relationships between the social and physical environment and various aspects of population are investigated. The emphasis is on currently developing countries although developed countries such as the United States are also considered. Among the topics covered are the relationship of the environment to the following: changing patterns of mortality and illness, nutrition-population connections, agricultural and economic structure changes, and the adoption of fertility control. Policy implications of the examined relationships are considered.

121. *Sociology of Learning* (Education 121)

Ms. DAILEY.

See Education 121 for description.

123. *Sex Roles and Status in Comparative Perspective*

The STAFF.

Will view sex roles from a sociological perspective. Beginning with biological sex differences and early socialization, the course will follow the life cycle, in order to ascertain how the initial ascription as to sex influences the life courses of women and men.

125. *Social Psychology: Collective Behavior*

The STAFF.

An investigation of the nature, causes and consequences of such ephemeral, unorganized, large-scale human groupings as crowds, mobs and riots, and publics, as well as such amorphous collective phenomena as fad, fashion, gossip, rumor and public opinion.

127. *Race, Class, and Ethnicity in the Modern World*

Mr. MARTEL.

A sociological look at changes in class, ethnic, "racial", and religious divisions found in the United States and other advanced societies during the past century; at their historical backgrounds; and at their future prospects. Special attention to the newly emerging as well as traditional ethnic groupings. Intensive seminar-sections will focus on the personal meanings of the social patterns depicted.

130. *Urbanization in World Perspective*

Mr. MEYER.

The transition from a rural to an urban society. Changes in the social and ecological organization of rural and urban sectors of modern and modernizing societies. Problems associated with rapid urban growth, rural decline, and rural-urban migration.

132. *Urban Housing and Social Policy* (Urban Studies 132)

The STAFF.

See Urban Studies 132 for description.

133. *The Metropolitan Community* (Urban Studies 133)

Mr. MEYER.

Study of the internal ecology and dynamics of metropolitan regions in developed and less-developed nations. Topics include residential mobility, change in residential areas, commercial and industrial land use, changes in land use system, and exurban/nonmetropolitan dynamics.

135. *Environment and Urban Life* (Urban Studies 135)

The STAFF.

See Urban Studies 135 for description.

136. *Social Change and Social Policy*

The STAFF.

The various theories of social change together with a consideration of their implications for accurate forecasting and prediction in the service of planning and social problem solution. Special emphasis on the analysis of recent social trends on both the societal and community levels as a basis for dealing with such contemporary social problems as population growth, race relations, economic welfare, and poverty.

140. *Political Sociology*

Mr. SILVER.

A study of the social bases of political behavior. Social and psychological forces that help to determine political beliefs, political processes in complex organizations, and political participation including voting and other forms of political behavior.

144. *Social Movements and Social Protest*

The STAFF.

The nature and functions of both general and specific movements of protest - reform and revolution - in various types of societies. Special attention to protest movements in contemporary society and their implications for social change.

150. *Bureaucracy and Society*

Mr. MARSH.

Complex organizations - factories, offices, schools, government agencies, hospitals, research laboratories, etc. - and their role in modern society. Theories of organizations, beginning with Weber's theory of bureaucracy and continuing to the most recent contingency and open systems theories. The principal focus is on the main elements of any

organization - its goals, technology and task-structure, size, internal structure, decision-making, environment and performance effectiveness. Organizations in the U.S., Japan and elsewhere will be compared.

154. *Human Needs and Social Services* (Urban Studies 154)

Mr. BROWN.

The development of human services provided by societies for their members. A broad range of social welfare institutions are studied, including income maintenance, family policy, housing, and health. The organization of institutions and professions receives particular attention. Issues of class, race, and gender are covered. Alternative models of human services are discussed.

155. *Sociology of Medicine*

Mr. ROCKETT.

The socio-political context within which health, illness, and medical care are defined. Sociological materials used to examine current developments in the health care field. Emphasis on identifying social and political forces which impinge upon the delivery system and tracing their impact on the roles of practitioners and the health of their clients.

158. *The Sociology of Work and Industry, I*

Mr. EVANS.

The contemporary industrial order as seen from a sociological perspective. Focuses on the work process in the modern corporation. The conditions of work and the problems of industrial and clerical workers as determined by technological and organizational factors. Effects on workers and their individual and collective responses. Reforms and alternatives to present structure of work. Relation between the industrial order and social institutions, including the system of social stratification and political institutions.

159. *The Sociology of Work and Industry, II*

Mr. EVANS.

Complements Sociology 158 by providing a sociological analysis of decision making and managerial strategies in the large corporation. Examines how the growth of the modern corporation has affected the relations of firms and the market. Also looks at interorganizational linkages among industrial enterprises and financial institutions and their implications for the functioning of the industrial order as a whole.

160. *Modernization: Comparative Analysis of Developing Nations*

Mr. MARSH.

A review of theories and research in the social sciences that offer answers to the following three questions: (1) why have some less developed societies had more rapid rates of economic development than others? (2) why do developing nations differ in their degrees of socio-economic inequality? and (3) why did many, but not all, developing nations abandon democratic constitutions after political independence and adopt military and other forms of authoritarian regimes? The focus is on the historical experience of less developed countries since World War II.

161. *Sociology of Education* (Education 161)

Ms. DAILEY.

See Education 161 for description.

163. *Sociology and Equality of Opportunity*

Ms. DAILEY.

See Education 163 for description.

164. *Social Inequality*

Ms. SILVER and Mr. STEPHENS.

To what extent, and under what conditions, can social inequality be reduced or eliminated? Distinctions between equality of opportunity, and equality of rewards will be drawn and their implications explored, in the perspective of sociological theory and research in our own and other advanced industrial societies.

165. *Political Socialization and Education* (Education 165)

Ms. DAILEY.

Interested students should register for Education 165.

170. *Theories of Imperialism and Colonialism.*

Mr. MORRIS.

An examination of the assumptions of theories of imperialism and colonialism and the extent to which historical evidence does or does not support various interpretations. An analysis of theories of imperialism which seek to explain the expansion of North Atlantic economies into less developed areas and theories of colonialism which attempt to describe the extent and ways in which imperialist economies have retarded and distorted the development of their colonies.

187. *Undergraduate Seminars*

Open to juniors, seniors, and graduate students with instructor's consent. Note that some 200-level seminars are open to qualified undergraduates and may count for concentration credit.

187A. *Sociolinguistics: Language, Socialization, and Conduct*

Mr. ELLIOTT.

An inquiry into the nature of symbolic communication, the role of language in cognitive development, self-concept, and motivation of conduct in terms of a "vocabulary of motives," as well as in the integration of interpersonal relationships and the viability and change of social structures.

187B. *Principles of Demography*

Mr. GOLDSTEIN.

Designed to introduce students to major substantive knowledge in the demographic study of human population growth, fertility, mortality, migration, and composition. Emphasis is placed on describing and interpreting demographic patterns; techniques of analysis are considered only insofar as necessary for understanding substantive patterns. Wherever possible the social causes and consequences of demographic phenomena are emphasized.

187C. *Urban Planning and Public Policy* (Urban Studies 187C)

Mr. MEYER.

The seminar will examine the internal development and external expansion of cities in terms of public policy. Topics to be discussed include: inner city revitalization, zoning, transportation, and the preservation of open space. Interested students should register for Urban Studies 187C.

187D. *Industrialization, Democracy, and Dictatorship*

Mr. RUESCHEMEYER.

Examines the interrelations between economic development past and present, and political change. Does economic development encourage democratization in today's underdeveloped countries as it did in Western Europe? Does rapid economic change foster revolutionary movements? Does sustained economic growth require authoritarian rule? What is the impact of multinational corporations on political conditions in developing countries?

187E. *Structure and Performance in Economic Organizations*

Mr. EVANS.

Methods of connecting structural variables (e.g. span of control, length of hierarchies, interconnections of multiple hierarchies) with conventional measures of economic performance will be explored in this course. Students will be expected to participate in an empirical research project or to work on the elaboration of a formal model of organizational structure. Prerequisite: Sociology 150 or 158. S/NC.

187F. *Health Policy Seminar*

The STAFF.

Systematic study of current policy developments with respect to health care delivery. Academic materials will be utilized to evaluate past policies as well as predict the impact of future alternatives. Particular attention to issues relating to trends in medical education, role delineation among health workers, introduction of new types of practitioners, assessment of quality of care, accessibility of services, impact of prepaid group practice and health insurance, prospects for public accountability and regulation, developments in occupational health, and the status of patient rights. Prerequisite: Sociology 155 or written permission.

187G. *Advanced Statistics for Social Research*

The STAFF.

Use and interpretation of selected advanced statistical procedures, including partial and multiple regression, analysis of variance and covariance, factor analysis, multidimensional contingency tables. Includes data analysis by students using computer programs primarily in SPSS (Statistical Package for the Social Sciences) and data files from the Social Science Data Center. Prerequisite: Sociology 110.

187H. *Selected Issues in Urban Sociology*

Mr. ZIMMER.

The seminar will examine selected urban issues from a sociological perspective. Particular attention will be focused on the theoretical and policy implications of sociological research.

187J. *Social Structure and Social Change in Contemporary Brazil*

Mr. EVANS.

Uses post-1964 Brazil as a case study in order to test the implications of different theoretical approaches to the analysis of socio-economic development. Topics will include changes in agrarian structures and the development of agriculture, industrialization and the role of multinational corporations, labor organization and political protests, and ideology and regime stability. Prerequisites: 15 or 160; or Portuguese and Brazilian Studies 160B; or equivalent with written permission.

190, 191. *Individual Research Project*

The STAFF.

Intensive supervised reading or research. A specific program will be arranged in terms of the student's individual needs and interests. Required of students who are Intensive Concentrators; open to others only by written consent of the Chairman of the Department.

198, 199. *Concentration Special Project*

The STAFF.

An independent study that helps to deepen, balance or integrate the concentration program. This individual project may relate to service as a Teaching Assistant in the Department, or as a Research Assistant on a faculty or community investigation. The project should be selected with a faculty preceptor, and a written proposal must be approved before the semester in which credit is given. The student must write up a summary paper which may be submitted as an Honors Thesis. See the new Department Guide for project suggestions and resources.

III. PRIMARILY FOR GRADUATES

200. *Research Design and Measurement*

Ms. ANDERSON and Mr. ROCKETT.

This is a course for second-year graduate students oriented toward the preparation of research proposals and the methods of collecting data. There will be a systematic presentation of the logic of social research, the goals of research design, the problems of reliability and validity and the methods of sampling. Major methods of data collection such as observation, surveys and content analysis will be presented with the aim of equipping students with sufficient understanding to be able to select and employ those methods most appropriate for a particular research problem. Prerequisites: Sociology 110 and Sociology 201. Offered every year.

201. *Multivariate Analysis*

Ms. KOBRIN and Mr. SPEARE.

This course is designed to introduce students to methods for analyzing quantitative data which are most frequently found in the current sociological literature. It is oriented to pragmatic problems of manipulating, exploring, summarizing and displaying data with three or more variables. The course includes the general linear model, multiple regression, analysis of variance and path analysis. While these subjects will require the mastery of basic statistical theory, the emphasis will be on problems associated with the analysis of sociological data such as measurement error, non-linear relationships, missing data and index construction. Prerequisite: Sociology 110. Offered every year.

202. *Sociology of Personality and Mental Disorder*

The STAFF.

A detailed examination of the theoretical and empirical literature in selected areas: language and communication, socialization, desocialization, and resocialization; social types of personality; the sociology of motivation; national character; social psychiatry. Offered in alternate years.

203. *Stratification and Power*

Mr. STEPHENS.

The causes and consequences of socially structured inequality will be the substantive focus. Analysis of theoretical explanations will be combined with the examination of empirical methods for the investigation of inequality. Comparative material, historical or crossnational, will be examined, focusing on first and third world countries. Offered in alternate years.

204. *Sociological Theory I*

Messrs. MARSH and RUESCHEMEYER.

An intensive examination of the sociological theories of Marx, Durkheim and Weber, along with a consideration of theory construction. Offered every year.

205. *Sociological Theory II*

Messrs. MARSH, MARTEL and RUESCHEMEYER.

A systematic survey of current approaches, comparing functionalist, social-behaviorist, neo-Marxian, demographic, ecological, symbolic interactionist and Freudian works. The course will begin with models for the analysis of the logical and empirical structure of complex sociological theories, and will include an introduction to simple mathematical models. Offered every year.

206. *Complex Organizations*

Mr. MARSH.

An analysis of the development, structure and operation of complex organizations. Comparisons of organizations in relation to type (industrial, governmental, educational, military, etc.), and to social, cultural, technological and other settings. Theories of and research methods in bureaucracies. Offered in alternate years.

207. *Theories of Modernization*

Messrs. EVANS, MARSH, and RUESCHEMEYER.

A consideration of various theories of modernization. The extent to which changes in aspects of social, cultural, and personality systems can be systematically related to levels of societal modernization. Empirical analyses of modernizing societies in East and Southeast Asia, and comparison of these with the earlier modernizing Western societies. Offered every year.

208. *Social Movements*

The STAFF.

Development of a sociological frame of reference for the analysis of the causes, careers, and impact of social movements in society. Case studies of types of movements: political, religious, millenarian. The relationship of social movements to social change. Offered in alternate years.

209. *Culture and Social Structure*

Mr. RUESCHEMEYER.

An analysis of the interrelations of religious ideas, value patterns and various forms of knowledge on the one hand, societal structures and changes as well as those organizations and roles most immediately concerned with the different aspects of the cultural system on the other hand. Offered in alternate years.

210. *Social and Political Aspects of Community Organization*

Ms. SILVER.

An analysis of the sociological bases of power, political organization, and decision-making in U. S. cities. Offered in alternate years.

212. *Households and Families*

Ms. KOBRIN.

Will review the important sociological, economic, anthropological, and historical research on the impact of demographic change on family structure, and the effect of family processes on demographic behavior. Emphasizes that one must study the family to better understand demographic processes.

213. *Health, Illness, and Medicine in Social Context*

Mr. WESSEN.

A critical examination of the influence of social and economic factors on the development of concepts of health and illness and on patterns of medical intervention. Assessment of the implications of the expanding jurisdiction of medicine; the relationship between work and health, power and disease-labeling; issues in social epidemiology; conflicting claims concerning the effectiveness of modern medicine; and alternative modes of care. Medical intervention will be viewed from the perspective of the client; evaluation of the benefits and liabilities of becoming a patient and participating in the medical care process will be emphasized.

214. *The Metropolitan Community*

Mr. MEYER.

Examination of the major theoretical and empirical literature on ecological structure and dynamics of metropolitan regions in developed and less-developed nations. Particular focus on residential choice and mobility, residential structure and dynamics, and land use dynamics. Offered in Semester I, alternate years.

215. *Socio-Economic Analysis of Development*

Messrs. MORRIS, MARSH, and RUESCHEMEYER.

This course follows Sociology 207. It brings together economic and sociological perspectives on the problems of development. Sociological and economic approaches are compared. Specific topics include problems of conceptualization and measurement, entrepreneurship, capital accumulation, labor force utilization, income distribution, the role of the state, and the impact of international economic relations on developing countries. Prerequisite: students are expected to have taken the equivalent of a basic undergraduate micro-macro economics course or must obtain consent of the instructors.

216. *Systems of Cities and Development*

Mr. MEYER.

Long term dynamics of systems of cities in developed and less-developed nations. Examination of the role of intermediaries such as financial institutions and corporations in integrating systems of cities. Topics include mercantile/colonial systems, dependency and urban systems, and urban-regional development policy. Offered in Semester I, alternate years.

217. *Topics in Societal Analysis*

The STAFF.

Offered irregularly, topics vary with instructor.

218. *Population Growth and Economic Development*

Mr. GOLDSCHIEDER and Mr. ROCKETT.

The relation between population growth, natural resources, and economic change both in developed and in underdeveloped countries; the problems of economic and social development including optimum rural-urban growth and manpower utilization. Offered in alternate years.

219. *World Urbanization*

Mr. GOLDSTEIN.

Attention is given to the rapid rate of urban growth in the developing countries and the factors responsible for this. The social and economic consequences of rapid urbanization are considered. Comparisons are drawn between the experience of the developing countries and the earlier experiences of the industrialized world. Offered in alternate years.

221. *Field Research in Community and Organizational Settings*

The STAFF.

Methods of field research in community and organizational settings. Operationalization of theoretical constructs in field settings and identification of sociological questions underlying practical concerns. Students will engage themselves with the formulation of research problems within the context of community and organizational settings, especially those related to the delivery of health services. Offered in alternate years.

222. *Advanced Quantitative Methods of Sociological Analysis*

Mr. ELLIOTT.

The course primarily covers statistical methods not included in Sociology 200 and 201. The emphasis of the course will be on the analysis of discrete data, including two-way contingency table analysis, measures of association, loglinear models for analysis of higher order contingency tables, methods of estimation of parameters, handling of incomplete tables such as social mobility tables. Prerequisite 201. Offered every year.

223. *Techniques of Demographic Analysis*

Mr. GOLDSTEIN.

Procedures and techniques for the collection, evaluation, and analysis of demographic data; census and vital registration systems; measures of population composition and of fertility, mortality, and migration; construction of life tables, population estimates and projections. Offered every year.

226. *Selected Topics in Sociological Statistics*

Offered irregularly.

226A. *Advanced Computer Programming in Sociology.*

The STAFF.

Prerequisite: Sociology 242 or consent of the instructor.

226B. *Stable Population Theory*

Mr. POTTER.

226C. *Factor Analysis*

The STAFF.

Prerequisite: Sociology 222 or consent of the instructor.

226D. *Epidemiology*

Mr. WESSEN.

226E. *Analysis of Deficient Demographic Data*

Ms. ANDERSON.

226F. *Ethnicity*

Mr. GOLDSCHIEDER.

226H. *Comparative Analysis of Health Care Systems*

Mr. WESSEN.

A comparative analysis of the similarities and differences in the ways various social systems respond to a common human need—the maintenance of health. Health care needs and resources in major areas of the world, “traditional” and “modern” health care systems in the Third World, comparative analyses of major types of health care organization: the “free enterprise,” “mixed” and “socialistic” models in developed and developing countries. The roles of international organizations and national policies in International Health. Convergence theory and the organization of medical care.

228. *Urban Institutions and Organizations*

The STAFF.

The development and structure of urban institutions and organizations (the police, educational, and public welfare groups), in their relationship to social, political, and economic systems. Offered in alternate years.

230. *Social System Theories*

Mr. MARTEL.

An intensive study of the works of Karl Marx and Talcott Parsons and of current sociological works deriving from them. The course will take up current issues between Marxian and functionalist theorists and seek to specify empirical ways of clarifying them. Changing emphasis in works and issues stressed in alternate years.

231. *Health Institutions and Professions*

Mr. BROWN.

Based on concepts, perspectives and relations of health care developed in Sociology 213, this course focuses on the structure and operation of health professions and institutions. The course begins with the social-historical development of clinics, hospitals, and other health care locations. Next, the training, socialization, and practice of physicians and nurses is studied. These first two areas then combine to inform a study of the social structure of the modern hospital. To further explain the health care system, its political-economy is explored. Finally, solutions are examined, including organizing by health workers and health consumers for better care, as well as alternative structures in socialist countries. Sociology 213 is strongly recommended as a prior course. Offered in alternate years.

232. *Migration*

Mr. SPEARE.

A review of the major patterns and differentials in international and internal migration in a cross-cultural perspective. Particular emphasis is placed on theoretical models of migration. Offered in alternate years.

233. *Manpower Resources and Labor Force*

Ms. KOBRIN and Mr. SPEARE.

Manpower resources and labor force as sociological variables are considered in an international context. Attention is given to the differential manpower resources available in the developing and the developed countries; the occupational and industrial composition of the labor force; and the manner in which these are related to economic development and population growth. Offered in alternate years.

235. *Historical Demography*

Ms. ANDERSON and Ms. MILLMAN.

This is a critical study of the major work and the outstanding research questions in historical demography and the most appropriate methods for investigation of these questions. Most examples are drawn from Western Europe, although materials from Russia, Japan, and the former British Empire in Asia will also be considered. Students with a background either in demography or in social history are welcome. Offered in alternate years.

236. *Fertility*

Messrs. GOLDSCHIEDER and GOLDSTEIN.

Comparative analysis of levels and trends in fertility in developed and developing countries with special emphasis on social and economic differentials and on determinants and consequences. Offered in alternate years.

238. *Mortality and Morbidity*

Mr. POTTER.

Analysis of levels and trends of mortality and morbidity with special emphasis on social-demographic and economic differentials. Offered in alternate years.

239. *Population Policy and Control*

Ms. MILLMAN.

An examination of the formal and informal programs and practices which influence the determinants of population size and distribution, i.e., mortality, fertility and migration. Attention will be given to the potential role of technological development and institutional changes in affecting rates of population growth. Offered in alternate years.

240. *Ecological Study of the Community*

Mr. ZIMMER.

An evaluation of the concepts of human ecology and their application to the interrelationships of population, environment, technology and organization in the community setting. Offered every year.

241. *Mental Health Institutions and Providers*

Mr. BROWN.

The social history of mental health concepts, treatment, and the professions provides a foundation for studying sociological analyses of the mental health system. Particular emphasis is placed on community mental health, deinstitutionalization, public-private service mixes, and other recent policy directions. Attention is also paid to issues of law and psychiatry, particularly mental patients' rights and the relation between prison and mental hospital populations. Various forms of alternate treatment methods and system organization are studied. Offered in alternate years.

242. *Computer Applications in Sociology*

The STAFF.

Basic knowledge of computer usage for social sciences. Use of social science packaged programs. Introduction to job control language, FORTRAN programming, use of terminals. Offered every year.

246. *The Impact of Metropolitanization: Special Topics*

The STAFF.

An evaluation of the effects of increasing metropolitanization on population distribution and composition. A synthesis of demographic and metropolitan area research and theory. Offered in alternate years.

248. Biometrics of Human Fertility

Mr. POTTER.

Construction and application of probability models and computer simulation to the study of human reproduction. Offered in alternate years.

250-251. Teaching Practicum in Sociology

The STAFF.

Each student will be assigned to a faculty member to serve as an apprentice teacher in an undergraduate sociology course. During the course of the year the student will assume increasing responsibilities in all phases of course work, including direction of section meetings, giving lectures under supervision, preparing examinations, and reading reports and examinations. Offered every year.

291, 292. Reading and Research

The STAFF.

Work with individual students in connection with special reading, research, and preparation of dissertation. Offered every year.

Theatre Arts

Professors BARNHILL,¹ WILMETH (Chairman); Associate Professors BASS, EMIGH; Assistant Professors COLYER (Visiting); Lecturers, Ms. DONER, Ms. DUNBAR, Mr. FRANCE (Visiting, Semester II, 1982-83), Ms. HIMMELBERGER, Mr. LUCAS, Ms. STRANDBERG, Ms. TANNENBAUM.

UNDERGRADUATE PROGRAM

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

The Department of Theatre Arts offers a concentration which combines study of dramatic literature, theatre history and studies and studio work in the various theatre arts. The aim of the concentration is to teach students to develop independent perspectives by means of practical, historical, and theoretical studies of dramatic procedures. An essential of the program is the engagement of the student in dramatic performance (acting, directing, stage design, dance, etc.) in order to help him or her to arrive at a total experience of the relationship between theatre and drama. Enrollment in the concentration will be limited to those students distinguished by their seriousness and sense of purpose. The concentration advisor will be assigned to the individual student by Professor Wilmeth, depending on the student's main focus. The concentration draws heavily from course offerings throughout the University, especially courses in dramatic literature, semiotics, and playwriting. The 12 course requirements of the concentration are:

- A. Theatre Arts 123-124 (to be taken prior to semester VII); Theatre Arts 23; Theatre Arts 25.
- B. Four courses in dramatic literature, theory, criticism, or history.
- C. Theatre Arts 152 (to be taken semester VII).
- D. Three additional courses determined in consultation with the assigned advisor on the basis of the student's primary area of emphasis (general theatre study, acting/directing, technical theatre/design, playwriting, dance or theatre/speech).

Honors. The standard pattern above, including Theatre Arts 152. Additionally, candidates will prepare an Honors thesis (Theatre Arts 199), the topic of which should be determined before semester VII. Candidates for the Honors program should apply to the Department by semester VI. The Honors advisor is John Emigh.

¹ On sabbatical leave, 1983-84.

GRADUATE PROGRAM

MASTER OF ARTS. For admission to graduate work for the Master's degree in Theatre Arts, a prospective student must present a completed bachelor's degree or equivalent, with a background in dramatic literature and theatre arts. Other desirable foundation subjects include: speech, fine arts, music, philosophy, psychology, history, and literature.

A minimum of eight courses of graduate-level work in residence is required for the degree. (A student admitted provisionally may be required to present more than the minimum eight courses or to make up deficiencies at no degree credit.) Six courses in the area of theatre study and dramatic literature are required. The remaining two courses may be in performance, design, or playwriting, depending on the student's particular area of scholarly or artistic specialization.

Normally the degree requires completion of a Master's thesis. (One course of the eight required for the degree may be a thesis research course.) The thesis normally grows out of research in an advanced course and demonstrates a lucid and responsible piece of scholarship or criticism. In some cases, a student may be allowed to take a degree program without a thesis. The student who does not submit a thesis is required to complete ten courses rather than eight, which may require a third semester of residence.

A candidate for the Master's degree should show reading competence in one modern foreign language (preferably French or German).

Course Requirements for the A.M. degree

The candidate is required to demonstrate an understanding of the basic principles and practices of design and technical theatre, either by satisfactory completion of Theatre Arts 25, taken without credit during the first semester of residence, or by satisfactory performance on an oral or written exam to be taken at entrance to the program. A student whose undergraduate record indicates satisfactory performance in a course equivalent to Theatre Arts 25, or who can present other evidence of adequate expertise and experience, may be exempted from Theatre Arts 25 and the exam.

The student must demonstrate an understanding of the principal theories and methods of acting. This requirement may be fulfilled either by Departmental approval of evidence of study and experience in acting, or by satisfactory completion of Theatre Arts 23, taken without credit during the first semester of residence.

The student will take Theatre Arts 123-124, unless the undergraduate record indicates that he or she has taken two courses or their equivalent in the History of the Theatre.

1. PRIMARILY FOR UNDERGRADUATES

6. *Introduction to Dramatic Writing*

Mr. BASS.

The creative process of dramatic writing for beginning playwriting students interested in studying form and structure. Exercises and techniques for the development of craft and critical skills are included in a method of study that will result in the completion of an original play script. Written permission. S/NC.

12. *Advanced Playwriting* (English 12)

Interested students should register for English 12.

14. *Persuasion and Argumentation*

Ms. DUNBAR.

Designed to introduce students to basic concepts in the theory of argumentation and will explore the uses of argumentation in our society. Argumentation concepts will be drawn from a variety of classical and contemporary theorists. Particular attention will be given to the use of argumentation as a tool for decision-making in deliberative (policy), legal and scientific settings. Opportunity to employ theoretical concepts in practical argumentation. Written permission required.

21. *Voice for the Actor*

Ms. TANNENBAUM.

Combines the traditional study of voice and diction (including phonetics) with the Linklater technique for freeing the natural voice. Monologues and speech work will be from Shakespeare. Attendance is mandatory. Section 1 in Semester I and II is designed for general voice improvement and analysis. Permission required. S/NC

22. *Persuasive Communication*

Ms. TANNENBAUM and Ms. DUNBAR.

Provides skills and helps to develop confidence in public speaking through oral presentation of persuasive speeches. Additional topics covered include rhetorical criticism, audience analysis, and attitude change. S/NC. Attendance is mandatory. Permission required.

23, 24. *Play Production*

Mr. BARNHILL.

Focus on the elements of dramatic analysis and interpretation as applied to the art of acting. Monologues, scene study, and improvisation are the basis for comment on individual problems. Projects and extensive reading of dramatic literature. Substantial commitment necessary for preparation of class scenes. Eight hours of attendance. In special cases, the course may be repeated. Enrollment limited to 25 with a maximum of 5 freshmen in each section. Written permission required. S/NC.

25, 26. *Technical Production of Plays*

Mr. LUCAS.

Sem. I: Scene Design and Technical Production. A beginning survey of theatrical design considerations coupled with extensive ground work in scenic construction. Emphasis is laid on communication of ideas through scenographic techniques. Lab required. Written permission required. S/NC. Mr. Lucas and Mr. Schrader. Sem. II: Stage Lighting. A detailed study of materials and methods of lighting design based on technical knowledge of equipment and established procedures. Lab required. Written permission required; 25 is normally a prerequisite to 26, but arrangement possible with consultation. S/NC.

31. *Beginning Modern Dance*

Ms. STRANDBERG and STAFF.

One and one-half hours of class, four days a week. Prerequisite: attainment of an intermediate level in any dance technique. Course limited to 40. Written permission required. S/NC.

32. *Dance Composition and Choreography*

Ms. STRANDBERG and STAFF.

Prerequisite: Some experience in dance composition or dance choreography. Written permission required. Course limited to 40. S/NC.

66. *Introduction to Cinematic Coding and Narrativity* (Semiotics 66)

Interested students should register for Semiotics 66.

71. *Introduction to Filmmaking* (Semiotics 71)

Interested students should register for Semiotics 71.

91. *Study at RISD*

Eligible for consideration for credit are courses in beginning architecture, apparel design, patterning, water color, and graphics. Specific courses cannot be named until after RISD catalog is issued. A list of courses approved for cross-registration will be posted in the Registrar's Office and the Theatre Arts Office. This credit is only valid for Theatre Arts concentrators. S/NC.

II. FOR UNDERGRADUATES AND GRADUATES**100. *Intermediate Dance and Movement for the Theatre***

Ms. STRANDBERG and Ms. DONER.

Designed to expand the student's knowledge of and proficiency in dance as an art form. Theatre Arts 31 or the equivalent is required. Mainly a studio course, but selected readings, papers, critiques, and field trips are important components of the course. Permission required. S/NC.

102. *English Composition: Drama* (English 102)
Interested students should register for English 102.

119, 120. *Play Production, Advanced Course* Mr. EMIGH.
For qualified graduate students and undergraduates who offer Theatre Arts 23, 24 or the equivalent as a prerequisite. Written permission required. Sophomores are discouraged from applying for this course; concentrators and upper-classmen will be given primary consideration. S/NC.

122. *The Development of the American Theatre* Mr. WILMETH.
From Colonial Times to 1915. The course concentrates on theatre production, actors, business management, architectural styles and changes, and styles of acting. Suggested for concentrators in Theatre Arts, American Civilization, and American literature. Written permission required.

123, 124. *A History of European Theatre* Mr. WILMETH.
Sem. I: The theatre and the theatre arts of ancient, Medieval, and early Renaissance Europe (England and Italy). Written permission required. Mr. Wilmeth. Sem II: The European theatre and theatre arts from the Renaissance to the early twentieth century, with special reference to the English theatre. Written permission required.

125. *Non-Western Theatre and Performance* Mr. EMIGH.
This course will concentrate on selected ritual and theatrical traditions of India and Indonesia with some attention given to related forms in East Asian, Oceania, and Medieval Europe. Connections with contemporary theatre practice in the West will also be stressed. Recommended for Anthropology, Religious Studies, Ethnomusicology, and Semiotics concentrators as well as Theatre Arts concentrators.

126. *Origin and Development of Popular Forms of Entertainment* Mr. WILMETH.
Major forms of English and American Popular entertainment are included, such as circus, carnival, dime museum, wild west show, medicine show, vaudeville, music hall (English), British pantomime, minstrel show, burlesque, and popular theatre. Interview and permission of instructor required.

127. *The Lyric Stage, 1600 to the Present* Mr. LUCAS.
An examination and analysis of the history, style, content, and staging of opera, operetta, ballad opera, and musical comedy with an emphasis on the fluctuating relationships between the theatrical and musical aspects of each production. Written permission required.

128. *Topics in Theatre Studies*

128A. *Rhetorical Foundations of Human Communication* Ms. DUNBAR.
Communication analysis using the rhetorical theories of contemporary and earlier scholars. Readings will consist of selections from the rhetorical theories of Aristotle, Kenneth Burke, Richard Weaver, and others, as well as a variety of critical essays and messages for students to analyze. The course will allow students to understand several humanistic perspectives toward communication, to develop some basic conceptual tools for rhetorical analysis, and to consider the ways in which our symbolic behaviors shape our social lives. Written permission required.

128B. *Dance Styles* Ms. STRANDBERG.
Will concentrate on special modern dance styles and will help students isolate and understand, kinesthetically, the specific contribution of the major forces in the dance field. Permission required. S/NC.

128C. *Choreography* Ms. STRANDBERG.

Designed for those who have had some experience in composition and would like to work, under supervision, on making dances. Prerequisite: 32 or equivalent and some performing experience. Permission required. S/NC.

128D. *History of Clothing and its Relationship to Theatrical Costuming*

Ms. HIMMELBERGER.

A survey of the history of clothing with a strong emphasis on the art and artists influencing each major period and historical and cultural events that have influenced clothing and art. Objective is to give the theatre designer an increased knowledge of research approaches and resources. The application of historical materials to stage worthy costumes will be discussed. Permission required. Lab required.

128E. *Costume Design for the Theatre*

Ms. HIMMELBERGER.

Introduction to the various elements of costume design in relation to other theatre artists will be examined. Research techniques and their application will be stressed. Written permission required.

128F. *Stage Make-Up and Facial Sculpture*

Ms. HIMMELBERGER.

Designed to acquaint the theatre artist with the basic techniques and principles of stage make-up so that creativity of design and execution may materially assist the actor in the development and projection of his character. The course will deal with facial modeling with paint, three-dimensional and prosthetics, facial hair, and hair styling. Permission required. S/NC.

128G. *Broadcast Journalism*

Ms. TANNENBAUM

For students with internship projects approved by the instructor. The course provides an opportunity to explore theatrical and practical elements of broadcast journalism. Attendance is mandatory. S/NC.

128H. *The Production of New Scripts*

Mr. BASS.

A workshop course in which the students explore the problems, responsibilities, and creative challenges of playwright, director, and dramaturg in the rewriting and staging of original unproduced scripts. Seminar sessions are complemented by stage readings of original student plays. S/NC.

131. *Advanced Dance and Movement for the Theatre*

Ms. STRANDBERG.

Designed for dancers who have attained an advanced level in any dance technique. Purpose is to help such dancers come to understand both intellectually and kinesthetically the diversity of one of the few indigenous American art forms: Modern Dance. Written permission required. Course limited to 40. S/NC.

152. *Seminar in Theatre Arts*

Seminar designed primarily for senior theatre arts concentrators, required during Semester VII. Topics will focus on career planning and theatre subjects not dealt with in other courses. S/NC.

163. *Special Topics in Film (Semiotics 163)*

Interested students should register for Semiotics 163.

189. *Independent Reading and Research*

Intensive reading and research on selected topics arranged in terms of special needs and interests of the student. A written proposal must be submitted to the instructor and the chairman of the Theatre Arts Department before the project can be approved. Written permission required. May be repeated for credit. The Staff.

199. *Senior Honors Thesis Preparation*

To be taken by all students accepted into the Theatre Arts Honors Program. Written permission required.

III. PRIMARILY FOR GRADUATES

210. *Seminar in Dramatic Theory*

Mr. EMIGH.

Studies in Western and Non-Western dramatic art. Theatrical theory from Aristotle to Grotowski. Written permission required. Limited to 20. For graduate and qualified juniors and seniors.

280. *Graduate Level Independent Reading and Research*

A program of intensive reading and research on selected topics arranged in terms of special needs and interest of the student. Written permission required. May be repeated for credit.

285. *Master's Thesis Research*

RELATED COURSES

Courses in dramatic literature, offered in other departments, in particular English, Comparative Literature, Classics, French, German, and Italian, and Greek can be taken for credit in the concentration and the Masters of Arts degree in Theatre Arts. Courses should be approved by the staff advisors. Other courses related to theatre may receive credit if approved for concentration.

Urban Studies

A major feature of the history of man in modern times has been the radical change in the pattern of settlement, from rural to urban to metropolitan. The ramifications of this trend have been enormous, generating in this country, a sense of crisis in recent decades. But the social scientific study of this phenomenon has lagged far behind the movement of events. In part, this was due to the pace of events, and in part, it was because the study of urbanization and the problems of urban areas did not fit neatly within the boundaries of a single discipline.

At Brown University, interest in urban problems first manifested itself in the late 1960's with the recruitment of urban specialists in a variety of departments. With the introduction of the new curriculum in 1969, many students sought to develop independent programs of study around the theme of urbanization. Interaction among the urban specialists on the faculty and with these students generated a momentum which ultimately led to the appointment of a Committee on Urban Studies by President Hornig in 1971. Since then, the pace has quickened, and a number of significant developments have taken place which reflect a growing commitment on the part of the administration, faculty, and students to Urban Studies. Additional faculty appointments in Urban Studies were authorized in 1974.

A *standard* concentration in Urban Studies was approved by the Educational Policy Committee in the spring of 1973, and a revised concentration program was approved in the spring of 1975 and is now in effect. Several new courses were introduced into the program. A student organization, The Urban Studies Society, has been formed. Two graduate students petitioned the Graduate Council for approval of a Ph.D. in Urban Studies, and their petitions were granted. Urban Studies faculty also participate in the University's Curricular Advising Program through Special Topics 33, *The Liberal Arts: Context for Urban Studies in Urban Planning*.

The Committee on Urban Studies has stimulated the development of new courses, both departmental and extra-departmental, which deal with urban problems and techniques of analysis. The Committee has also been active in sponsoring seminars and lectures by distinguished academics and practitioners in the urban field. A small working library with

materials relevant to research and career guidance has been developed in Lower Maxcy Hall, Room 8. Periodical reports are issued informing interested faculty and students of recent acquisitions.

The Committee also acts as a clearing house for information on intern programs, part-time, summer, and full-time employment as well as information on graduate and undergraduate programs in Urban Studies and related fields at universities throughout the country and abroad. The Committee encourages and facilitates participation in work-study programs off campus as part of an Urban Studies concentration.

Although Urban Studies is now a standard concentration, much of the flexibility offered by the independent concentration has been preserved. The aim of the concentration program is to expose undergraduate students to the study of urban phenomena through the approaches of different disciplines, thus providing an interdisciplinary context in which to focus on urban policy and problems. Urban Studies is not a discipline—it is a subject matter to be studied. To study it properly it is necessary to bring a number of different specialized disciplines together and have each focus on aspects of the problem appropriate for that discipline. At the same time the interdependence of the different approaches to a common problem must be recognized. Only in this way will the student acquire a full and balanced view of the many dimensions of the urban community and urban life. The problem defies disciplinary jurisdictions, particularly if policy issues are involved.

While the program attempts to have sufficient flexibility to allow students to pursue specific interests without being overly bound by requirements, it nonetheless is designed so that there will be a core content to the program of study. The core content of the program will assure a familiarity with major scholarly approaches to the urban (metropolitan) community, while providing a set of common experiences that will create some sense of cohesion among concentrators and faculty. The attention of the Urban Studies Program is focused on undergraduate teaching and on research. The Program has several objectives. First of all it provides a broad liberal arts education in the Brown University tradition. It is designed to satisfy the needs of those students who are interested in urban problems, but who do not feel well served by the existing departmental programs, which traditionally represent a much narrower point of view.

The following members of the faculty are involved in the Urban Studies Program: Professors B. G. ZIMMER, Chairman (Sociology), and W. JORDY (Art); Adjunct Professor M. FELDMAN (Urban Studies); Professors J. V. HENDERSON (Economics); H. CHUDACOFF (History); Assistant Professors J. MORONE (Political Science); D. R. MEYER (Sociology), H. SILVER (Sociology).

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE

The program requires ten courses for a concentration. Urban Studies 21 (Introduction to the City) or Urban Studies 22 (Urban Politics) is required. The remaining courses are selected from four other course groups:

1. *Research Skills* (one course): either Sociology 102 or an approved statistics course, e.g., Applied Mathematics 165, Mathematics 162, Political Science 60, or Sociology 110.
2. *Core Curriculum* (six courses): A) The disciplines (one course from each of three disciplines) selected from among Art 56 and Art 59; Economics 141; History 175 and History 176; Political Science 22 and Political Science 118; Sociology 130, 133, 154 and 164. B) Urban Studies Core Courses (two courses selected from among Urban Studies 23, 101, 102, 116, 132, 135, and 142. C) An Urban Studies Seminar, Urban Studies 18X.
3. *Complementary Curriculum* (two courses): selected from among American Civili-

zation 152, Art 47, Classics 54, Economics 148, Engineering 90, Engineering 194D, Political Science 147, University 111, and University 163. In addition, any course listed in the above two groups, including any research seminar in an urban studies-related discipline (art, economics, history, political science, sociology, e.g., History 197C or Art 159) not used to satisfy any of the requirements of the above two groups may be used to fulfill this requirement.

Honors. Candidates for honors concentration should apply by midterm of the second semester, junior year. Twelve courses are required of an honors concentrator, including one thesis preparation course in the senior year and the second *research skills* course. To receive an honors degree, the candidate's thesis and course record must be of outstanding quality.

I. PRIMARILY FOR UNDERGRADUATES

21. *An Introduction to the City* Mr. ZIMMER.

This is an introductory course designed primarily for students planning a concentration in Urban Studies. It will examine the growth of cities and the development of metropolitan areas in the 20th Century. The social, economic, and political consequences of the urbanization process will be emphasized.

22. *American Urban Politics* (Political Science 22) Mr. MORONE.

Analysis of politics and government in large American cities. Topics include power and leadership, political organization and participation, bureaucracy, community organization and public policy-making.

23. *A Case History of a Social Invention: Urban Renewal* Mr. FELDMAN.

This course will examine how the Urban Renewal Program has defined the conditions for the redevelopment and conservation of communities participating in the program. The course aims to examine the Urban Renewal Program's history and current operations. This will be done by: a) formal lectures; b) a class project; and c) student preparation of a research proposal dealing with a renewal-related topic of their choice.

56. *Nineteenth-Century Architecture* (Art 56) Mr. JORDY.

European and American developments in architecture contributing to the modern movement.

59. *Twentieth-Century Architecture* (Art 59) Mr. JORDY.

European and American developments in modern architecture to the present.

II. FOR UNDERGRADUATES AND GRADUATES

101. *Fieldwork in the Urban Community* Mr. FELDMAN.

Examination of theoretical and classroom experience in the context of practical situations by working in a community agency or organization. Students must devote a minimum of six (6) hours per week to the community organization and attend weekly seminar meetings with the faculty sponsor. A final, analytical report will be required. Written permission required.

102. *Issues in the Development of a National Urban Growth Policy* Mr. FELDMAN.

The principal topics covered by the course include: the emergence of national urban issues in Post WWII U.S.; the interrelationships of local, state and federal efforts addressed to those issues; an analysis of various kinds of planning approaches ("master", development, project, incremental) as applied to urban issues; and the current status of national urban policy in the United States.

116. *The Modern Corporation and Metropolitan America*

Mr. MEYER.

(1) A detailed analysis of how the modern, large-scale corporation operates and how its activities crucially affect metropolitan areas. Particular attention will be given to its impact of corporate decisions and relocations on urban policy, job markets, residential patterns, and problems of urban government. Will use empirical data derived from current research. (2) Will examine various theoretical perspectives relating behavior of corporations to urban impacts; will analyze empirical material on major metropolitan areas which is just now becoming available; intensive focus on several case studies. (3) Will emphasize extent to which corporate activity significantly affects metropolitan areas, a topic which is currently neglected.

118. *Federalism and Urban Public Policy* (Political Science 118)

Mr. MORONE.

Examination of urban public policy formation and implementation in the context of inter-governmental relations in the United States. Topics include theory and history of federalism in the U. S., organizational and political determinants of national urban policies, mechanisms of interest aggregation and representation at the local level, and evaluation research. Case studies of urban policies will be used.

130. *Urbanization in World Perspective* (Sociology 130)

Mr. MEYER.

The transition from a rural to an urban society. Changes in the social and ecological organization of rural and urban sectors of modern and modernizing societies. Problems associated with rapid urban growth, rural decline, and rural-urban migration.

132. *Urban Housing in the United States*

Mr. FELDMAN.

The course will examine "housing" as a series of institutional practices involving individuals in the design, financing, development, management and control of housing. The context for these institutional practices will be a review of the housing issues which have emerged and the housing programs which have been employed in the United States from the mid-1930's into the 1980's.

133. *The Metropolitan Community* (Sociology 133)

Mr. MEYER.

Dynamics of system of cities and internal urban systems. The system of cities includes the rise of metropolises from mercantile beginnings to industrialization and rise of financial institutions and corporate head offices. Relation of specialized industrial cities and central places to metropolises. The internal urban system considers the ecology of metropolitan region: residential mobility, change in residential ecology, commercial and industrial land use, and changes in land use system. Selected policy questions are examined.

136. *Social Change and Social Policy* (Sociology 136)

Ms. SILVER.

The various theories of social change together with a consideration of their implications for accurate forecasting and prediction in the service of planning and social problem solution. Special emphasis on the analysis of recent social trends on both the societal and community levels as a basis for dealing with such contemporary social problems as population growth, race relations, economic welfare, and poverty.

140. *Political Sociology* (Sociology 140)

Ms. SILVER.

A study of the social bases of political behavior. Social and psychological forces that help to determine political beliefs, political processes in complex organizations, and political participation including voting and other forms of political behavior.

141. *Urban Economics* (Economics 141)

Mr. HENDERSON.

An analysis of the growth of metropolitan areas with special emphasis on the spatial distribution of population and employment within such areas. The following urban problems and their associated policy issues are developed in detail: congestion, pollution, poverty, housing, governmental structure, and the fiscal crisis of local government.

142. *Topics in Urban Economic Policy*

Mr. HENDERSON.

This course is designed for either Economics or Urban Studies concentrators. The course will examine public policy in an urban area in terms of goals or reasons for the policy, whether the policy is likely to attain those goals, and what alternative policies might be. A major emphasis will be placed on presenting data on government policies and examining the data. Policy areas include housing, poverty, environment, revenue sharing, and the property tax.

154. *Human Needs and Social Services* (Sociology 154)

Mr. BROWN.

The development of human services provided by societies for their members. Welfare and medical systems in the U. S., with selective comparisons with other countries. The growing importance of both bureaucracy and professionalism in health and welfare institutions, and differential access to their services by men and women in various age groups and social classes. Alternative models of human service systems, and various critiques of present approaches.

164. *Social Inequality* (Sociology 164)

Ms. SILVER.

To what extent, and under what conditions, can social inequality be reduced or eliminated? Distinctions between equality of ability, equality of opportunity, and equality of rewards will be drawn and their implications explored, in the perspective sociological theory and research in our own and other societies, both present and past.

175, 176. *American Urban History* (History 175, 176)

Mr. CHUDACOFF.

This course will examine the urban dimension of American history. It is both a survey, covering a period from colonial times to the present, and a specialized focus, placing the city in its historical context and exploring American history from an urban frame of reference. It will divide around 1850 or 1860, the watershed between the old "walking" city and the modern, mechanized city.

187C. *Urban Planning and Public Policy*

Mr. MEYER.

For juniors and seniors who are pursuing concentration in Urban Studies. The seminar will examine the internal development and the external expansion of cities in terms of public policy. Topics to be discussed include inner city revitalization, zoning, transportation, and the preservation of open space.

187I. *Social Welfare Policy and U. S. Cities*

The STAFF.

For juniors and seniors who are pursuing concentration in the Urban Studies. This seminar will examine social welfare policies at the federal level—e.g., AFDC/Social Security, other cash transfer programs, proposals for income maintenance—and how these relate to the social structure of cities. Topics covered will include welfare reform, guaranteed income versus other income maintenance programs; unemployment, underemployment, and the working poor; income equalization proposals. A research paper will be required.

188. *Seminar: Topics in Urban Public Policy*

Mr. HENDERSON.

This is a seminar course for juniors and seniors pursuing a concentration in Urban Studies. The course will examine empirical studies in the areas of housing, industrial structure, fiscal federalism, transportation, environment, and migration. The emphasis will be on an economic interpretation of the data as it relates to urban areas. Various articles, books, and government documents will be studied. Students will be required to do their own projects. By the end of the course students should know how to read and interpret empirical studies and data, what types of questions to ask, and the basics of how to go about doing their own empirical studies.

190, 191. *Independent Reading and Research*

The STAFF.

A specific program of intensive reading and research will be arranged in terms of the special needs and interests of the student. Open primarily to concentrators, but others may be admitted by permission of instructor.

III. PRIMARILY FOR GRADUATES

210. *Social and Political Aspects of Community Organization* (Sociology 210)

Ms. SILVER.

An analysis of the sociological bases of power, political organization, and decision-making in U. S. cities. Offered in alternate years.

Extra-departmental Courses

SPECIAL THEMES AND TOPICS¹

In recognition of the fact that in an intellectually creative atmosphere unforeseeable ideas for new kinds of courses may and should arise, the category "Special Themes and Topics" is specifically designed for course offerings that do not fit within any other existing category. Courses originate with individual instructors and are retained in the curriculum only so long as these instructors wish to teach them.

I. PRIMARILY FOR UNDERGRADUATES

21 *Strategies of Survival: Modern Jewish Society and Politics*

Mr. ZUCKERMAN.

The last century has witnessed profound changes in Jewish society and politics. In 1870, the bulk of world Jewry lived within the confines of the Russian Empire's Pale of Settlement. There, and most everywhere else, for well over a millenium, Jews were "tolerated". They were a people living alongside of, but apart from the general society, facing traditional forms of discrimination. Modernization and Enlightenment as well as the Nazi nightmare ended this forever. Jews and Judaism became a "Problem," with many answers. Between 1890 and World War II, 5 million Jews left Eastern Europe for points west and south. During the war, the Nazis and their helpers destroyed six million and terrorized three million other Jews. During this period and later, well over a million moved to Israel to establish the first Jewish polity in nearly two thousand years. The massive changes cover more particular ones: Jews formed political parties; they changed jobs, they altered their religious beliefs and their families. They adapted to new societies in all parts of the globe, but were most profoundly caught up in the developments in the United States and the Soviet Union. They left old societies, in the Middle East and North Africa, as well as Europe.

The course seeks to analyze how Jews responded to these changes. At its center are a set of general topics: Jews in traditional Europe; European modernization and the Jewish Question; the Holocaust and its aftermath; and the experiences in America, the Soviet Union and Israel.

The course will apply the tools of social science to the study of Jewish society and politics. Readings include general histories and detailed studies of particular events and novels and autobiographies. Students will do class presentations and research projects under the guidance of the instructor.

¹ See also Special Themes and Topics/Seminar Courses (page 481) and Special Themes and Topics/Foundation Courses (page 484).

22. *Islamic Communities: Culture and Ideology in Asia and North Africa*
(Anthropology 104).

Ms. FRUZZETTI

This course will examine Islamic religious beliefs and practices in two geographic areas, Asia and North Africa. The central focus of the course will be the concept and identity of Islamic communities in Arab and non-Arab environments. We will question what label "Muslim" signifies to the many societies in the Asian subcontinent as well as define cohesive Muslim ethnic groups in relation to local non-Islamic cultural and political influences.

Some of the major issues that the course will consider relate to the permanent (Islamic) and changing local (cultural) self-definition of the communities in question. Broad questions of "sacred" and "secular" religious perspectives are not sufficient guidelines for an understanding of Islam and social structure. For an ethnic Muslim group social and cultural considerations and adaptations are best analyzed through a clear separation of "culture" and "religion" (din). Such a duality exists in everyday life and is clearly exemplified on the levels of family, kinship relationships, rituals (cultural and religious) and so forth. Thus, through a comparative consideration of the varied levels of the socio-political aspects of specific societies we will arrive at the ways groups formulate their Islamic identity (Arab or/and Indian or other cultures) and at the central symbols through which these groups organize their lives. We aim at a clear understanding of what constitutes the definition of "Muslim" in India, Bangladesh, Malaysia, Tunisia, Sudan or Morocco.

The comparative approach the course takes for its methodology is useful in highlighting the above concerns. Islam (as a religion) transcends nations and lends meaning to everyday experience and actions. Throughout the course we will concentrate on the abstract notion of the Umma Muslima (Muslim nation, identity, brotherhood) within culturally diverse groups. Islam makes allowances for cultural differences (Arab vs. Indonesia, Pakistani) on the level of *adat* (custom, culture, tradition) as long as culture does not contradict the basic fundamental beliefs of the Islamic faith. The course aims to demonstrate how this can be accomplished making it possible to talk about Muslim, Chinese, Saudi and other Muslims.

23. *Language Diversity: The Social Function of Variation and Correctness in Human Language*

Mr. MESKILL

The function of language is to convey information. However, in the context of a work-a-day interaction, language also communicates social status and role-function, formality and intimacy, regional and educational background, and often ethnicity. Major questions to be addressed are: How and why?

With a minimum of technical jargon, we will explore the interface of the disciplines of education, linguistics, psychology, and sociology. Topic areas to be addressed will include: 1) formality and intimacy; 2) status and social class; 3) regional dialects; 4) sex differentiation in language usage; 5) ethnic variation: Black English, a case study; 6) tapping psychological attitudes and responses to language variation; 7) internal and external causes of languages change over time; 8) shibboleths and our modern "Judges over Usage", 9) dimensions of correctness and value judgements; 10) education and the "language deficit theory"; 11) manipulations of language: advertising and propaganda; 12) language planning.

Evaluation of students will be on the basis of a) preparedness and participation in discussions, b) brief quizzes, c) a class project, and d) a final research paper.

27. *Social Issues in Biology*

Ms. FAUSTO-STERLING and Mr. FAUSTO.

Examines biological theory and social policy both from an historical and a current viewpoint. Emphasizing (1) the biological theories involved, (2) a critique of the notion of the culture-free, neutral scientist, and (3) an examination of the relationship between sup-

posedly non-applied biological research and social policies in arenas as diverse as criminology, immigration, education, marriage laws, and workers' health and safety. S/NC.

31. *Parables and Paradoxes: The Limits of Language and the Redescription of the Self* (Religious Studies 88A) Mr. STOWERS.

For course description, see Religious Studies 88A.

36. *The Hospital, Perspectives on a Social Institution* Ms. MONTEIRO.

This course will focus on the modern hospital as an integrating part of and perhaps the center of the health delivery system in the United States. It will use a behavioral science orientation to examine the hospital as a social structure through the study of sociological and literary works on the hospital and through optional observation in the hospital.

37. *The Biology of Gender* (Biomed 36) Ms. FAUSTO-STERLING

This course examines the question of gender. We will consider (1) the phenomenon of sexual dimorphism, (2) genetic and embryological causes of sex determination, (3) sex reversal in non-human vertebrates, (4) the evolution of sex differences in non-human vertebrates and (5) the development of gender differences in humans. In the last part of the course we will investigate critically the claim that particular behaviors or capabilities are associated with hormonal or genetic differences between the sexes. The goal of the course is to teach the basic principles of scientific analysis and to provide the necessary background to use them in investigating an exceedingly complex aspect of human existence. Prerequisite: written permission of the instructor and an introductory course in *one* of the following areas: biology, sociology, psychology, or anthropology. S/NC.

38. *Women, Work and Family* (Anthropology 14) Ms. LAMPHERE.

An introduction to broad issues concerning the relationship between work and family life with an emphasis on women's roles. Using data from anthropology, history and sociology, the first part of the course will focus on 19th and 20th century U. S. experiences. Later segments of the course will deal with the experiences of women in selected ethnic groups (European immigrant women, Blacks, Hispanics, and Native Americans) as well as with the relationship between women, work, and family in Latin American countries.

- 39, 40. *Studies in World Interdependence* Mr. BARNES and STAFF.

An effort will be made through this course to lay certain groundwork for possible further studies in the form of independent concentrations in World Interdependence.

However, regardless of area of concentration this core course is directed to all undergraduates. It will consist of a series of two-week periods, each devoted to a different subject and presented by one or more members of the faculty involved in that field. There will be three lectures and one discussion period each week.

Subject areas will be: World resources and climate; Human origins, nature, and cultures; Language and communication; Political tensions, Non-Western art and its meanings; Technology and agriculture in non-Western countries; Philosophies of East and West; Global economic problems; Population predicament; Environmental problems; Energy; Ethnocultural friction; The rich and the poor; Search for human unity.

It is hoped that through these orientations, followed when desired by independent study, it will be possible for students to begin a growing understanding of various aspects of the critically unstable world of today.

A Committee will also be available for consultation with and in a number of ways for support of students interested in individual, independent concentrations in World Interdependence.

43. *The Far Side of the Old World: Perspectives on Chinese Culture* Ms. LEVY.

49. *Under the Double Eagle: The Culture of Hapsburg Europe*

Mr. SCHNERR.

The Hapsburg dual monarchy, considered an anachronism by its own subjects, included elements from the three major language groups of Europe (Germanic, Romance, Slavic). Even if it did succumb to national and social conflicts, this plurinational state left a permanent imprint in the culture of Europe, and current nostalgia for this state attests to disillusionment with nationalism. This is a cultural study of the final decades of Hapsburg, based on writers of world renown (Schnitzler, Kafka, Werfel, Musil, Svevo), the emergence of ideologies (Otto Weininger, Theodor Herzl, Adolf Hitler), and the unparalleled flourishing of the performing arts (Strauss, Mahler, Schoenberg, Hermann Bahr, Max Reinhardt). Since Viennese culture always has been eminently theatrical, the course emphasizes not only the analysis of major literary works (in terms of the prevalent sense of decadence), but also music and drama (in terms of the persistence of the Baroque tradition). Lecture, slides, music, one research paper, course conference, but no final examination.

51. *Human Adaptability*

Mr. GOULD.

The nature and limits of the adaptability of the human species as shown by anthropological evidence and theory. Will draw upon all major subdisciplines of anthropology (i.e., physical anthropology, archaeology, social-cultural anthropology, and anthropological linguistics). How can we account for present-day variability in human behavior? And what are the biological and cultural origins of this variability? These are the basic questions to be addressed under the following units or subheadings: I. HUMAN BEGINNINGS. Background to human evolution, primates and primate behavior, fossil hominids, the origins of human culture. II. THE HUMAN CAREER. The emergence of modern man (*Homo sapiens*), the evolution of human culture and geographic spread of man, early plant and animal domestication, settled life and civilization. III. PRESENT-DAY VARIETIES OF HUMAN ADAPTATION. Hunters-and-gatherers, herdsman, slash-and-burn farmers, intensive food-producers. IV. HUMAN NATURE IN A CROWDED WORLD. Anthropological views of selected topics of current interest; war, conservation, population vs. resources, development and underdevelopment, etc. Tentative reading list: *Early Man*, F. Clark Howell; *The Emergence of Man*, John Pfeiffer; *The Birth of Civilization in the Near East*, Henri Frankfort; *The Year of the Gorilla*, George Schaller; *Habitat, Economy and Society*, C. Daryll Forde.

53. *The Image of the Shtetl in Yiddish (and other Eastern European) Literature*

Mr. WARNOCK.

The *shtetl*—the Eastern European Jewish or partly—Jewish small town—was the subject of passionate and vastly divergent portrayals in Yiddish literature of the nineteenth and twentieth centuries. At the one extreme it was sentimentalized for memories of years in the *kheder*, warmth of the family and preparations for the holidays, as a haven in a largely hostile gentile world; at the other it was ridiculed for its poverty, ignorance and the narrowness of spirit that it was felt to engender. Course work will involve the rapid reading of prose writings by a number of Yiddish authors. We will examine these for their varying views of *shtetl* life and, through some non-fictional readings, try to understand the changing historical and social conditions that account for them. Authors to be treated include: Sholem Asch, Mendele Mocher Sforim, I.L. Peretz, Sholom Aleichem, Isaac Joel Linetski, I.M. Dik, I.M. Weissenberg, David Bergelson, S. Ansky, Joseph Opatoshu and Isaac Bashevis Singer. For contrast we will read several works dealing with the topic by Russian and other non-Yiddish writing authors. All readings can be done in English and there is no foreign language requirement. If any students should have adequate knowledge of Yiddish, they are encouraged to read at least some of the works in the original language, and additional regular meetings can be arranged to discuss specifically linguistic and stylistic problems.

64. *Women and Health Care*

Ms. BARKER, Ms. FARNES, and Ms. MARTIN.

Women have many health care problems not shared by men. The goal of the course is to examine the health care system's past and present response to the needs of women as patients and health care workers, and explore their effectiveness and potential avenues for improvement. We emphasize myths and controversies about women's physiology, and students are guided to generate "missing information" about women's health care issues.

68. *Genetics, You and Society* (Biomed 8).

Mr. HAGY.

Genetics is a particularly exciting, relevant area of modern biology. New technology is leading to rapid expansion of knowledge in human genetics which has implications both for individuals and for society. The goal of this course is to learn basic principles of genetics which give the foundation for understanding (1) the development of traits in individuals, (2) the transmission of traits in families and (3) how recent advances in genetics have an effect on individuals and on society. Topics will include gene-chromosome relationships, modern concepts of gene structure and function, experiments with recombinant-DNA, cloning and genetic engineering, genetic counseling, prenatal diagnosis, and genetic screening programs. Lectures are supplemented by a weekly discussion section which will include appropriate films. Not intended for students who are concentrating in biology or who are completing a premedical/pre dental program. Enrollment limited. Written permission.

72. *In Search of the Melting Pot: A Global Perspective on Multi-Ethnic Societies* (Portuguese and Brazilian Studies 72)

Ms. BECKER.

Using a cross cultural approach, this course studies population diversity in three multi-ethnic societies. Concepts of ethnicity, as they relate to racism, politics, women's roles, education and economic policy in the U. S., Brazil and Angola are explored. Students are expected to combine research and original thinking for a presentation and paper on an aspect of the inter-ethnic dynamic, e.g. racism in Brazil, women's roles in Angola or comparative educational philosophies in Brazil, Angola and the U. S. With guidance from the instructor, students will play an active role in the preparation and presentation of material designed to elucidate one facet of multi-ethnic interaction. S/NC.

84. *Approaching 1984: Orwell and Freedom*

Ms. WOODS.

The purpose of this course is to examine the Anglo-American attitudes toward freedom and tyranny as they evolved from the English Renaissance to George Orwell's post-World War II statement in *1984*. Political theory and philosophy will provide the backdrop for some of the most successful and enduring literary statements of this subject. Sir Thomas Smith's 1587 *Commonwealth of England*, for example, provides an Anglicization of certain Aristotelian precepts which John Milton, in the 17th century, embodied in both his prose tracts and his great poetry. At the turn from the nineteenth to the twentieth century William Wordsworth and other Romantic poets helped convey and solidify a view of personal and social liberty that was the heritage of Descartes, Hobbes, Locke, and such early psychologists as David Hartley. By the twentieth century it is the American experience of democracy that most informs English and American discussions of freedom and tyranny, both theoretical and literary.

Orwell's *1984* provides a timely statement of this tradition, and is itself both a political and literary document. Orwell's chilling vision is a particularly characteristic postwar assessment of the opportunities in and dangers to the libertarian tradition in England. The course will use that document as a point of departure for reviewing the mutual interaction of history, theory, and literature on the subjects of freedom and tyranny. Limited to 20. Written permission.

86. *The Making and Breaking of Order: England in the Eighteenth Century*

Ms. RABB.

The course will take an interdisciplinary approach to the study of England during the period between the Glorious Revolution and the Industrial Revolution. This historical period, during which different fields of learning still seemed "near allied," begins as a self-proclaimed "neo-classical" age, with ideals of balance, order, and consensus. But it developed into a very unclassical culture. Within this context, we will investigate the general human need to create systems of understanding and belief, and the equally human need to overturn these systems. Specific examples of the impulse toward order will be drawn from several areas of human experience, including eighteenth-century literature, science, philosophy, arts, and history. Our constant interest will be in making connections between these areas, not simply in studying each in isolation. We will attempt to assess the extent to which a culture's ostensible and professed "orders"—its dogmas, ideals, platitudes, and systems—also define its "disorders"—its unsolvable problems and anxieties. Enrollment limited to 20. Written permission required.

II. FOR UNDERGRADUATES AND GRADUATES

102. *History of Biology and Medicine*

Messrs. BECK and ERIKSON.

Will examine a series of major figures and events in the history of biology and medicine, endeavoring to put the scientific and cultural elements into a context of time and place. Selection in this enormous field will be influenced by the competence and predilections of the participants—staff and students—but in general there will be a bias for Europe and America, for the most recent 500 years, and for those elements most relevant to today's science and practice. Lecture-demonstration-discussion sessions will present the primary background and further the integration of the extensive reading. The demonstration of artifacts, instruments, specimens and books, combined with the use of slides, films and tapes will illustrate and supplement the reading during class sessions and be made available for individual study at other arranged hours. Students will present special topics to the group and will write one major and several short papers. Intended for upperclassmen and graduate students who have at least an elementary background in history and biological science—as evidenced by course work and/or real independent interest and activity. Students will be selected on the basis of their interest in sustained, active participation in this venture. Applicants should arrange for an interview through the office of the Section of Morphology of the Division of Biology and Medicine (Room 102, Biomedical Center, tel. 863-3355). Offered in alternate years.

103. *Agricultural Development in the Third World* (Anthropology 103)

Mr. JAY.

How land is farmed in Third World countries today has become big political and economic business for both their governments, Western governments and especially large transnational corporations. The ideological battleground is "Development": what is it, how does it work, whom does it profit, how can it be improved, for whom? The most visible signs of the process are the globalization of world food resources and the increasingly unequal distribution of food and therefore of surfeit and hunger. In this course, the process is examined in case studies from three Third World areas: Southeast Asia, Africa and Latin America, related to different theories of "development," and then finally brought back home to look at American society as a major force in shaping that process.

104. *Black Psychology* (Afro-American Studies 101B)

For course description, see Afro-American Studies 101B.

105. *Culture and Health*

Ms. NEWMAN.

This undergraduate course is about definitions of health and illness and their cultural contexts. The first part, biosocial perspectives, includes evolutionary, epidemiological and

ecological perspectives. The second part, cultural perspectives, includes cross-cultural comparisons of health behavior, folk medicine, holistic health, and past and present formal medical systems.

106. *Japanese Culture and Society* (Anthropology 118)

For course description, see Anthropology 118.

110. *Introduction to the Study of Medieval Texts*

Mr. MATHIESEN.

A practical introduction, for undergraduates and graduates, to the basic methods of scholarly work with medieval texts (paleography, codicology, diplomatics and textual criticism), both through classwork and through supervised individual work on medieval manuscripts, legal documents and incunabula at Brown. Although the methods will be exemplified on medieval materials, they are equally applicable to texts of other periods, such as Antiquity or the Renaissance. Prerequisite: some knowledge of a medieval language, or of Classical Latin or Greek.

114. *Insiders and Outsiders*

Ms. GOLOPENTIA-ERETESCU.

In everyday language, in politics, sociology, anthropology, linguistics, semiotics, history, religious studies, comparative literature, etc., we think and act frequently according to distinctions we make, consciously or not, between *insiders* and *outsiders*. What do these terms mean? What is the difference between defining somebody as I or O with respect to a particular social group, a particular competence, or a particular situation? Are children, women, foreigners, non-native speakers, avant-garde movements always to be viewed as O? Are adults, men, native-borns, native speakers, traditionalists always to be viewed as I? What values are attached to being an I or an O? Do they change with time, place, culture? Do professions always exclude for their members the O perspective? What about anthropologists, dialectologists, folklorists? Could it be that in their case (and others) there is rather a need to complement an I perspective with an O one? What about artists? Which aspects of our life make us I, which make us O? Is there such a thing as an *ideal balance* between being an I and being an O? How do we attain it? In the course we will also consider the kinds of changes that convert an I into an O (forgetting a semiotic code, mental illness, travel), an O into an I (learning a language, religious initiation, entering a profession). We will ask how we deal with these changes—by provoking them, submitting to them or avoiding them—as well as explore means for bringing them about (outlawing, emigration, excommunication, teaching). Finally we will study the varieties of I-O interactions. The course is meant as a highly interdisciplinary project. Its methodology will be semiotic. Students will be asked to contribute examples from the disciplines in which they plan to specialize. Reading will include texts from literature, folklore, anthropology, linguistics, sociology, and history. A written project will replace the final examination.

116. *The Seeds of Modernity: Politics, Philosophy, Psychology, Literature, The Arts in Vienna 1890-1915*

Ms. BARNOUW.

The development of a new style of mass politics, the open insistence on and systematic inquiry into the cultural importance of sexual energies and the dynamics of the unconscious, functionalism in architecture and design, the expressive explosion of conventions in the arts, the exact scrutiny of language, its limits and potential as a medium of communication, manipulation, repression: all this happens in Vienna around 1900. It is the beginning of the cultural trauma and exhilaration of modernity and secularity with which, at the end of the century, Western societies still have not learned to cope. The reading list includes texts by Theodor Herzl (*The Jewish State*), Karl Lueger (*Political Speeches*), Sigmund Freud (*Interpretation of Dreams*), Robert Musil (*Young Torless*), Arthur Schnitzler and Hugo von Hofmannsthal (social comedies); Ludwig Wittgenstein (*Tractatus Logico-philosophicus*), Karl Kraus (investigative journalism and socio-linguistics),

and studies of individual painters (Gustav Klimt, Egon Schiele, Oskar Kokoschka) and architects (Otto Wagner; Adolf Loos). Lectures, discussions, oral presentations, 3 short papers. Enrollment limited to 25. Written permission required.

118. *Social and Political Unrest in the Contemporary Latin American Novel*
(Hispanic Studies 103)

Mr. DURAND.

The object of this course is to study the political, social and economic conditions of Latin American countries as these are reflected in the 20th-century novel. The approach will be twofold: through (1) the aesthetics of the novel, and (2) the "revolutionary" background of each work as a manifestation of Latin American reality. The mutually enriching combination of disciplinary approaches is ideal here, the combination of social sciences and humanities. For while historical works and sociological or political reportage may offer an accurate account of the social and political conditions of each country, it is the novel that captures the turmoil, anguish, and hopes of the people. This is especially significant in this case because the contemporary novel of Latin America has reached a professional and literary sophistication that clearly places it in the forefront of that genre in world literature. The novelists to be read in the course are scholars and/or intellectuals as well; they combine with their novelistic experimentation and artistic creation a sense of the social and cultural transformations taking place in their countries.

121. *Land-Use, Culture, and Civilization in Northern Europe* (German 191B)

Mr. CROSSGROVE.

The relationship of people to the land they live on is multifaceted. The land is sustenance to the farmer, a thing of beauty to the painter, and a source of profit to the speculator. It is measured in meters in densely populated urban areas, in kilometers in remote, thinly-settled areas. It may be shaped entirely by nature, or be barely visible through cracks in the asphalt. But everyone lives on it (literally) and off it (figuratively). This course will explore changing views of the rights and duties of Northern European landowners from the Middle Ages to the present, attitudes of people towards the land as reflected in literature and art, and changes in the actual use of the land. Particular attention will be devoted to examining how the lives and social status of the peasants and farmers who work the land have changed in the transition from agrarian to industrial societies. Northern Europe is defined here as the lands surrounding the North and Baltic Seas, especially Northern Germany and Scandinavia. There will be a midterm exam, a take-home final, and a paper (ca. ten pages). Prerequisite: either a reading knowledge of German, Russian, or a Scandinavian language; or prerequisites for 100 level course work in one of the social sciences; or written permission.

122. *Fantasy in Art and Literature*

Mr. LANDOW.

This course will examine fantastic literature and art from a broad range of perspectives, and although the readings largely concern fantasy literature from 1800 to the present, lectures will frequently discuss the nature of fantastic art, illustration, and design; the role of perceptual and representational conventions in creating the fantastic; and the relation of fantasy and realism. In addition to becoming acquainted with various theoretical and critical studies of the fantastic in both visual and verbal arts, students can expect to read works of Beagle, Borges, Cabell, Hodgson, Leguin, Lindsay, Lovecraft, MacCaffrey, MacDonald, Morris, Ruskin, Tolkien, and others. Near the close of the course we shall devote some time to the relation of fantasy to contemporary popular culture, including comic book art. There will be a midterm, final examination, and a term paper of 15-17 pages.

124. *Space: Geometry, Cosmology and Cognition* (History 198F)

Ms. RICHARDS.

Changing interpretations of human nature and human knowledge have always been intimately bound up with changes in scientific theory. This course will focus on this interaction by looking at the interplay among psychological, mathematical, and physical defini-

tions of space, in the ancient world, the early modern period and twentieth century. The specific study of space will be used to highlight the ways in which our scientific concepts are intertwined with and immediately affect our views of ourselves in the natural world.

Although there are no specific prerequisites, the course will consistently span psychological, physical and mathematical issues, and students must be willing to give serious attention to each of these areas. Enrollment limited to 20. Written permission.

131. *Contrasting Views on Social Change: Lenin and Gandhi.*

Messrs. SCHMITT and BOWEN.

145. *Richard Wagner: Strategies of Aesthetic Revolution* (Music 145/German 145)

Messrs. LAURENT and LOVE.

Using the concrete example of Wagner's artistic practice, the course explores the problematical nature of an aesthetic synthesis of dramatic, literary, musical, philosophical, and political thinking in the 19th century and its ramifications in modern times. Study of Wagner's operas and prose works; consideration of his relation to German Romanticism as exemplified in the writings of Wackenroder, Novalis, and E.T.A. Hoffmann; critical examination of ideological parallels in Feuerbach, Schopenhauer, Nietzsche, Gobineau and other contemporaries. The course is open to the general student but will require extensive time for assigned work and an independent project which may incorporate a range of individual interests. Some working knowledge of music history or analysis and relevant languages would be most helpful but is not mandatory. Consultation with either instructor is urged.

UNIVERSITY COURSES

University courses address themselves to major themes and problems requiring a different perspective than generally governs departmental offerings. They provide students with the opportunity to integrate their understanding of major areas of learning and explore relationships among diverse forms of human experience; or to relate one or more disciplines to a broader context; or to focus on large and fundamental problems that need to be approached through several disciplines or by ways not found in existing disciplines.

University courses are not attached to departments. They originate with individual instructors and are retained in the curriculum only so long as these instructors wish to teach them. They are intended as important educational experiences for students in every area of learning; in addition, they may have special importance for students pursuing extradepartmental programs. University courses are taught by seminars, lectures, or other suitable methods. They are not open to first year undergraduates. Enrollment may be limited and may require the instructor's permission.

I. PRIMARILY FOR UNDERGRADUATES

42. *The Many Perceptions of Mental Illness*

Mr. P. BROWN.

Mental illness is a basic part of social life, and afflicts many people. Public attention has always been important in mental illness. State mental health care is one of the major items in a state's budget, and frequently a major political issue as well. Federal mental health programs in the last two decades have created entirely new forms of treatment and location of care. Most recently the fate of discharged chronic patients in the community has received widespread attention in cities throughout the nation. Besides these structural issues, mental illness has always played a major role in popular culture and basic human awareness. Mental illness has figured largely in poetry, fiction, art, and music. Many of

the perceptions of mental illness form key parts of childhood socialization and adult belief systems. The mad artist, the frightening asylum, the mentally ill relative in the family closet, fear of a halfway house in the neighborhood, the mental patient's terror and desolation—all these are part of the many perceptions of mental illness.

This course will study various perceptions of mental illness, including some which don't usually receive attention in academic courses. There will be four major parts:

1. Mental illness as a central aspect of life—will include general clinical models, Laing's existential—phenomenological approach, Ken Kesey's fiction, and other material which situates mental illness in a full social context.
2. Sociological perspectives—includes study of the medical model and social structure of the mental hospital as in the works of Erving Goffman, Walter Gove, Thomas Scheff, David Rosenhan, Alan Wheelis, Maurice Temerlin, Frigyes Karinthy, Morton Schatzman, Edgar Allen Poe and Anton Chekhov.
3. Mental illness in the arts—includes fiction by Sylvia Plath, Barbara Gordon, Charlotte Perkins Gilman, Charlotte Bronte, and Jean Rhys; drama by Peter Schaffer and Tennessee Williams; poetry by many authors, to be read aloud; and art of mental patients and well-known artists, and musical treatment of mental illness.
4. Public attitudes, patient perspectives, and patients rights—explores mental illness from various patients' viewpoints, mental patients' rights, popular perceptions of mental illness, public education, and community opposition to group homes.

Lectures, class discussion, and discussion sections will be complemented by guest speakers, slides, audio tapes and films.

53. *Language, Thought and Reality*

Mr. HUNTLEY.

See Linguistics 53 for course description.

104. *The Written Word* (Linguistics 104)

Ms. BARON.

For course description, see Linguistics 104.

107. *The Burden of Disease in Developing Countries*

Mr. ARONSON.

Course will critically define and weigh the role which infectious and nutritional diseases exert upon the individual and collective health of populations of certain developing countries of Asia, Africa and the Caribbean during the current century. By epidemiologic methods, inquiry will be made into those special biological and geophysical risk factors which selectively predispose these populations to certain diseases. Particular attention will be directed to the complex but measureable effects of malnutrition upon attack rates of certain communicable infections, the resultant incidences of disease sequels, the mortality rates, the industrial or agrarian productivities and maternal fertility rates. Patterns of disease currently encountered in developing countries will be compared with the morbidities and mortalities recorded in the last few centuries of the developed countries. Emphasis will then be placed upon the influence of sickness as it affects both biological and political maturation. Open to juniors, seniors and graduate students with permission of the instructor. Enrollment limited to 30.

II. FOR UNDERGRADUATES AND GRADUATES

111. *Possibilities for Social Reconstruction*

Mr. MORGAN.

The quality of people's lives is interwoven with the major practices and institutions of their society. Despite the many achievements of modern Western society, the quality of life it fosters is widely deplored. Views as to the nature of our troubles and what to do about them vary. Many persons take for granted that intensified effort within existing institutions is the way to improvement. Others, on the contrary, are convinced that it is

just these institutions which are at fault. In this course we will pursue a twofold aim. We will try to identify and critically examine basic assumptions and characteristics of practices and institutions in advanced industrial society, and we will consider alternatives which seem more conducive to human needs and fulfillment. The study of some writings which share this aim will initiate the course. They will be Lewis Mumford's *The Pentagon of Power*, Ivan Illich's *Tools for Conviviality*, and Walter Weisskopf's *Alienation and Economics*. This portion of the course will also serve the important purpose of providing common ground for all members of the class. Following this, members will pursue studies of their own choice. Each study will be presented to the class in ways which will enable all participants to engage in common exploration. Studies may focus on some general feature of social practices or one particular practice. Illustrative examples of the former are: the notions of growth and improvement in modern society; the idea of living with limits; specialization and its implications for personal and social life; the nature and value of change and stability; the relation of humans to nature in advanced industrial society and alternative relations; attitudes toward time and human experience; values and disvalues of organization and "rational calculation"; individualism, collectivism, community; kind, size, and complexity of means and products of human activity; conflicting principles of advanced industrial society; advanced industrial society in world context. Illustrations of studies focussing on particular institutions are: work in modern society and alternatives; notions of work and attitudes toward man and woman; notions of work and attitudes toward the body; the disappearance of productive work and the substitution of leisure; notions of health and illness; aims and ways of health care; industrial-scientific-technical society and the political process; expert knowledge, public ignorance, and democracy; education for advanced industrial society and alternatives; values and disvalues of mass media. An important aim of these studies will be to bring out interrelations of various issues and areas. In the consideration of alternatives, we will try to combine as far as possible attention to basic matters and attention to specific characteristics of desirable and feasible social reconstruction.

The course will be conducted as a seminar. There are no specific requirements; however, considerable capacity for independent work and readiness for dialogue will be expected. Students will be encouraged to draw on appropriate practical experience. Open to juniors, seniors, and graduate students. Enrollment limited to 15. Written permission required. Early application is advised.

112. *The Threat of Nuclear War: Looking for Creative Responses* Mr. MORGAN.

The topic will be examined from a wide range of perspectives, including factors generally in the forefront of attention to nuclear arms and war, as well as underlying dimensions of human existence that bear upon them. The instructor hopes that the study will lead to participants' greater understanding of the matters discussed and, at the same time, to their greater ability to prepare themselves for thoughtful action aimed at diminishing the likelihood of nuclear war.

1. The threat of nuclear war—nuclear arms, US plans for new arms, consequences of nuclear war, historical summary of the arms build-up; 2. Attitudes toward the threat—apathy, confrontation, the question of hope; 3. National security—security doctrines, assessments of the balance of power, significance of "Who's ahead?" 4. Some forces behind the US nuclear arms build-up—economic, political, psychological, bureaucratic factors, science and technology; 5. Language, reason, and nuclear war—the use of estranging language, language for deception and self-deception, appeals to rationality by "hawks" and "doves," different kinds of reason; 6. Moral issues—value conflicts arising from war, special problems of nuclear arms, individual responsibility; 7. Our relation to the "other"—adversarial stance, the enemy, aggressiveness, trust and mistrust, negotiation; 8. Nuclear weapons in our life—psychological impact, impact on the sense of mean-

ing and absurdity, impact on our relation to mortality, confidence in the future, impact on democratic politics; 9. Diminishing the likelihood of nuclear war—assessments of arms control, calls for more far-reaching steps, rethinking national security, what individuals can do.

Conducted as seminar. Class discussion on the basis of common readings. Each student will choose one of the major topics for special study and, together with others working on the same topic, will be responsible for selecting a significant portion of the common readings.

No specific admission requirements; however, considerable capacity for independent work and readiness for dialogue will be important. Open to sophomores, juniors, and seniors. Enrollment limited to 18. Written permission. Early application is advised.

114. *Anthropological Issues in World Population*

Ms. NEWMAN.

World Population is influenced by broad biological and cultural forces. The course will be concerned with the following perspectives: the cultural context of reproductive behavior; symbolism of reproduction and of the life cycle; interpersonal aspects of fertility regulation; cross cultural perspectives on family and couple communication; procreative aspects of gender identity; biosocial mechanism of population regulation; pronatalist policies and the roles of women; ethical issues in international population policies; and technology and "artificial" reproduction. Open to upper level students.

118. *The Realm of Interhuman*

Mr. MORGAN.

A study of human relationship and of views concerning this fundamental realm of existence. The course will begin with the writings of Martin Buber, whose interpretation of relationship has been central to what has been said to constitute a "Copernican Revolution in the thinking not only of Europe but of the whole of mankind." The study of Buber is also intended to provide common ground for all members of the class, and a center which will draw together the various topics and views that will be examined in the remainder of the course. A deepening and refinement of understanding will be sought through comparison of Buber with some other authors, for example, Marcel, Sartre, Ortega y Gasset, Scheler, Macmurray, Tillich, Fromm. Following this, members of the class will pursue studies of their own choice. Each study will be presented to the class in ways which will enable all participants to engage in a common exploration. Examples of such studies are: basic problems of the nature, difficulty, and realization of the interhuman and of its place within the totality of human life; conceptions of the interhuman as found in various approaches, authors, or works (literature, philosophical and theological writings, psychoanalytic theories, sociology, and anthropology); kinds of relations (marriage, parent and child, teacher and student, physician or psychiatrist and patient, friendship, sex, love, hate, relationship in the public sphere); dimensions of, and topics linked with, relationship (modes of communication, morality, responsibility, guilt, solitude, personal identity, social roles, community, problems of current techniques for furthering relationship). These explorations will give scope and substance to the understanding sought, and show connections among various aspects of the complex and crucial subject to be dealt with.

The course will be conducted as a seminar. There are no specific admission requirements; however, considerable capacity for independent work and readiness for dialogue will be important. Open to sophomores, juniors, and seniors. Enrollment limited to 15. Written permission required. Early application is advised.

122. *Multi-Person Decision Making* (Economics 118)

Mr. RAB.

A survey of group decision processes involving economic and social aspects. The scope for collective or joint action as opposed to individual decentralized decision making will be explored. The impossibility of aggregating individual preference into a consistent

social ranking and its philosophical and moral implications. The significance of the constraints imposed by the privacy of information and the comparative performance of direct controls vs. negotiations. The role played by economic reasoning in the design of a rational legal system. Prerequisites: designed for juniors and seniors with social sciences background. Enrollment restricted. Written permission.

123. *Changing Conceptions of Infancy and Childhood*

Mr. LIPSITT.

Infancy and childhood are distinct stages of human development, relatively well identified by age. However, in different periods of history and in different cultures, widely different conceptions of infants and children have been held. These conceptions are based in part upon adult expectations of children's behavior at different ages. With increasing knowledge about children's capabilities and motivations at different ages, however, these expectations have shifted considerably. Moreover, our conceptions of the infantile, childhood, and adolescent stages of development are markedly affected by social custom, historical trends, transgenerational changes, and the political and economic climate. This course will explore the shifting sands on which the concept of childhood stands. We will draw upon psychological knowledge and the contributions of other disciplines for an understanding of how it is that in different cultures at different times children can be imbued with such diverse characteristics and are required to behave so differently. Open to juniors and seniors. Enrollment limited. Written permission.

124. *The Breakdown of Democratic Regimes: A Comparative Study of European and Latin American Cases*

Mr. STEPHENS.

Citizens of the developed democracies of the West now tend to take their form of government for granted and regard antidemocratic movements as something of an aberration. Yet, only half a century ago, such movements managed to seize power in six different European countries and imposed regimes that sent sixteen million people to death in concentration camps and unleashed a war that caused the death of many millions more. Measured in terms of loss of human life, these events overshadow any others in history by a staggering magnitude. And though the breakdown of a number of democratic regimes in Latin America in the past several decades cannot compare with the European events in terms of death toll, the suffering there should be of great relevance to all Americans, not only because it continues to the present, but also because some critics have claimed the United States is in part responsible for the events. We will analyze the breakdown of democratic regimes in Europe and Latin America in comparative and historical perspective, in order to gain a better scientific understanding of the causes of such phenomena, as well as to elucidate matters of political and moral concern.

The European section will focus on four cases: Germany, Austria, Spain and Italy. First, we will trace the primary historical antecedents of the breakdowns. Then, in the in-depth study of the four cases, we will examine the micro and macro level dynamics of the seizure of power by anti-democratic forces. The role of the declining petty bourgeoisie (small shopkeepers, peasants, etc.), the development of paramilitary groups, and the role of charismatic leaders will be among the topics discussed. In the examination of the individual cases, we will try to develop an explanation of why the anti-democratic forces in some countries adopted a fascist ideology which contributed to the imposition of totalitarian rule penetrating to every aspect of the populations' lives (i.e., even such matters as what good art is) while others adopt a "softer" authoritarianism, as in Austria.

The Latin-American section of the course will also begin with a tracing of the broad historical antecedents to the breakdown of democracy. An in-depth study of three cases, Chile (1973) and Brazil (1964), and Argentina will follow. Again the focus of the case studies will be on the micro and macro level dynamics of the seizure of power.

125. *Virtues and Vices: The Good Life* (Religious Studies 125)

Mr. TWISS.

For course description, see Religious Studies 125.

126. *Energy, Man, and Environment*

Mr. SEIDEL.

This course will discuss the nature of the U.S. and world energy problem. The factors responsible for this problem—the exponential increase in the use of energy by man, the depletion of natural resources, the restraints imposed by a deepening concern over the deterioration of the environment, the influence of international politics, and domestic policy decisions—will be considered in terms of science, economics, and politics. The scientific principles necessary to appreciate the significance of the various forms of energy in nature and the use of energy by man will be presented with the aim of providing an understanding of present societal problems rather than from any consideration of the pedagogy of science. The concepts of energy, heat, entropy, etc. will be discussed in relation to physical, chemical, biological, and nuclear processes important in nature and society. Subjects to be treated will include fossil fuels and chemical energy, resources, energy conversion processes, nuclear fission and fusion, radiation and reactor safety, thermal pollution, solar radiation, energy flow in the biosphere, agriculture and other biological systems, transportation, the impact of energy production on the environment, the production and utilization of power in a technological society, the relation to standard of living, and government policies influencing energy use and supply. No previous training in science is required and no particular aptitude for science or mathematics is necessary. The specific and technical discussions for the most part will be descriptive. However, a willingness to study the physical principles underlying the problems of the use of energy by man is essential. Readings will be taken from texts in science, recent books and journal articles, and special studies made by government agencies, scientific societies and public interest groups.

127. *The European Conscience in the Twentieth Century*

Mr. SCHNERR.

In the decades before 1914, European civilization reached the height of its fertility, and Europe, with all its cultural diversity, was still the major source of new ideas, new styles, new intellectual currents. This is a period in which Europeans surpassed the confines of the prevalent “closed systems” of the nineteenth century (e.g. positivism in philosophy, determinism in science, naturalism in visual arts and literary expression, the conventional musical scale, outwardly stable bourgeois capitalist society). Objects of study are: the anticipation of European crisis in the writings of Dostoyevsky and Nietzsche; representative European writers as exponents of personal crisis (Strindberg); philosophical currents (Pirandello), or social crisis (Decadents and Expressionists), and, finally, certain European philosophers of history and culture (Simmel, Ortega y Gasset, and Spengler). Course open to sophomores, juniors, seniors. One major paper. No written examination, but possibly a final conference.

128. *The History and Philosophical Context of Economic Thought* (Economics 128)

Mr. PUTTERMAN.

For course description, see Economics 128.

129, 130. *Understanding the Brain*

MESSRS. ELBAUM and ANDERSON.

In Semester I, we will provide basic factual background for discussing the neurosciences. We will analyze the visual system in some detail. Simple mathematical models for learning and memory will be introduced. Some important results from experimental and cognitive psychology, which a satisfactory model for brain organization and function should explain, will be discussed. We will continually try to relate psychological function on one level with the underlying neural circuitry on another.

In Semester II, we start the course by examining briefly the basic features of communication processes with emphasis on the physical and chemical mechanisms of information

storage and transmission involved in living systems. A detailed analysis of a few simple cases will be made. We will then study several models of distributed memory, learning and association. Discussions of information processing will be included. Consistency of the models with known biology in general and with neurophysiology in particular will be examined throughout. The validity of comparisons with the functioning of 'inanimate' systems will be discussed.

Requirements: A substantial term paper, occasional written homework and occasional oral presentations to the class will be required. *Prerequisites:* Some mathematical background—first year calculus or better—is expected. Biological background desirable but not essential. Graduate students are welcome and encouraged to register.

133. *Religion and the Good Society* (Religious Studies 127) Mr. REEDER.
Religious visions of the good society; interpretations of economic and political institutions; comparisons with thinkers such as Marx and Rawls. Connections between views of human nature and history and prescriptions for social change, in particular, the relation between notions of ultimate salvation and responsibility for the alleviation of suffering and injustice; the relation of socio-scientific analysis to normative social thought. Arguments for civil disobedience and violence as methods of social revolution. Written permission required.

135. *Alcohol, Health, and Culture* Mr. HEATH.
An introduction to alcohol as it relates to health and cultures. A variety of perspectives will be offered, including: historical and geographical perspectives on alcohol use, sociological and anthropological viewpoints on the range of beliefs and behavior associated with alcohol, biochemical and physiological data on the metabolism and effects of ethanol, epidemiological and medical data on alcohol consumption and its outcomes, legal and forensic implications of alcohol and alcoholism, a review of approaches to treatment of alcoholism, and other selected topics. Designed to provide students with a variety of perspectives on alcohol, its uses by human beings, and the outcomes of such usage, multidisciplinary collaboration will be emphasized throughout, demonstrating the complementarity of approaches by scholars in the humanities, life sciences, and social and behavioral sciences, as well as concerns of different kinds of administrators and practitioners. Several specialists will discuss various topics; lecture-discussion format.

143. *Caught in the Web: or the Form and Fate of Folklore* Ms. ARANT.
Oral traditional narrative genres (epic, folktale, ballad) as well as lyric genres (incantation, lament, ritual and lyric song, proverb and riddle) have played a vital role in the life of man. These various genres, their stereotypical motifs, themes and story patterns, their common structural devices, and the rites and rituals that accompany them, have had an influence on man that is still felt, even though their modern manifestations might seem disguised.

This course will attempt to study these various genres from the point of view of their poetics, their effect on written literature for both children and adults, and the relation of these forms to ritual and myth. The course is open to undergraduates and graduates. Students are urged, but not required, to choose the S/NC option.

146. *Marx and the Poets* (Comparative Literature 181C) Mr. AHEARN.
A contrastive and integrative study of the range of Marx's writings and selected novels and poetry by some of the following: Blake, Dickens, Balzac, Flaubert, Baudelaire, Rimbaud, Dostoyevsky, James. Questions to be addressed include: the impact of socio-economic forces on individual life and interpersonal relationships; inauthentic and alienated consciousness; the self, language, things, imagination, work, and social existence; literary themes and forms in relation to socio-historical processes (for example: society, love, money, fantasy and novelistic form in *Madame Bovary*). The larger goal will be to

illuminate, for students of literature, philosophy, social sciences and others, the complex connections between forms of social life and works of literature arising within them.

Prerequisite: at least one semester of 100-level course work in at least one of the following: literature, modern history, philosophy, political science, economics, sociology; or permission of the instructor. (History 116, 117, Philosophy 182, German 148, Political Science 123, Comparative Literature 121 are recommended as related courses.) Readings will be in English, but bilingual texts of the poets will be furnished, and those with foreign language competence will be encouraged to read in the original. Background materials on history and esthetics will be provided, but the course will focus mainly on the readings of Marx and the literary figures. Attendance at lectures, active participation in discussion sections, several short papers and a final project will be required. S/NC.

149, 150. *Literature and Society I and II* Messrs. CURTIS, HENKLE, and others.
The interactions of literature, culture, and society in modern Europe (including Britain).

Semester I begins with a consideration of literary theory and historical approaches to the study of writers and texts within a social and cultural context. Reading assignments and lectures deal with aspects of the English Revolution, the Enlightenment, the French Revolution, and the rise of industrial society. The course focuses on the relationship of the novel to the emergence of bourgeois culture in the eighteenth and early nineteenth centuries in Britain and on the Continent. Students are also introduced to Marxian theory in the last part of the course. Semester II begins with some readings and lectures on literary and historical theory and then deals with more of Marx's writings on class conflict and the labor theory of value (including readings from *Capital*). Lectures and readings then focus on such dominant themes in nineteenth and early twentieth century society as revolutionary ideology in Russia (as evidenced in Dostoyevsky's *The Possessed*), the nature of the marriage market in Britain and France, the naturalistic novel (Zola's *L'Assommoir*), literary images of imperialism and class tensions (Conrad's *Heart of Darkness* and *The Secret Agent*), and the incubation of revolutionary and authoritarian ideas in European literature (from Nietzsche to Pound), Freudianism, fin de siècle attitudes towards bourgeois culture, Sartre's existentialism (*La Nausee*), and writers and political involvement during the Spanish civil war (Orwell and Auden).

The lectures are given by scholars drawn from a number of departments in the Humanities and History Departments and they are designed to introduce students to the study of modern social history, literature, and definitions of culture in an interdisciplinary context, embodying the methods and perspectives of such literary critics and social historians as Raymond Williams and E. P. Thompson. Discussion sections are held in addition to two lectures each week. Open to non-Literature and Society concentrators. Written permission required.

152. *The Shaping of World Views* Mr. ALMEIDA.

To many students, an exclusive emphasis on specialized studies fragments the "world" in which they live. A widespread feeling of loss pervades the minds of students who often come to universities to learn right from wrong, to distinguish what is true from what is false, but who realize at the end of four years that their world has fallen into pieces, for they have deconstructed their freshman beliefs, values and ideologies, but have created nothing to replace them.

By attempting to shed light on the process of formation and transformation of world views and their nature, through the utilization of various disciplines, of their discoveries and perspectives, students will recognize that they function within a frame of reference in which facts and values are still tied, and that even though suspending their judgments on questions of truth, they are on a daily basis, consciously or unconsciously, making choices on matters of value, which have their serious implications.

The course will look at the diversity of various explanations for such diversity (from psycholinguistics and anthropology to psychology, sociology and religion). Then, after a clarification of major and relevant concepts such as "world view," "ideology," "value," "belief," "right and wrong," "good and evil," "cultural relativism/ethical relativism," possible ways out of the "anything goes syndrome" will be investigated.

Conclusion stresses the moral implication of one's necessarily functioning within a world view.

Enrollment limited to 30. Written permission required.

156, 157. *Historical Evolution of Modernist Culture in the Nineteenth and Twentieth Centuries* (History 197E, 198E)

Ms. GLUCK.

The seminar examines the emergence of modernist culture in the 19th and 20th centuries by focusing on four distinct phases in its evolution: romanticism, aestheticism, avant-gardism and post-modernism. Students will be asked to read both works of history and literary criticism as well as original texts by such thinkers as Coleridge, Schiller, Mathew Arnold, Nietzsche, Kandinsky and others.

163. *The City and the Arts* (Comparative Literature 181D)

Mr. WEINSTEIN.

The focus will be double: (1) to shed light on the experiential dimension of city-dwelling by studying a variety of artistic forms—literature, painting, architecture, photography and film; and (2) to better understand how the City can be the stimulus and subject matter for artistic expression. Emphasis largely on 4 cities—London, Paris, St. Petersburg and New York—over three centuries. Nonetheless, the mode will be thematic and general, rather than geographic or particular. In addition to artistic material, some attention will be given to selected studies of urban history (especially the work of Mumford) and urban sociology; by contrasting these modes of understanding, the course should promote a fuller, more nuanced and distinctive sense of how the arts and how the social sciences teach us about human experience, as well as a richer overview of the possibilities of urban life.

The sequence will be as follows:

1. 18th century London: materialism and literature; the attendant urban drama of stealing and begging, poverty vs. riches.
2. the city of the Industrial Revolution; the allure of the metropolis; the moral and social disease in it;
3. the beauty of the city: community and democracy; a man-made world; a new aesthetic; city planning: forms and people;
4. alienation: impersonality and secondary relationships; the over-sharpening of the intellect; sterile order vs. vital order; solitude;
5. the city as labyrinth and nightmare: violence, both real and fantasized; the ethnic and social prison; the solvable and unsolvable problems;
6. visions and prospects for the future: visionary literature and art; futurist proposals; the computerized Necropolis.

Texts include literary and artistic works, including painting, architecture, photography and film. These materials will be complemented by studies of urban history and work that focusses on the nature of cities and city dwellers, ranging from the 18th century to the present.

164. *Constructive Responses to the Freudian Image of the Person.*

Mr. MILHAVEN.

Building on the analytic, critical work of Religious Studies 24 (its prerequisite), students and instructor will respond weekly to designated facets of the Freudian person by developing and expressing their own thought, imagination and sensibility. The responses, which may differ radically from the Freudian position, will concern value questions or other human issues. The responses may be philosophical, theological, scientific and/or artistic, applying more than one discipline or art. To stimulate their own responses, students and instructor will also study constructive responses to Freud (or alternative images to his) of other writers and artists.

The work of the course will consist of weekly papers and group discussion. Twice, in place of the group discussion, the student will discuss his/her paper individually with the instructor. There will be no examination or required paper of length. Regular weekly participation is necessary for credit; no deadlines are extended.

170. *Arms Control and Disarmament* (Political Science 146)

MR. CALDWELL.

Introduction to the dynamics of weapons competition, the components of the arms race, and the possible solutions to the pre-eminent problem of our time. Specific topics to be addressed include: historical attempts at arms control and disarmament; the technology of nuclear weapons; the social, political and economic effects of nuclear war; negotiations and agreements to limit nuclear weapons (SALT and START); the problem of nuclear proliferation; and the possibility of disarmament.

Requirements: Midterm and final exam, and short paper. Prerequisite: Any one of: History 138, 160, Philosophy 6, Political Science 40, 141, Religious Studies 188B. Not open to freshmen.

Seminar Courses for Freshmen and Sophomores

MODES OF THOUGHT COURSES

Because the first college years are so significant in the formulation of the student's educational objectives, the Faculty in May, 1969, established a special program—Modes of Thought—designed to provide freshmen and sophomores with opportunities to participate actively with a professor and a small group of students in courses in a variety of academic areas. To accomplish this, it was agreed to start offering in 1969-70, Modes of Thought courses as described below:

1. The Modes of Thought course should place major emphasis on the methods, concepts and value systems required in approaching an understanding of a specific problem, topic or issue in a particular field of inquiry. The how and why of studying a given field should pervade the entire structure of the course. Facts must be considered as a point of departure in a course where the purpose is to create the spirit of a field and to spark the student's interest and capacity to deal with it meaningfully.
2. The particular subject in a given course, as limited or as broad as it may be, must always serve primarily as a vehicle for exploring modes of thought in the field of inquiry to which it belongs. By "field of inquiry" is meant a general category of scholarly activity such as Humanities, Social Studies, Natural Sciences or Formal Thought, that transcends departmental disciplines.
3. Modes of Thought courses include: a) the course which explores the modes of thought in a particular field of inquiry (Humanities, Social Studies, Natural Sciences or Formal Thought); b) the Inter-field course (e.g., Darwinism; World War II; Population Growth), designed to examine the relationship between modes of thought in two or more fields of inquiry. The Inter-field course could be offered under one or more fields of inquiry as designated by the professor(s).
4. It being recognized that an atmosphere of excitement and interest is a most important factor in the learning process, the Modes of Thought course should be viewed as highly personal. It should have its justification for existence in the individuals serving as faculty and students. Accordingly, course subject matter and course structures should not be propagated from one year to the next; rather, a course should be offered only as long as a professor is willing to teach it and a sufficient number of students choose to enroll in it.
5. To ensure further this atmosphere of excitement and interest, the Modes of Thought

- course should be the focal point for lively experimentation, and innovative proposals for courses should be encouraged and supported enthusiastically.
6. The Modes of Thought course should not be a prerequisite for any advanced course. The danger exists that inappropriate pressures may be placed on the course to shape its direction in order to serve the purposes of advanced students. Accordingly, traditional "Survey" and "Service" courses are not appropriate for designation as Modes of Thought courses.
 7. In the Modes of Thought course special emphasis should be placed on the "problem approach", in which a single problem might be viewed from several different perspectives by professors and students of differing academic backgrounds. Participating faculty should not divide the course into consecutive blocks of time whereby they phase in and out of teaching duties. Rather, the students in such courses should have direct contact with at least one faculty member throughout the course. The Committee on Modes of Thought courses should encourage and support courses that are proposed by two or more professors working as a team. At the same time, it is recognized that many of the Modes of Thought courses will be taught by one professor working alone with the students.
 8. Although lectures may form a necessary and desirable approach in the teaching of some Modes of Thought courses, in all cases there must be ample opportunity for discussions pursued in small groups of twenty or less. The more detailed mechanics of any particular course, however, will always be determined by the course itself and the individuals involved.
 9. Along with the opportunity for discussions pursued in small groups, self-expression through written work should also be encouraged in a manner consistent with the aims of the specific course. Above all, the student should have direct access to detailed and constructive criticism of his or her writing efforts.
 10. To create a relaxed atmosphere in which the student is able to explore fields of inquiry that might be of interest, the Modes of Thought courses should always be graded on a "Satisfactory" basis with qualitative statements made for individual performance. The qualitative statements prepared by the professor in consultation with the students will be used for counseling purposes.

SPECIAL THEMES AND TOPICS/SEMINAR COURSES

In the spring of 1976, the Educational Policy Committee was presented a Preliminary Report of its Subcommittee on the Curriculum of the First Two Years. The Report was entitled Programs for Curricular Innovation, and was, in effect, a report to the Dean of the College. In part, the Report recommended the development of a seminar program, designed primarily for freshmen and sophomores, which would both retain the strengths and goals of the Modes of Thought courses and, also, broaden the program by providing for the addition of new seminar courses which, although perhaps not meeting the strict guidelines established for MT courses, would still provide opportunities for both students and faculty members in small classes to explore issues and works of particular interest. Such courses would be expected to perhaps show what workers in the field in question actually do, to convey some of the excitement of the problem or theme, to be essentially self-contained (i.e., to assume no prerequisites nor to become a prerequisite for other courses), and to consider questions of values as appropriate—but not to develop a particular mode of thought as a primary emphasis.

The Educational Policy Committee decided to broaden the seminar program as recommended by approving proposals for new seminar courses as either Modes of Thought courses or as Special Themes and Topics/Seminar Courses, as appropriate. Accordingly, beginning in 1976-77, the seminar program designed especially for freshmen and sopho-

482 / Seminar Courses-Freshman and Sophomores

mores has consisted of two types of courses: Modes of Thought and Special Themes and Topics/Seminar. Titles of these courses offered in 1982-83 and scheduled to be offered in 1983-84 are listed below. For complete course descriptions, it is necessary to consult the booklet, Guide to Liberal Learning, for each of these years.

COURSES OFFERED IN 1982-83

Modes of Thought

- MT 1. *Women Writers: The Novelist as Social Critic.* Ms. BAIR.
- MT 2. *Psychology and Women's Issues.* Ms. BLOUGH.
- MT 4. *Consequences of Cultural Impressions: The Role of Americans Abroad.* Mr. BROOKS.
- MT 5. *Women as Healers and as Patients: An Historical and Theoretical Approach.* Ms. CAYLEFF.
- MT 6. *Freedom and Socialization.* Ms. DAILEY.
- MT 7. *Limits to Growth: Past Hopes and Future Visions.* Ms. FORKEY.
- MT 8. *Beginning the World: Self-Consciousness and Realism in the Novel.* Mr. GAUGHAN.
- MT 9. *Women and the Art Forms of Everyday Life.* Ms. GOODMAN.
- MT 10. *Science and Religion in the Modern World.* Mr. LEVY.
- MT 15. *Power and Authority.* Mr. NORDLINGER.
- MT 17. *Black Holes in History: Problems in Understanding the Cultural History of Pre-Literate Peoples.* Mr. PADDEN.
- MT 18. *Understanding Human Motives.* Mr. SHEPP.
- MT 19. *The Sea and Salvation.* Mr. SKARSTROM.
- MT 20. *Behavior and Survival.* Ms. SORRENTINO.
- MT 25. *Health Problems in World Perspective.* Messrs. WARTMAN and WESSEN.
- MT 27. *Holography, Meeting Ground of Art, Science and Technology.* Mr. GERRITSEN.

Special Themes and Topics/Seminars

- ST/S 3. *Death and the Meaning of Life.* Mr. BOYCE.
- ST/S 14. *Finite Resources and the Future.* Mr. MATTHEWS.
- ST/S 16. *Oral History: The Documentary Art in Theory and Practice.* Ms. OPPENHEIMER.
- ST/S 24. *The Railroad in the American Landscape: An Examination of the Interchange between Technology and Art in American Culture.* Ms. WALTER.
- ST/S 26. *The Bonds of Politics: Social and Political Groups in Different Cultures.* Mr. ZUCKERMAN.

COURSES TO BE OFFERED IN 1983-84

Modes of Thought

- MT 2. *Women Writers: The Novelist as Social Critic.* Ms. BAIR.

- MT 3. *Classical Conceptions of Art and the Artist*. Ms. BASSI.
- MT 4. *Psychology and Women's Issues*. Ms. BLOUGH.
- MT 5. *Women as Healers and as Patients: An Historical and Theoretical Approach*. Ms. CAYLEFF.
- MT 6. *Freedom and Socialization*. Ms. DAILEY.
- MT 11. *Nature and Nurture in Psychology*. Mr. KLING.
- MT 15. *Japanese Music in Context*. Ms. HERD.
- MT 18. *Understanding Human Motives*. Mr. SHEPP.
- MT 19. *Science and Religion in the Modern World*. Mr. LEVY.
- MT 20. *A Scientific Revolution: Molecular Biology, 1943-1966*. Mr. ROTHMAN.
- MT 25. *Health Problems in World Perspective*. Messrs. WESSEN and WARTMAN.
- MT 27. *Holography, Meeting Ground of Art, Science and Technology*. Mr. GERRITSEN.
- MT 29. *The Twilight Zone: Experiences of Aging in Cross-cultural Perspective*. Ms. SHIELD.
- MT 31. *Comedy in Theory and Practice*. Ms. MYLONAS.
- MT 34. *The Biological Clock*. Mr. HOLOWINSKY.
- MT 35. *Religion, Politics, and the Arts in Spain's Golden Age*. Ms. WILKINSON-ZERNER.
- MT 43. *Women and the Art Forms of Everyday Life*. Ms. GOODMAN.

Special Themes and Topics/Seminars

- ST/S 7. *Dissent in the Middle Ages: Its Forms in Literature*. Ms. BOUCHER.
- ST/S 8. *Ethnic Experiences in American History*. Mr. CARLSON.
- ST/S 9. *Health Care Technology: Benefits vs. Costs*. Mr. DANIELS.
- ST/S 10. *"Song for a Barbarian Reed Pipe": Asian-American Literature, 1940-1980*. Ms. FUSITA.
- ST/S 17. *Society and Civilization in Tibet*. Mr. KAPSTEIN.
- ST/S 23. *Beyond Society's Looking-Glass: An Investigation of the Theories/Myths of Female Development*. Ms. MASCIAROTTE.
- ST/S 24. *Anthropological Perspectives on African Women*. Ms. MORAN.
- ST/S 26. *The Bonds of Politics: Social and Political Groups in Different Cultures*. Mr. ZUCKERMAN.
- ST/S 28. *Evolution*. Ms. ROTHSCHILD.
- ST/S 30. *Critics of Society*. Mr. TAPLIN.
- ST/S 33. *The Liberal Arts: Context for Urban Studies and Urban Planning*. Mr. FELDMAN.
- ST/S 41. *Elementary Number Theory: A Mathematical and Philosophical Approach*. Mr. SPYROPOULOS.

Foundations Courses

Another portion of the Preliminary Report of the Subcommittee on the Curriculum of the First Two Years, in the spring of 1976, (see above under Special Themes and Topics/Seminar Courses) recommended that a new category of courses be established, to be known as Foundations Courses. It was proposed that such courses be designed to provide freshmen and sophomores in particular with an opportunity for exposure to fundamental conceptual questions presented in a vigorous and coherent manner. The courses should explore the foundations of academic inquiry and attempt to reveal and challenge basic assumptions underlying such inquiry, with the expectation that students exposed to sustained inquiry into such topics would profitably apply their new awareness to subsequent academic endeavors.

As with the new courses (in addition to Modes of Thought) in the seminar program for freshmen and sophomores, the Educational Policy Committee approved Foundations Courses under the established category of Special Themes and Topics.

ST/F1. *Face of the Earth*

Mr. YUND and Ms. TULLIS.

See Geological Sciences 1 for course description.

ST/F5. *Dynamics of Living Systems* (Biomed 5)

Messrs. BIGGINS and HEYWOOD.

For course description, see Biomed 5.

ST/F6. *Modern Science and Human Values*

Mr. PITOWSKY.

See Philosophy 6 for course description.

ST/F10. *The Nature of Mathematics and its Applications*

Mr. P. DAVIS.

What is mathematics? How does it work? What are its principal concerns? What are its principal products? In what way does it connect with science and with the general cultural life? What position does it occupy in the varieties of human thought?

These are some of the questions to which this course will address itself. Using a mixture of history, philosophy, biography, concrete case studies, and with the presentation, from time to time, of primary mathematical material, a coherent picture of the discipline will be aimed at.

It will not be assumed that the students in this course are majoring in science or in mathematics. However, such students might very well profit from the general point of view adopted.

The required work in the course will be adapted to the interests of the individual student. Projects will be assigned on an individual basis. They will have an emphasis which could be historical, biographical, philosophical, methodological. Projects could be oriented toward pure theory, toward applications, or toward computation. The possibility of dealing with primary source material will not be neglected.

ST/F11. *The Rule of Law*

Mr. BEISER.

Central issues in political theory, as reflected in the American legal system. Particular attention will be paid to the relationships of the individual to the community, and to the issue of equality. Careful discussion of legal materials will facilitate the analysis of the central empirical and normative assumptions of the liberal state. Topics include: discrimination (racial and gender); the environment; property rights; obscenity and censorship. Designed to stimulate the consideration of issues which are central to education at Brown, the course requires student self-discipline and active participation. Not open to juniors and seniors. Limited to 150 students, chosen at random, with preference given to freshmen.

ST/F12. *Foundations of Western Art in Antiquity*

Messrs. HOLLOWAY (Classics) and WINKES (Art).

Our looking at the world around us and our reprojction of that world in art rests on conventions of thought and expression established by the Greeks and the Romans. Deals with the art of Greece and Rome both for its significance to the modern world and in the context of the diversity of the parent cultures. Materials include the eternal monuments of antiquity from the pyramids of Egypt to the Pantheon of Rome as well as the most recent discoveries of archaeology, among them the Bronze Age frescoes of the Aegean island of Thera and the royal tomb of Philip father of Alexander the Great. Intended as a background to further work in art history or classical civilization but may be taken as a foundation for the study of almost any branch of western humanism.

ST/F13. *Ancient World I*

Mr. TOOMER and OTHERS.

An introduction to the civilization of antiquity. After considering the origins of western culture in Mesopotamia and Egypt, with some attention to ancient India and Israel, the course focuses on early Greece, the rise of the city-state, and the cultural and political achievements of the classical age. Within this chronological framework the treatment is mainly topical, and concentrates on developments of historical significance (e.g. literacy, law, democracy). Most of the reading is of original sources in translation. The course is introductory and open to all.

ST/F14. *Ancient World II*

Mr. TOOMER and others.

Beginning with the conquests of Alexander and their consequences, the course traces the spread of Greek culture to non-Greek peoples as far as India in the east and Spain in the west, to the rise of Rome, the establishment of its empire, and the world of late antiquity. Rather than being a chronological survey, the course concentrates on topics of lasting historical significance (e.g. Hellenization, Roman law, the background of Christianity). Most of the reading is of original sources in translation. The course complements Ancient World I but is independent of it; it is introductory and open to all.

ST/F16. *Environmental Issues* (Environmental Studies 11)

This is an introduction to environmental studies. A number of case studies of environmental issues, ranging from events of local to global concern, will be examined. The natural science necessary to discuss these issues, the institutional framework in which decisions affecting these issues are made and the values which underlie these decisions will be discussed, and the manner in which the methods of the various disciplines are used to reach these decisions will be explored.

ST/F18. *Foundations of the Theory of Signs*

MESSRS. SCHOLLES and SILVERMAN.

See Semiotics 12 for course description.

ST/F22. *The Ethics of Professionalism*

Mr. LADD.

See Philosophy 20 for course description.

ST/F31, 32. *Beginning Astronomy*

The STAFF.

See Physics 21, 22 for course description.

ST/F36. *Medieval Perspectives*

Ms. ELLIOTT and others.

The Middle Ages, Conventionally the thousand years from 500 to 1500 A.D. in Western, Central and Eastern Europe, are in many respects more alien to us, and therefore also more fascinating, than either Classical Antiquity or the post-Medieval era from the Renaissance on. Built on the ruins of Ancient civilization, and built in part from its elements, the many civilizations and cultures of the Middle Ages can be viewed as selections from and rearrangements of these elements. On the other hand, the Middle Ages were also a period of great inventiveness and radical innovation in many areas of life, and our Modern civilization rests solidly on a foundation of Medieval advances in knowledge and skill.

An introduction to the study of Medieval civilizations and cultures. An overview of them, and an examination in some depth of a few of their more interesting aspects as

reflected in certain works of literature, drama, music, liturgy, architecture, art and craft, as well as in certain Medieval institutions.

Taught by a team of faculty from several departments. Readings include selected Medieval texts (in English translation) and also some secondary sources, many of which will be discussed in class. A short paper is required, and a final examination. A syllabus for the course may be obtained from any of the instructors.

ST/F41. *The Humanities: A User's Guide*

Ms. BARON.

What are the humanities and what is their place in liberal education? Traditionally, it was assumed that to be a member of well-educated society, one needed to study classical texts (and languages). During the twentieth century, such education in the "humanities" slowly eroded. Course requirements were dropped, and the "humanities" became professionalized into a specialized area of scholarly study. In the last few years, as universities have begun re-examining their undergraduate curricula, there has been a resurgence of interest in the "humanities." And yet despite all this talk, there is no consensus as to what the "humanities" are about and precisely why they should be studied. What counted as humanistic inquiry in the middle ages (i.e. rhetoric, grammar, dialectics, geometry, arithmetic, music, and astronomy) bears only partial resemblance to the contemporary "humanities" (i.e. foreign languages, linguistics, history, law, philosophy, archaeology, music, and the fine arts).

What general education is valuable for everyone to have? The purpose of this course is to answer that question, and in the process, to see how an understanding of humanistic inquiry can help students gain such an education. To reach this goal we will read intensively in the "humanities" as well as surveying the disciplines represented in contemporary higher education.

The course is divided into three sections. Part one considers the content and division of knowledge: How have our conceptions of what we know changed over the past 2500 years? What effects have these changes had on education? How did contemporary academic disciplines emerge? What difficulties are there in dividing knowledge into discrete disciplines?

Part two of the course examines the society which produced our earliest "humanistic" texts: archaic and classical Greece. By studying the Greek world, we gain first hand acquaintance with several of the "classics" upon which the western cultural vocabulary has been built. Moreover, we will have a case study in terms of which to see how an understanding of the past can aid our thinking about contemporary problems. Finally, the Greek case enables us to consider a single society from an integrated perspective rather than dividing it up among departments of history, language, theatre, art, and philosophy.

The perspectives developed in the first two parts of the course are then applied to the study of specific domains within a liberal arts education (e.g. philosophy, literature, anthropology, history, biology, psychology, economics). In each case, we will examine how a humanistic perspective on knowledge enables the non-specialist to make entry into new disciplines.

ST/F 43. *The Far side of the Old World: Perspectives on Chinese Culture* Ms. D. LEVY.

The purpose of this course is to consider the Chinese humanistic tradition in the context of world civilization, in order to challenge the student's pre-conceived notions of Chinese culture in comparison to his or her own. The course will take the form of a survey of traditional Chinese culture focusing on the major literary and artistic achievements of six major periods in Chinese history, including philosophical texts, poetry, various forms of the fine arts, and vernacular fiction and drama. A broad range of primary materials would give the student greater insight and appreciation of Chinese culture in general and also provide a foundation for further study of East Asia in other disciplines.

ST/F49. *Writing Mathematics—Four Synthetic Geometries and Arithmetic* Mr. FARRIS. Students will be asked to write down the foundations of mathematics in their own words, gaining exercise in rigorous written argument while also becoming familiar with the nuts and bolts of our scientific vocabulary of space and number.

After an informal investigation of four physical models, each a "plane" with "lines" and "points," we will pursue a formal axiomatic development of the four geometries they typify, these being the Euclidean geometry of the plane, the projective geometry of perspective drawing, the Lobachevski geometry familiar from Escher's tilings of the disc, and a planar model of relativistic space-time. Students will be expected to discover, write, and present in class arguments establishing various theorems as logical consequences of certain axioms adopted along the way. Next the concept of number will be developed rigorously, with the burden of proof again falling to the student (perhaps with hints from the instructor). In addition to developing clear expression and accurate reasoning this exercise provides insight into delicate philosophical questions: if there are four contradictory geometries each consistent within itself, it makes no sense to think of one system as being true. The influence of this discovery on our modern perception of mathematics will be examined. Final term papers could extend the synthetic or analytic mathematics developed in the course or could discuss the role of experiment in mathematics, the status of axioms, or a variety of other issues, cultural, historical, or philosophical.

Prerequisites are a basic ability to write English and a willingness to devote some time to the mastery of formal language. Students who know some calculus will be able to use it in the last part of the course.

ST/F50. *Foundations of Political Analysis* (Political Science 50) Mr. ZUCKERMAN. Interested students should register for Political Science 50.

The course examines various modes of thought taken from the different social sciences and used in systematic political analysis. We will compare different ways of thinking about politics as complementary and competing approaches to political knowledge. To be specific, we will study the meanings of hypotheses, the selection of cases for analysis and their effects on the understanding of politics. Individuals, groups, villages, governments and states will be studied from perspectives such as personality theory, Marxian and Weberian analyses of social class, power analysis, and rational economic action. The varied cases include villages in France, political elites in less developed areas, conflict between nations, and bargaining situations in cabinets, factories, and families. Limited to freshmen and sophomores; strongly recommended for those likely to concentrate in political science.

ST/F90. *Development and Modernization in a Colonial Society: Origins of the Third World in Brazil* (History 90) Mr. PADDEN.

This course examines in a disciplined way the impact upon pre-literate societies in America of European development and modernization programs that were conceived and carried out some 200 years before the Industrial Revolution. By semester's end students can expect to have confronted the major theoretical problems of knowing the Third World and to have acquired an extensive interdisciplinary foundation for future thought about the Third World and its problems.

ST/F98. *Philosophy of Education* Mr. ARCHAMBAULT. See Education 156 for course description.

Independent Study Plans

INDEPENDENT STUDY PROJECT (Including Internship)

Any student may register for an *Independent Study* course or courses for any semester. Each such course must have the approval of a faculty sponsor who shall be responsible for the scrutiny of the proposal, the evaluation of the work done, and the assignment of a grade. The faculty sponsor is not expected to give regular tutorial instruction.

Proposals for Independent Study must be submitted in accordance with guidelines established by the Educational Policy Committee on a form provided by the Registrar. The proposals will be reviewed by the Educational Policy Committee to assure the academic quality of the proposed course and to avoid undue duplication. Proposals for the fall semester are due by September 1 and for the spring semester by January 15. Proposals submitted after these dates, but not later than the first day of classes of the pertinent semester, will be considered only upon clear justification to the Educational Policy Committee of the late submittal.

GROUP STUDY PROJECT

Group Studies are cooperative inquiries in which participating students bear major responsibility for both planning and conduct of the work. They provide an opportunity for academic pursuits which might not be available in regular courses. They carry course credit.

Each Group Study is sponsored by an instructor who holds a teaching appointment in Brown University and whose central functions are to assess the proposed study, to provide advice during the work, and to be responsible for the evaluation of each student's work. Group Studies permit instructors to interact with more students than independent studies can realistically permit. A Teaching Assistant or Teaching Associate may sponsor a Group Study if the department chairman recommends that he or she be permitted to do so.

Proposals for Group Studies should be made on a form provided by the Registrar. They will be reviewed by the Educational Policy Committee to assure the academic quality of the proposed study and to avoid undue duplication. Proposals for the fall semester should be turned in by June 1 of the preceding spring semester; proposals for the spring semester are due December 1st of the fall semester. Proposals received after these dates and no later than the first day of classes of the next semester, will be considered only upon clear justification of the late submittal.

At the end of each Group Study, a joint student-faculty evaluation report of the accomplishments of the project must be submitted by the faculty sponsor to the Educational Policy Committee. NOTE: Students and instructors interested in setting up a Group Study should consult the document, "Guidelines for Group Study," which is available in the Registrar's Office.

University Libraries

University Library

THE UNIVERSITY LIBRARY, containing more than 3,800,000 items, including bound volumes (1,800,000), maps, pieces of sheet music, manuscripts and adding more than 60,000 items each year, includes the John D. Rockefeller, Jr. Library building, the John Hay Library, the Sciences Library, the Pembroke Campus Library, and the Annmary Brown Memorial.

The Main Library building, completed in 1965, was made possible by gifts to the Bicentennial Development Fund by many friends and alumni and was named in honor of the late John D. Rockefeller, Jr., Class of 1867, whose many benefactions have enabled the University to accelerate its progress toward preeminence.

THE JOHN D. ROCKEFELLER, JR. LIBRARY, a seven-story building of contemporary design situated across College Street from the John Hay Library, houses the administrative offices for the University library system, central acquisitions and cataloging departments, and reading rooms for the Humanities and the Social Studies. The main floor, on which is located the administrative offices, acquisitions, cataloging and documents departments, also contains the information-reference center of the Library—the public catalog, periodicals work and reading rooms, reference department, central bibliographical collection, and the circulation department. A microfiche center has been established in the Periodicals Reading Room on the main floor. The book collection, reading rooms, conference rooms, and faculty studies for the Social Studies are located on the floors below the main floor. The staff of the Reserve Book Room administers the Library's growing collection of recordings—music, voice, and ethnographic. The following collections made by outstanding scholars in their fields are housed in the Rockefeller Library since they supplement the general book collection:

Chambers Dante Collection, 1,700 volumes, formed by a specialist on Dante, William F. Chambers, during a long residence in Florence, its strength is in scholarly editions, commentaries (chiefly in Italian) and works concerning Dante's time.

Gardner Collection, 30,000 volumes, the majority in Chinese. Given in 1961 by Dr. Charles Gardner, noted Harvard University Sinologist, the collection reflects his interest in Chinese history—cultural, economic, literary, political, and social, especially in the Ch'ing Dynasty (1644-1912).

THE SCIENCES LIBRARY, the latest addition to the Brown Library System, is a highrise building of contemporary design located at the pivot of the University's science complex. The building, which was completed during the autumn of 1971, now houses the University's book and periodical collections in astronomy, chemistry, geology, mathematics, physics and engineering formerly shelved in the John Hay Library—the Physical Sciences Library—and the collections in botany, biology, medicine and psychology formerly shelved in the Arnold Laboratory—the Biological Sciences Library. The reference collection and current periodicals in the various fields served by the Library are located on level A, the reference/informational center of the Library. The Library provides computerized bibliographical searches and interlibrary loan services. Circulation services and the reserve book collection are located in the lobby. Above the mezzanine there are eleven floors devoted to stacks, student carrels, conference rooms and faculty studies. The fourteenth floor contains the staff lounge and computer terminals linked to the University

Computer Center for student use. The eighth floor contains the collection of geological maps in addition to the book collection. The Corthell Library of Engineering given in 1912 by Elmer S. Corthell, Class of 1867, together with an endowment for the purchase of books in the fields of engineering is a part of the engineering collection. The original Corthell materials are shelved in Special Collections at the John Hay Library for the purposes of preservation. The botanical collection includes the books bequeathed by Stephen T. Olney and those added each year on the income from the endowment which he established. The mathematical section forms an outstanding and internationally famous collection.

THE JOHN HAY LIBRARY, a memorial to John Hay of the Class of 1858, which had served since 1910 as the Main Library building, has become the special collections, rare books, and manuscript library for the University Library system. During 1980-81 the John Hay Library was renovated with funds received from a National Endowment for the Humanities Challenge Grant and three-to-one matching contributions. The renovation included atmospheric controls to combat the deterioration of the historic materials housed in the library and installation of new plumbing, electrical, fire and security systems. The most notable of the special collections shelved in the John Hay Library are:

Harris Collection of American Poetry and Plays, founded by Judge Albert Gorton Greene, class of 1820, increased and catalogued by Caleb Fiske Harris, class of 1838, presented to the University in 1884 by the legacy of Senator Henry Bowen Anthony, class of 1833, and endowed by Samuel Coffin Eastman, class of 1857, has grown to be the world's largest collection in its field, containing at present some 250,000 bound volumes, 30,000 broadsides, leaflets, etc., 300,000 pieces of sheet music, 50,000 manuscripts, etc. Included in the Harris Collection are the *Walt Whitman Collection* of some 1,300 volumes; the *Langdon Collection of Pageants*, containing a great variety of material in approximately 250 volumes and portfolios; the *Asa Cushman Collection of Plays*, manuscripts and prompt copies, constituting a large part of Mr. Cushman's repertory during his career as actor and manager in Providence, New York, etc.; and the *Macdougall Collection of psalters and hymnals*. *The Dictionary Catalog of the Harris Collection of American Poetry and Plays* was published, during 1972, in 13 volumes by G. K. Hall, Boston, Massachusetts.

Archives of the University, dating from 1763, consisting of manuscript and printed official documents, writings of faculty and alumni, records and publications of student organizations, papers of Presidents Manning, Messrs. Wayland, Faunce, and of many alumni. Material for the early history of the University is supplemented by the Brown Family Papers in the John Carter Brown Library.

John Buchan Collection. Lyman Bloomingdale, class of 1935, has given to the University Library a nearly complete collection of the published speeches, historical writings and novels written by the English statesman, Lord Tweedsmuir. A checklist of the books belonging to this collection is available in the Library.

Dorr Collection, manuscripts, pamphlets, broadsides, and newspaper clippings gathered by Thomas W. Dorr (of "Dorr's Rebellion") and some two hundred volumes once belonging to Dorr and his immediate family.

Drowne Collection, 320 volumes from the library of Dr. Solomon Drowne, class of 1773, kept together as a memorial of this distinguished alumnus and as an instructive example of a private library of the eighteenth and the early nineteenth century; also three groups of Solomon Drowne papers.

Fantasy Literature Collections, includes the H. P. Lovecraft Collection and S. Foster Damon's two collections of Occult and Visionary Literature and works by and about William Blake.

John Hay Collection, a virtually complete collection of the writings of John Hay, periodical contributions and separately published books, broadsides and pamphlets, supplemented by books from his personal library. The collection is especially rich in manuscripts, containing the diaries which John Hay kept while acting as assistant private secretary to President Lincoln, letter press books, letters written by and to John Hay. This collection, which complements and supplements the McLellan Lincoln Collection, contains much of interest to the political historian of the United States during the last four decades of the 19th century.

Foster Horace Collection, some 600 volumes, chiefly editions and translations of Horace, gathered by William E. Foster, Class of 1873 and Librarian of the Providence Public Library, 1877-1930.

Koopman Collection, a memorial to Harry Lyman Koopman, Librarian of Brown University, 1883-1930, a collection of 5,000 rare books, manuscripts, fine bindings, association copies, etc., particularly in the field of English literature, formed by the late Philip D. Sherman, class of 1902, Professor of English, Oberlin College.

Hammond Lamont Memorial Library of English Literature, 2,700 volumes, with emphasis on eighteenth century English literature, formerly the library of Hammond Lamont, Professor of Rhetoric at Brown University, 1895-1900.

Legend of the Wandering Jew, 1,500 volumes, collected and given by W. Easton Louttit, Jr., Class of 1925.

Albert E. Lownes Collection, 12,000 volumes, prints and manuscripts relating to epochal scientific achievements, including works on Medicine, Mathematics and the Sciences. The collection spans the period from the early days of printing to the development of the atomic bomb.

McLellan Lincoln Collection, formed by Charles Woodberry McLellan, acquired in 1923 for the University by John D. Rockefeller, Jr., class of 1897, and enriched by other gifts of Mr. Rockefeller; one of the three strongest Lincoln collections in the country, containing some 15,000 bound books, pamphlets and newspapers, 5,400 broadsides, leaflets, etc., 7,000 prints, photostats, etc., 2,900 manuscripts (over 900 of which were written or signed by President Lincoln), 315 pieces of sheet music, and 1,500 museum pieces (medals, coins, etc.)

Manuscript Collections, some sixty collections of manuscripts (autograph letters, documents, papers, etc.) of political, literary, medical, and scientific importance. In addition to the Archives of the University and the collections of Lincoln, Hay, and Whitman, there are papers of Thomas Wilson Dorr, Charles Warren Lippitt and family, William Sprague, Jonathan Russell, Henry Wheaton, Dr. Charles V. Chapin, Dr. Solomon Drowne, Dr. Usher Parson, Mrs. Maud Howe Elliott, Edgar Lee Masters, John B. Wheelwright, and Howard P. Lovecraft; also microfilms of the Robert Todd Lincoln Papers. Microfilms of the Adams Family Papers, owned by the Adams Manuscript Trust, Massachusetts Historical Society, form a part of the general microfilm collection available in the Rockefeller Library. There are seven collections of letters written by soldiers during the Civil War and almost five thousand manuscript sheets by American poets.

Anne S. K. Brown Military Collection. During 1963 and 1964, Mrs. John Nicholas Brown gave to the Library the American part of her world-famous collection of books, periodicals, prints, paintings, and other items concerned with the history of military uniforms. The remainder of her collection was received in 1982. Besides its considerable and well-known iconographic holdings this collection contains many histories, texts on wars, campaigns, and battles, on military art and science, the administration, composition, organization and deployment of armies, drill and tactics, officers' handbooks, as well as army lists, military biography and memoirs.

Bullard and Hoffman Napoleon Collections. The *Bullard Collection*, presented by Paul Revere Bullard, class of 1897, consists of 185 Napoleon caricatures representing the work of the great English, French, German, Russian, and Spanish cartoonists who lampooned Napoleon and his campaigns throughout his career. The *William Henry Hoffman Collection*, presented by Mrs. Hoffman in 1921, constitutes a museum collection of 500 items—books, fine bindings, engravings, and art objects of unusual interest and beauty.

Metcalf Collection of Pamphlets, 10,000 sermons of the early nineteenth century and 40,000 miscellaneous pamphlets of considerable historical interest, the major portion of which were presented by Judge Theron Metcalf, Class of 1805, in the years 1842-1875.

General Rare Books belonging to Special Collections are distributed among four groups known as "Starred Books," "Dated Books," "Rare Books," and the "1793 Library."

Starred Books, which makes up the largest of these groups with about 12,500 volumes, is a diversified group of books identified by a star below the call number; included are early English, European and American books, including American fiction, 1774-1850, extra illustrated volumes, limited editions, fine printing, autographed or association books and those which, because of scarcity, value or condition, require special handling. *Dated Books* constitutes a group of nearly 2,500 volumes arranged chronologically by date of publication from 1506 to 1822. The primary strength is in the Seventeenth Century with 1,780 volumes but there are 229 volumes in the Sixteenth Century and 290 in the Eighteenth Century. *Rare Books*, a designation given to either the more valuable or scarcer books belonging to the Library's collection, includes Audubon's *Birds of America*, London, 1827-38; Newton's *Philosophiae naturalis principia mathematica*, London, 1687, a fine copy of the Streater imprint acquired for the Library by the Friends of the Library; Shakespeare's *Comedies, histories and tragedies*, London, 1623, a fine copy of the first folio; *The Holy Bible* containing the Old Testament and the New Testament, translated into the Indian Language, Cambridge, 1683, the copy given by the translator, John Eliot, to Roger Williams, whose shorthand notes on the end papers to this day remain undeciphered. The *1793 Library* represents the books in the early College Library. Reassembled from various parts of the library, the collection contains 969 of the 1,232 titles recorded in the first printed catalog of the College Library. Also included are about 500 volumes in the Williams Table Collection which were in the care of William Williams of the Class of 1769 in Wrentham during the Revolution.

Rider Collection of Rhode Island History, 5,000 volumes and 10,000 pamphlets formed by Sidney S. Rider and acquired for the University in 1904 by Marsden J. Perry.

George Earl Church Collection on South America, 3,500 volumes, chiefly on Latin America but containing valuable material on political history and economic resources of both North and South America prior to 1910.

Knight and Peltz Stamp Collections, an almost complete collection of United States postage stamps in blocks of four, uncanceled, received in 1938 as the bequest of Colonel Webster Knight, Class of 1876, together with funds for current issues, and a collection of United States special delivery stamps, the gift of W. L. L. Peltz, of Albany, in 1946.

Henry D. Thoreau Collection. The Library has received from Albert E. Lownes of Providence, Class of 1920, an outstanding collection of the writings of Henry D. Thoreau. The collection includes most printed editions of Thoreau's writings with the exception of those intended primarily for use as textbooks, also, books from Thoreau's personal library and biographical and critical materials, and some interesting manuscript material, letters written by Thoreau, letters to Thoreau, college papers, memoranda concerning natural phenomena for the years 1851-57, two or three poems and several pages from his journal. For a brief description of the high spots of the collection, see Barton St. Armand, "Thoreau Comes to Brown" in *Books at Brown* Vol. 22 (1968) p. 121-141.

Ward Collection, the library and literary remains of Lester Frank Ward, one of the founders of sociology and Professor of Sociology at Brown University, 1906-1909. The 1,200 bound volumes and pamphlets represent Ward's interest in botany, paleobotany, geology, philosophy, and sociology. The scrapbooks of correspondence, notebooks on various subjects, and the many card indexes give an interesting picture of Ward's personality, philosophy, and work habits.

Morse Whaling Collection, 1,100 books, periodicals, and manuscripts relating to the whaling industry, collected by Charleton D. Morse, Class of 1913, and given in 1958 in his memory by his widow and daughter.

Williams Table Collection, containing at present some five hundred volumes identified as having been in the University Library in its colonial period (1767-1782).

PEMBROKE CAMPUS LIBRARY, located on the top floor of Pembroke Hall, is a basic open-shelf collection of more than 17,000 volumes, carefully chosen and continuously revised to balance the old with the new. The library contains the books needed for background reading for the larger courses offered at Brown as well as the books for required reading. There is a small reference collection and a select group of current periodicals. A unique part of the Pembroke Campus Library holdings is the Pembroke Temporary collection. This group of books has no LC classification and the subjects included are diverse. The Library's aim is to present to borrowers popular and thought-provoking items as quickly as possible. There is also a collection of phonograph records which are also available for use in the library or for home circulation.

John Carter Brown Library

THE JOHN CARTER BROWN LIBRARY collects anything printed from the 15th century to the early 19th century that in any way reflects what happened as a result of the discovery and settlement of the New World. Founded as a privately administered library on the Brown Campus in 1904, it is one of the outstanding libraries of the world in the field of Americana. The growth of its collections has been steady and uninterrupted since John Carter Brown purchased his first American book about 1830. Beginning with the fundamental books, such as original narratives by Columbus, Vespucci, Cortez, Champlain and Captain John Smith, the Library has grown to include all facets of the European experience with the Western hemisphere. Classified by the European cultures which produced books about America in both the Old World and the New, Spain, Portugal, England, France, Holland, Scandinavia, Italy, Germany and the Slavic countries, the collection includes works in all the traditional subject classifications of a library: Philosophy and Religion, History, Geography and Anthropology, Economics, Sociology, Political Science, Law, Education, Music, Fine Arts, Language and Literature, Science, Medicine, Agriculture, Technology, Military Science and Bibliography.

Among the some 40,000 volumes are a substantial proportion of the well-recognized works such as the accounts of voyages and travels by explorers, books and pamphlets, concerning the colonialization and growth of each of the European colonies, accounts of the American Indians and American Indian languages, religious writings from both Protestants of British and Dutch America, and from the Roman Catholics of French, Spanish and Portuguese America, and the large body of literature which resulted from colonial wars and wars for independence. An outstanding part of the Library is its extensive collection of maps dating from 1477 to the mid-nineteenth century. Of equal importance to the Library are the many ways in which America affected Europeans during the almost three and a half centuries included in the years from 1492 to the end of the colonial period. Thus, the collection includes the influence of Indian missionary work on religious thought, the role of the Africans in the development of European attitudes towards non-

European races, the impact of the wealth of the New World on the economic system of the Old World, the part played by the American experience in scientific and medical matters and maritime history. The development of new attitudes toward the political ideas engendered by the new societies which grew up in the various colonies in both North and South America is a particularly important aspect of the Library's collections.

Seating in the reading room of the John Carter Brown Library is restricted to those who are making use of the Library's collections. The Library is designed to serve as a special resource for those who are engaged in original research and need to go beyond the secondary literature on a subject. A conventional dictionary catalogue is supplemented by a number of special files such as the chronological file which lists all the books in the Library by the date when they were printed. In addition, there are printed catalogues of all the books in the Library printed before 1701. The extensive bibliographical reference collection of some 12,000 volumes not only assists as a guide to unconventional approaches to a subject but also makes it possible to identify and locate copies of books not in the Library. In general, the John Carter Brown Library does not have secondary works but relies upon the extensive collections in the John D. Rockefeller Library for supporting materials.

Located on the College Green, the Library is open to the public and regularly mounts special exhibitions for visitors.

The Annmary Brown Memorial

THE ANNMARY BROWN MEMORIAL, on Brown Street near the southwest corner of the Wriston Quadrangle, contains a world-famous collection of incunabula, valuable in the studies of the earliest known printing presses and of Renaissance and Medieval culture. Collected and housed by General Rush Christopher Hawkins, Commander of the Hawkins Zouaves in the Civil War, the books are assembled for the purpose of illustrating the spread of printing from its birthplace in Mainz about the middle of the fifteenth century. Items in the collection, many of them exceedingly rare if not unique, date between 1460 and 1501. The Memorial, dedicated to General Hawkins' wife, Annmary Brown, after whose grandfather this University is named, also contains paintings by early and later masters. The Memorial was acquired by Brown in 1948 by court order, when it was deeded to the University by the Memorial's Board of Trustees. The fifteenth century books from the University's general collection are also housed in the Memorial, which has recently become the center for Renaissance and Medieval Studies.

Providence Libraries

The collections of books named below comprise, with the University Libraries, over two million volumes in the city at the service of the students.

THE PROVIDENCE PUBLIC LIBRARY, at 150 Empire Street, offers to all students at Brown University the free use of more than 700,000 volumes. The following departments and collections are available: *Art and Music Department* is especially strong in architecture and jewelry, sheet music, recordings, and over 160,000 pictures; *Business-Industry-Science Department* with a complete file since 1876 of specifications and Drawings of the U.S. Patent Office, a collection of annual reports for leading Rhode Island and United States companies, standard business and financial services, and U. S. Military and Federal Specification and Standards; *Periodical Department* contains over 755 current journals. The periodical collection is particularly noteworthy for its nineteenth century periodicals with special emphasis on literary reviews and architecture. An extensive collection of out of state and foreign newspapers is also available. The Microfilm Reading Room has files of Providence Journal newspapers back to 1820, the New York Times

back to 1851 and the Wall Street Journal back to 1967. Photocopying services are provided: *Reference Department* with Rhode Island city directories and telephone directories for 1,200 American cities and towns, and U.S. Government documents; *Rhode Island Collection* includes books, pictures and maps pertaining to people, events and places. The Rhode Island Index is a subject catalog to material in the Providence Journal and Evening Bulletin as well as other printed sources for local information: *The George W. Potter and Alfred W. Williams Memorial on Irish Culture* containing 3,000 books and periodicals, reproductions of "The Book of Kells," "Lindisfarne Gospels," and the "Book of Durrow," *The Charles James Fox Collection* of 450 pamphlets printed in Ireland and England between 1740-1890, and a collection of nineteenth century Irish street ballads; *The Harris Collection on Civil War and Slavery* containing 8,000 books and pamphlets printed 1750-1870, concerned primarily with the abolition of slavery and the issues and conduct of the War, and including Confederate and Union ballads, Confederate imprints, and over 100 editions of "Uncle Tom's Cabin" in 15 languages; *The Nicholson Whaling Collection* comprising chiefly manuscript material including economic records and letters as well as about 930 logbooks, journals, and account books (For further description see Stuart C. Sherman's *The Voice of the Whaleman*, Providence, 1965). *The Updike Printing Collection* contains 6,000 volumes on the history and art of printing as well as examples of fine printing from older European and modern presses, early printers' manuals, type specimen books, and collections of the imprints of Giambattista Bodoni, Bruce Rogers, and the Merrymount Press; *The Edith Wetmore Collection of Books for Children* offers 1,850 volumes spanning five centuries in several languages and the *Wetmore Collection of Illustrated Books* with emphasis on the twentieth century and French illustration, particularly the livres d'artiste of the School of Paris. This collection of about 450 volumes also contains examples of the fine presses and illustrators of England, Germany, and the United States. *The Updike Collection of Autograph Letters* (600) and *The Updike Pamphlet Collection* (700) relate primarily to 19th century figures and events in Rhode Island.

THE PROVIDENCE ATHENAEUM is a "public operating Foundation" Library with a collection of general literature numbering over 148,000 volumes. Professors may become annual subscribers on the payment of twenty-five dollars in advance, and any student of Brown University may become a subscriber for three months on the payment of three dollars. The rights of such subscribers are personal only and do not extend to their families. There are two kinds of family memberships, shares and family subscriptions. The cost of the share is thirty dollars for the certificate. The annual assessment is for forty-five dollars (the cost of the share is deducted from the assessment). The cost of the family subscription is forty-five dollars a year payable in advance.

THE LIBRARY OF THE RHODE ISLAND HISTORICAL SOCIETY, 121 Hope Street, comprises 100,000 bound volumes, 50,000 pamphlets, about one million manuscripts on all aspects of Rhode Island history, 50,000 photographs and other graphics, film, and a practically complete file of Rhode Island newspapers, beginning with 1732. The genealogical collection is the third largest in New England. By courtesy of the Society this collection is accessible to members of the University.

THE LIBRARY OF THE RHODE ISLAND MEDICAL SOCIETY contains approximately 50,000 volumes on medical science and receives current medical periodicals. It has the James H. Davenport Collection of the extra-professional writings of physicians and surgeons and books about them. The Library is open to any person for consultation; circulation is restricted to members and to inter-library loan. Xerox copies are available.

THE STATE LAW LIBRARY is a collection of 115,000 volumes devoted wholly to law. It is open to any person for consultation.

THE STATE LIBRARY, in addition to United States, state, and legislative documents, has volumes in the field of constitutional and statutory law, political and social science, economics, general history and biography, and Rhode Island history, including the Preston Collection of Rhode Island material. It is the exchange authority for state documents with other nations, states, and some municipalities. Its Legislative Reference Bureau does research and special legislative reference for the General Assembly. It has a division for the collecting and filing of records of our several World Wars. The State Librarian is, *ex officio*, State Record Commissioner.

THE LIBRARY OF THE RHODE ISLAND SCHOOL OF DESIGN contains about 55,000 volumes and an extensive list of periodicals dealing with the practice and history of all the arts, fine and applied. Mounted photographs of works of art are available for study, and a clipping collection is maintained for the use of students of design and illustration. The library is open to all students for reference. Full privileges are accorded to those who are registered for courses at the School and a limited number of reciprocal borrowers' cards are available.

University Museums

Gardner House

Gardner House, located at 106 George Street, is the guest house of the University and an historic house museum, furnished with period pieces by Dr. and Mrs. George Warren Gardner during their occupancy and deeded to the University in 1932. The house was built between 1802 and 1806 by Joseph Haile. The various rooms contain period furniture of the late 17th century, Georgian, Empire, and Queen Anne styles, and pieces by Chippendale, Hepplewhite, and Sheraton. A curator will guide visitors through by appointment.

Haffenreffer Museum of Anthropology

The Haffenreffer Museum of Anthropology on Mount Hope Grant is located seventeen miles south of Providence, in Bristol, Rhode Island. The Museum buildings and over 500 acres of woodland overlooking Mount Hope Bay were a gift to Brown University in 1955 from the Rudolf F. Haffenreffer family and foundation. The Museum was originally erected to house the extensive collection of North American Indian art and artifacts owned by Mr. Haffenreffer. Since becoming a part of the University, the Museum has increased its scope to that of a museum of general anthropology.

The main gallery of the Museum is devoted to exhibits concerned with the Indians of North America. Archaeological, historical and contemporary Native American cultures are represented by materials from the Eastern Woodlands, Plains, Southwest, Far West and Northwest Pacific Coast regions. An adjacent section of the gallery contains exhibits based upon collections made by Museum expeditions to Alaska. Here, displays are devoted to the recent Eskimo as well as to the Museum's outstanding collections of Alaskan archaeological material, some of which dates back over 10,000 years. Another room contains Pre-columbian and ethnographic objects from Middle and South America. Other regions of the world are represented in exhibits in the large Tribal Arts gallery where displays of African, Asian and Pacific Islands objects are on view. Unseen by public visitors are storage areas, workrooms and laboratories utilized by Brown students for anthropological and archeological research and training in museology.

The Education Division of the Museum has headquarters in a large renovated barn next to the Museum. Its staff carries out an active program of instruction in anthropology for local school groups both in the Museum and, by means of a travelling van, in classrooms throughout the state and nearby areas. This aspect of the Museum's community and school involvement has been made possible through the generosity of the Haffenreffer Family Foundation.

The Museum is open every afternoon except Monday from June through August. It is open on weekends March-May, September-December, and closed January and February.

The woodlands and fields surrounding the Museum are of interest to students of zoology, botany, geology and history as well as to anthropologists. The area was the home-ground of the Wampanoag Indians of the Colonial era and was the location of decisive events during King Philip's War in the late 1670's. Near the Museum are beaches and the University's Recreation Building which can be reserved for picnics.

University Laboratories

The University provides extensive, modern laboratory facilities designed for undergraduate instruction, graduate instruction, and research. The major laboratory facilities include the following:

Physical Sciences

Barus and Holley Building—a seven story building housing both the Division of Engineering and the Physics Department. In addition to classrooms and faculty offices, the building contains over fifty laboratory rooms. These rooms are equipped with the latest scientific apparatus permitting research in fields such as: physical acoustics, low-temperature physics and super-conductivity, optical resonance studies, surface physics, radio-frequency and microwave spectroscopy, solid-state physics, magnetic properties of solids, non-linear optics, low-energy nuclear physics, high-energy and elementary particle physics, atomic physics, microwaves, servo-mechanisms, instrumentation, solid state electronics, micro-electronics, creep and fatigue of materials, materials preparation, field ion microscopy, transmission and scanning electron microscopy and electron microprobe analysis, soil mechanics, dislocation dynamics, dynamic in-elasticity, binocular vision, coal gasification, speech recognition; robotics and computer systems.

Prince Engineering Laboratory—a modern laboratory building adjoining the Barus and Holley Building. Apparatus presently installed includes: subsonic, and supersonic wind tunnels; two shock tubes capable of producing an air flow of twenty times the speed of sound and temperatures up to ten thousand degrees Kelvin, a Soil Mechanics Laboratory and two Chemical Engineering Laboratories; a Van de Graff accelerator; a Millimeter Wave Laboratory, a Thin Film Facility; several internal combustion engines, gas turbines, the Mechanical Testing Facility, electronic data acquisition systems, high speed cameras with rates up to 100,000,000 pictures per second; a well-equipped machine shop, and stockroom.

Chemical Laboratories—Most of the instructional laboratories and classrooms are in the Metcalf Chemical Laboratory. The research programs in inorganic, organic, physical, and biochemistry as well as the offices of the Department are housed across the street in the new Geology-Chemistry building. Facilities include a machine shop, a glass working shop, and an electronics shop as well as the latest modern instruments for research in chemistry.

Geo/Chem Building and Lincoln Field Building—these building house the Department of Geological Sciences. In addition to classrooms and faculty and graduate student offices, the buildings contain fully equipped laboratory space for research in geochemistry, geophysics, micropaleontology, petrology, Pleistocene climatology, sedimentology, and

structural geology. Special facilities include: mass spectrometer laboratories with four mass spectrometers and related equipment; x-ray diffractometer, pole figure goniometer, and fluorescence units; high temperature and pressure rock deformation apparatus; atomic absorption analyzer; comprehensive collection of photographs and maps from planetary exploration missions; numerous mineral synthesis and experimentation systems, both hydrothermal and low pressure; central facility access to electron microprobe, transmission electron microscope, and ion microprobe.

Life Sciences

Arnold Biological Laboratory—the original laboratory built in 1915 for biology. It now houses the administrative offices of the Division of Biology and Medicine (Program in Biology and Program in Medicine), the Office of Health Careers, as well as the Department of Community Health and the Center for Alcohol Studies.

J. Walter Wilson Laboratory—a five-story building first occupied in 1962. In addition to seminar rooms and teaching laboratories, the building houses sixteen separate laboratories devoted to research in the areas of molecular biology, microbial genetics, photobiology, plant physiology, developmental biology, and biochemistry. It includes environmental chambers, cold and warm rooms, glass washing and sterilization facilities, microbiological preparation rooms and instrument rooms. A machine shop, stockroom, and animal facilities are located in the basement. The Sol Koffler wing, completed in 1983, houses faculty offices as well as two lecture rooms and a teaching laboratory facility.

Medical Research Laboratory—a four-story structure linking the Metcalf Chemistry Laboratory and the Arnold Biological Laboratory, completed in 1965. It has facilities for research in the areas of neurobiology (neuroanatomy, neurophysiology and neuropharmacology), ecology, ecological paleontology and cell biology. It includes animal rooms and a glass washing facility.

Biomedical Center—a complex of three buildings, completed and dedicated in 1969, and to which a major addition, the Center for Health Care Studies, was made in 1982. The two underground floors house the Multidisciplinary Teaching Laboratory, which is designed for undergraduate and medical students, and include conference rooms, preparation areas for microbiology and biochemistry; instrument rooms equipped for studies with radio-isotopes, chromatography, electrophoresis and ultra-centrifugation equipment; cold rooms, warm rooms, and dark rooms, computing facilities linked with the Computing Laboratory; and a teaching laboratory for mammalian physiology. A facility for teaching, demonstrations, and research in human anatomy is also located here, as are the research laboratories for radiation biology. The terrace level features a large lecture room for medical classes, several conference rooms, a study lounge and mailroom for medical students, and the research facilities of the Center for Health Care Studies (including the Gerontology Center and the Health Care Evaluation Unit). The four-story research tower is devoted to research in the areas of physiology; biophysics and bioengineering; developmental biology; biochemical pharmacology; molecular and cellular pathology; microbiology; virology and immunology. In addition to about twenty-five independent suites, this building includes conference rooms, warm and cold rooms, dark rooms, instrument rooms, operating rooms and glass washing facilities. The six-story Animal Care Facility, under the direction of the University veterinarian, houses animal colonies for teaching and research purposes.

Partridge Hall—a building housing faculty and graduate students in the area of cellular biology. Facilities include two electron microscopes used primarily for cell biology and cancer-related research.

Walter Hall—this building provides facilities for research in genetics, ecology, and population biology.

Rogers Hall—the second floor of this building contains teaching laboratories for ecology and plant biology, as well as faculty and student offices and research laboratories. The herbarium is housed in Rogers Hall.

Hunter Psychological Laboratory—a four-story modern building equipped for instruction and research. Its facilities include specially designed rooms for laboratory work in elementary psychology and advanced experimental courses at the undergraduate level; computers for on-line control, stimulus generation and data reduction; a child psychology laboratory; and numerous areas devoted to electronic recording of sensory and neuromuscular phenomena. There is also a Primate Behavior Laboratory, and additional facilities for the study of a variety of species. The Human Information Processing Laboratory with facilities for the study of human learning, language, and cognition is situated nearby. Laboratories also are maintained near special subject populations (e.g., public elementary schools, Women and Infants Hospital of Rhode Island, etc.).

The Brown University Herbarium—located in Rogers Hall along with other botanical laboratory facilities for teaching and research in biosystematics, ecology, and mycology. The Herbarium of about 100,000 specimens includes a wide representation of vascular plants especially from Rhode Island and New England but also from North America and Europe. It is listed in the Index Herbariorum, and international listing that facilitates exchange privileges with other institutions.

Plant Environment Laboratory and Greenhouses—the greenhouses embrace about 6000 square feet of growing space for plants involved in research in plant physiology, ecology, and genetics. The growth chambers in the associated laboratory permit studies of the environmental controlling factors of light, temperature, and humidity in plant population development.

Other

Computer Center—a building at the corner of Brook and George Streets which houses the University's principal computing facilities, which is an IBM 3081. Advice on using this system can be obtained from a User Services Specialist, also in the building. Computer terminals are located in the Computer Center, the Rockefeller Library, and on the Pembroke campus and are available to faculty and students for accessing the computing system in an interactive mode.

Physical Plant

The Main Campus of Brown University occupies an area of approximately forty acres. In close proximity are athletic fields and recreational facilities covering more than fifty-two acres. Within fifteen miles of the University is the Mount Hope Grant in Bristol, Rhode Island.

University Hall was constructed in 1770 and is known as The College Edifice. The building is an excellent example of early colonial architecture, a monument to the founders and to the cultural interests of the colony. Near it on the Front Campus are Hope College erected in 1822, another example of early college architecture, and Manning Hall erected in 1834, an early American revival of the classical form. Surrounding these historic buildings are more than one hundred buildings now devoted to university purposes.

Over fifty buildings are devoted to classroom, laboratory, research, library, office, and conference use by the departments of instruction.

The George V. Meehan Auditorium with its hockey rink, the Aldrich-Dexter Field with its baseball diamonds, tennis courts, soccer, and other playing fields, and the Smith Swim Center are located on Hope Street, less than a quarter of a mile from the campus. The swimming pool consists of 8 lane 50 meter, 8 lane 25 yard, and water polo courses, diving boards, 1,500 seating capacity, locker rooms, and facilities for recreational, competitive, and instructional programs. Eight squash courts in this building have been in use since the Fall Semester 1975. Adjacent to the Smith Swim Center is a multi-purpose indoor athletic center for basketball, dance, volleyball, tennis, and track, which also includes lockers, weight rooms, and various athletic offices. The roof-top of the building is a 180'x400' lighted field covered with superturf for team practice and intramural activities.

The Hunter S. Marston Boat House on the Seekonk River south of Washington Bridge, provides headquarters for the Brown University rowing crews.

The Mount Hope Grant, 475 acres of land and approximately a mile of shorefront is located on Mount Hope Bay in Bristol, Rhode Island. Located on the Grant are the Haffenreffer Museum of Anthropology (see page 497) an annex to the museum in the form of a renovated barn, the Supervisor's Cottage, and an Outing Club House.

University Health Service

SUMNER HOFFMAN, M.D., *Director of Health Services*

FRANCIS X. MCCROSSAN, *Associate Director for Administration and Planning*

TOBY SIMON, *Director, Health Education*

The University has a strong commitment to programs designed to achieve and maintain an optimum level of health in the Brown Community with special emphasis on the student component. Counseling on stress coping, exercise, nutrition, disease prevention as well as treatment is available. The health center is located in Andrews House at 13 Brown Street (corner of Brown and Charlesfield Sts.) where out-patient as well as in-patient intermediate care facilities are maintained for all students. The center is open 24 hours a day when the University is officially in session. When the University is in recess (Thanksgiving, Christmas, Spring and Summer Recesses) the center operates as an out-patient facility daily from 8:30 to 4:00 p.m. Monday through Friday. Since the Health Fee is applicable only to the academic year there will be a proportionate additional fee during the summer for those wishing to use the Health Service.

The medical staff consists of three full time physicians, twelve speciality consultants in various fields of medicine and surgery, two physician assistants, two nurse practitioners, a laboratory technician, and registered nurses around the clock.

Medical History

Every student new to the Brown campus must have filed with Health Services the health form which includes an accurate past medical history and which should in all cases be checked with parents and past physicians where any questions arise. A physical examination is not required, but strongly recommended.

It may come as a surprise to some that measles and german measles continue to be a significant hazard from time to time. Rhode Island law stipulates that all women students (age 15 to 35) entering a college or university in Rhode Island must present evidence of having received immunization against Rubella, or a test showing immunity. A history of having had the disease is not sufficient. As basic health procedures we strongly recommend updating on diphtheria tetanus toxoid, and a tuberculin test with a chest x-ray for positive reaction in the twelve months preceding entrance to the University.

Hospital Care

Students requiring surgery or major medical care will be transferred to a well qualified community hospital.

Charges

There is no charge for medical care furnished by any members of the Medical Staff at the facility; care by the consulting staff in hospital, their private offices, etc. will be charged for.

Students are entitled to seven days in-patient care (cumulative) without charge (except meals) during the academic year. Subsequent to the 7 days the charge is \$35.00

per day. Students are responsible for medications, laboratory tests, x-rays, medical supplies, etc. Many of the charges are covered at least in part by meal contracts and the student insurance.

Summaries of medical records are available on a cost basis with a minimum charge of \$5.00.

Health Insurance

Health Insurance is not included in the Health Services fee. Undergraduate and Medical students who are not covered under a parental or private plan are required to purchase the insurance offered by the University. The University has no funds and assumes no responsibility for any medical care above and beyond that as described at University Health Services. Each year the University insurance division solicits bids on specifications particularly designed with our services in mind. We feel that for those students who do not have coverage under a parent's insurance, ours is the best plan of which we have any knowledge. The insurance company maintains an office at the Health Services which can be addressed as Health Insurance, Box 1928 Brown University, or telephone (401) 273-5532. All students will receive a brochure describing the plan in one of the summer mailings. In addition, all Foreign Graduate Students (except Canadian students) are required to have health insurance.

Students Participating in Intercollegiate Athletics

Special provisions have been made by the University for the medical examination, evaluation and on-going care by the Staff of Health Services and a team of orthopedic specialists with particular interests in sports medicine. Unless previously authorized in writing by the Director of Athletics or the Athletic Surgeon, the University accepts no responsibility for fees for medical or dental care beyond that rendered by the Athletic Surgeon and/or Health Services.

Psychological Services

FERDINAND JONES, PH.D., *Director*
 BELINDA JOHNSON, PH.D., *Assistant Director*
 ROBIN L. ROSE, PH.D., *Outreach Specialist*
 NANCY CHERICO, M.S., *Psychotherapist*
 JIMMIE L. WHITE, M.S.W., *Psychotherapist*
 GABRIEL A. NAJERA, M.D., *Psychiatric Consultant*
 MARGE LAMB, *Administrative Secretary*.

Staff members of the Psychological Services see undergraduate and graduate students when personal distress levels reach the point beyond which they can be expected to be managed alone. Such students may be self-referred or referred by others. Clinical services include assessments, crisis intervention, short-term and group psychotherapy, consultation and referral.

The services are available daily when the University is in session. The offices of the Psychological Services are located on the second floor of Rhode Island Hall. Appointments may be made in person from 8:30 A.M. to 4:30 P.M., weekdays, or by telephoning the Administrative Secretary. Students can also be seen on an emergency basis and provision has been made for coverage after-hours and on the weekends. Because of the philosophy that students' emotional problems are usually part of the difficulties of normal development, a major commitment has also been made to the development of programs designed to teach and encourage constructive approaches to living.

Student Life and Organizations

Worship

Brown seeks to provide occasions for worship for the major religious groups through the Office of the Chaplain. The present schedule is as follows:

University Church (Episcopal and Protestant)

11:30 a.m.—Sunday

Manning Chapel

Afro Caucus

1:00 p.m.—Sunday

Manning Chapel

Roman Catholic Masses

12 noon—Mon.-Fri.

5:10 p.m.—Tues., Thurs., and Sat.

10:00 a.m.—Sunday

Manning Chapel

Jewish Sabbath Services

Friday, 6:30 p.m.—Reform, Conservative, Orthodox

Saturday, 9:30 a.m.—Orthodox, Egalitarian

Hillel House—80 Brown Street

The Chapel is available for use by the various campus religious groups. It is available to incumbents of the University community for weddings, funerals, and other ceremonies.

At special times each year University Services are held to mark religious holidays or particular events in the life of the University.

The Office of the Chaplain

The Office of the Chaplain of the University is located on the second floor of Faunce House.

The Staff is as follows:

CHARLES A. BALDWIN, *Chaplain of the University*

ALAN FLAM, *Associate Chaplain & Director of Hillel Foundation*

DARRYL M. SMAW, *Associate Chaplain*

DAVID A. AMES, *Episcopal College Chaplain*

HOWARD V. O'SHEA, *Roman Catholic Chaplain*

DAVID A. INMAN, *Roman Catholic Chaplain*

MARY LOMAX, *Roman Catholic Chaplain*

The chaplains are regularly available to students and may be reached through the Faunce House Office.

Adviser to Foreign Students and Faculty

An Adviser to Foreign Students and Faculty is available to counsel and assist students and faculty members from other countries on personal and academic problems and on matters relating to immigration, social activities, and relationships with the community.

The Foreign Student Adviser issues all immigration documentation for foreign undergraduates. Immigration documentation for graduate students is handled by Mrs. Margaret

Reid of the Graduate School. Immigration matters for faculty and research staff are administered by Ms. Leah Niederman in the Office of the Provost.

University Food Services

Operated by the University for the Brown Community, University Food Services offers the individual student a selection of unique flexible board plans that may be modified each semester to reflect changing academic patterns and campus life styles.

Optional participation for upperclassmen, contract use in three distinctive late night snack areas, the option to purchase 7, 10, 13, 14 or 20 meals per week for use in twenty-seven meal periods in any of the five dining areas, are some of the features in this student oriented program.

Undergraduate students receive a current brochure and other information during the summer to assist in board contract selection for the following academic year. Graduate students should request this information directly. All inquiries should be directed to the office of the Director of Food Services, Sharpe Refectory, Box 1936, Providence, R. I. 02912— phone, (401)-863-3343.

Student Residences—Undergraduates

Undergraduate Residence Halls are located in the following areas:

MAIN CAMPUS: Caswell Hall, Hegeman Hall, Hope College, Littlefield Hall, Slater Hall, Keeney Quadrangle, Wriston Quadrangle, and Richardson Hall.

PEMBROKE CAMPUS: Andrews Hall, Metcalf Hall, Miller Hall, Champlin Hall, Morriss Hall, Emery Hall and Woolley Hall, 87 Prospect Street, 111 Brown Street, Plantations House, West House, and New Pembroke dormitories.

EAST CAMPUS: Appleby Hall, Perkins Hall, 74 Charlesfield Street, 78 Charlesfield Street, 67 Manning Street, 69 Manning Street, King House, Dyer House, and Young Orchard Avenue Apartments.

There are eleven fraternities housed on campus including Alpha Delta Phi, Delta Phi, Delta Psi, Delta Tau Delta, Kappa Delta Upsilon, Kappa Sigma, Phi Delta Theta, Phi Psi, Sigma Chi, Theta Delta Chi, and Zeta Psi. The one sorority housed on campus is Kappa Alpha Theta.

Undergraduate residences also include freshman counseling units, Sophomore Dorms, Special Interest Houses and Language Houses including French House, German House, Hispanic-Italian-Portuguese House, Russian House and The East Asian House. There is a cultural and racial awareness house called Phi Gamma Lambda.

With the exception of Resumed Education Program students, married students and local students living with their parents, all students are required to live in University residences unless excused by the Director of Residential Life.

Room assignments are made by Brown University without regard to race, creed, color, or national origin. Individual compatibility and preferences within rooms will be respected.

Accommodations are of four types—apartments of four, suites for three, double rooms and singles. Each student is provided with a bed, including mattress and pillow, a chest of drawers, a desk, a desk chair, and a bookcase. The apartments include a complete kitchen, living room furniture, and wall-to-wall carpet throughout. Blankets, desk lamps, and curtains are not provided by the University. Each student is responsible for damages to room and furnishings beyond ordinary wear. Sub-rental of rooms is not permitted.

The University cannot assume responsibility for personal property of students. Adequate insurance coverage is advised for each individual. Many parents have personal property insurance which can be extended to cover losses experienced by students in the University.

Information relative to room contracts and charges is located in the Financial Section of the Catalogue.

Student Residences—The Graduate School

The Graduate Center at Brown University is composed of four six-story residential towers which are connected to a centrally located Commons building. The Center is situated at the southern edge of the campus and is convenient to classrooms, laboratories, and libraries.

The Commons building contains the Center's recreational and meeting facilities and the Graduate School offices.

Housing accommodations and rooming assignments in the Graduate Center are under the direction of the Director of Residential Life who effects policies and practices determined by the Dean of the Graduate School. *Room assignments are made without regard to race, creed, color, or national origin.*

All rooms are designed for single occupancy and are arranged in units of from four to six. Each room is furnished with a desk, bookcase, two chests of drawers, a study lamp, a chair, and windows are provided with draw drapes. Residents must provide their own linen and blankets. Each student is responsible for damage to his/her room and furnishings beyond ordinary wear. Sub-rental of rooms is not permitted. The University cannot assume responsibility for personal property of students. Each student should consider the purchase of insurance to cover his property. Many parents have personal property insurance which can be extended to cover losses experienced by students in the University.

The University does not have housing accommodations for married students, but apartment-style housing is generally available in the immediate area.

A card file of houses and apartments currently available may be consulted at the Residential Life desk located in E Building of the Graduate Center.

More specific information relative to housing both at the Graduate Center and in the local community may be gained by addressing inquiries to the Office of Residential Life, P. O. Box 1864, Brown University, Providence, Rhode Island 02912.

Faunce House Student Center

Faunce House was dedicated in 1909 as Rockefeller Hall. It was built and equipped by a generous gift of Mr. John D. Rockefeller, Jr., of the class of 1897. In 1931 the East Wing was added, and at the request of Mr. Rockefeller, was named in memory of the late Dr. William Herbert Perry Faunce, President of Brown University. In 1981 the Corporation approved a plan proposed by the Undergraduate Activities Board and the Student Center Committee to restore Faunce as a Student Center to meet the present and future needs of students.

The third floor West has already been renovated for student organizations. The Leung family contribution has made possible the restoration of the Art Gallery (second floor).

Presently, sixty student organizations have space in Faunce House. The Undergraduate Activities Board is responsible for the continuing restoration and allocation of space in Faunce. Please refer any questions to the Director of Student Activities.

Picture Lending Library

The Picture Lending Library was founded in 1933 and was endowed in 1937 as the William Carey Poland Memorial Collection. From the funds available more than one thousand pictures, representative of many periods, techniques, and "schools," have been acquired and may be borrowed by the students for their rooms at a nominal cost. This Picture Lending Library is under the auspices of Residential Life. At the beginning of Semester I the pictures in the collection are placed on display in Poland Lounge in the Keeney Quadrangle.

Brown Resource Center

The Resource Center is a center of information and support on curricular options, community service, and leave-taking opportunities. It is located on the first floor of Rhode Island Hall (where it moved from Faunce House). The Resource Center was started in 1976 by a group of students concerned with student-initiated learning projects, and involvement with the larger Rhode Island community. The Center is a good source of information about events and issues on campus and in the community. Bulletin boards and notebooks list events in the local community and organizations looking for volunteers. The Center houses extensive resources on independent and innovative curricular offerings such as Group Independent Study Projects (GISPs), academic internships and independent concentrations. Students interested in taking a leave of absence will find information about the Starr Fellowship Program, the College Venture Program and copies of the Venture job bank, an extensive listing of jobs for students who take time off. The Staff of the Center includes the Dean for Curricular Resources, a full-time coordinator, work-study students and student volunteers.

The Resource Center sponsors ongoing programs and workshops, often in collaboration with other offices on campus. Past programs include a lecture and discussion series on the intellectual dimensions of racism, sexism and religious bigotry, and a series of lectures by Brown faculty members entitled "Walls and Windows: Exploring Cultural Differences." Other ongoing programs include: GISP and collaborative learning workshops, leave-taking forums, meetings on community issues and alternative vocations, and discussions about community life at Brown. The Resource Center provides counseling for students wishing to set up an internship for credit in the community and for students considering a leave of absence. Students can stop by the Resource Center to browse through the variety of resources and publications or to talk with a staffer.

Sarah Doyle Women's Center

The Sarah Doyle Center has been unique among academic women's centers in its concern for integrating academic, social, cultural, and political interests. It provides a variety of programs and services for all people interested in the changing roles of women and men in our society. Speakers in the Friday Forum and Sarah Doyle lecture series address topics ranging from new developments in women's studies, to political issues, to career choices for women. Other activities include support groups, study groups, concerts, poetry readings, and social events. The Center has a library, extensive resource and referral information, an art gallery, and meeting space for groups and individuals.

Physical Education—Men and Women

A diverse program in instructional physical education is available to all students at Brown University—undergraduate and graduate. This program is voluntary, non-credit. Most activities are co-educational and are available on a seasonal basis. There are four seasonal programs each year. Schedules may be obtained from the Director of Physical Education. The program provides periods of sequential instruction and regular supervised practice hours so that each student may progress to the highest level of skill. The purpose of the program is to provide recreational skills for worthy use of leisure time and rigorous activity for physical fitness and efficiency.

Intramurals

Both men and women have the opportunity for a competitive experience on an informal basis through club, fraternity, and dormitory league play in a variety of activities. This

program is available to undergraduate and graduate students, and schedules are available from the Director of Intramurals.

Recreational Programs

Athletic facilities are available at specified times for recreational use by all members of the University Community. These include the Olney-Margolis Indoor Athletic Center and Marvel and Sayles Gyms, Meehan Skating Rink, Brown Natatorium, weight rooms, tennis and squash courts, and numerous fields. Group reservations may be made for some of these.

Intercollegiate Athletics—Men and Women

An intensive intercollegiate athletic program is available to men and women undergraduate students.

Brown women participate in varsity and JV competition in the following sports: crew, field hockey, soccer, tennis, volleyball, gymnastics, ice hockey, squash, swimming, lacrosse, softball, cross-country and track.

Brown women compete with the Ivy League group, the Seven Sister Colleges, and other colleges and universities. Competition occurs in regional and national tournaments.

Brown men compete on the varsity and freshman level in football and crew. Varsity and junior varsity opportunities are offered in basketball, track, cross-country, hockey, soccer, lacrosse, and tennis. Varsity squads are also maintained in baseball, swimming, water polo, wrestling, and golf.

There are also active, less formal, squads in rugby, skiing, rifle, sailing, scuba diving, squash, cycling, fencing, and Frisbee.

The colleges and universities with which Brown is associated in Ivy League intercollegiate athletic agreements are Columbia, Cornell, Dartmouth, Harvard, Pennsylvania, Princeton, and Yale.

Undergraduate Student Organizations

Fraternities, special interest houses, dormitories, student organizations, and extra-curricular student activities are under the general supervision of the Office of the Dean of Student Life. The undergraduate student government organization, the Undergraduate Council of Students, determines minimum eligibility requirements for membership in the more than one hundred student organizations as well as the status of both existing and proposed student organizations.

Brown University Bookstore

The University owns and operates the Brown University Bookstore located at 244 Thayer St. The store is dedicated to being of maximum service to the community.

In addition to textbooks and medical books, the store carries approximately 25,000 titles in the general book department. This extensive selection of general titles provides collateral reading material related to the courses offered at Brown, and leisure time reading.

Used books are bought and sold to minimize costs for students.

Also available are: school supplies, art supplies, electronic calculators, stationery, personal sundries, Brown imprinted shirts and jackets, class rings, gifts, and Brown memorabilia.

Brown students buying course use books and supplies from the University store are exempt from the 6% Rhode Island Sales Tax.

Students are invited to open bookstore charge accounts.

Other University Activities

Arrangements with Other Institutions

RHODE ISLAND SCHOOL OF DESIGN

As a result of a cooperative arrangement, students of Brown University may elect certain courses at the Rhode Island School of Design. Students register for such work under Brown course numbers.

AMERICAN SCHOOL OF CLASSICAL STUDIES AT ATHENS

The establishment at the American School of Classical Studies of a fund of \$10,000, known as "The Albert Harkness Fund for the Benefit of Brown University," secures the privilege of reduced tuition in the School for all adequately prepared graduates and, in exceptional cases, undergraduates of the University. Information concerning the School may be obtained from the chairman of the Department of Classics.

With the extensive Gennadius collection of works on Greek art, literature, and history, including Byzantine and more recent history of the Near East, the American School also offers exceptional advantages to students of Byzantine history, archaeology, and literature.

During the summer the School also operates a six-week archaeological study tour of Athens and other sites of interest in Greece. This Session is open to advanced undergraduate and graduate students.

AMERICAN ACADEMY IN ROME

Free tuition in the School of Classical Studies in the Academy is available to qualified graduates, and occasionally to qualified undergraduates, of Brown University who are admitted to the Academy. For further information consult the Chairman of the Department of Classics or communicate directly with the Executive Secretary, American Academy in Rome, 41 East 65th Street, New York, New York 10021.

AMERICAN SCHOOLS OF ORIENTAL RESEARCH

As a charter corporate member of the American Schools of Oriental Research, Brown participates in the sponsorship of archaeologically related study and research in ASOR programs in Jerusalem, Baghdad, Amman, and Nicosia. The programs of the ASOR institutes are centered in Near Eastern and Mediterranean studies. Information concerning ASOR may be obtained from the Department of Religious Studies and the Program in Judaic Studies.

ART COLLECTIONS

The University Collection in Sayles Hall includes a number of portraits of prominent figures associated with Brown University and the State of Rhode Island. A collection of paintings by historical masters is owned by the Annmary Brown Memorial. The Art Department Collection consists of approximately 1600 prints, which date from 1500 to the present, and drawings, paintings and sculpture predominantly of the 20th century. The

Bell Gallery, List Art Building, presents a full schedule of exhibitions throughout the academic year. Included is at least one major scholarly exhibition, as well as exhibitions of work by students, faculty members, and visiting artists.

The Museum of the Rhode Island School of Design, located immediately adjacent to the Brown campus, houses major collections of Ancient, European, American and Oriental art and mounts several significant exhibitions each year.

THE BROWN UNIVERSITY ARCHAEOLOGICAL EXCAVATION

Since 1965 the Department of Classics has been active in archaeological fieldwork, principally in southern Italy. The results of excavations at Satrium and Buccino have been published in monograph form, and excavations are now in progress at La Muculufa, Sicily. The Department offers exceptional opportunities for students in this field.

INTERCOLLEGIATE CENTER FOR CLASSICAL STUDIES

Brown University is a member of the Intercollegiate Center for Classical Studies in Rome. Qualified undergraduates may apply to study during their junior year at the Center, which is maintained and staffed by classical scholars from cooperating institutions. For further information consult the Chairman or the Concentration Advisor of the Department of Classics.

THE BROWN UNIVERSITY—TOUGALOO COLLEGE COOPERATIVE PROGRAM

Tougaloo College is a historically Black, liberal arts institution in Tougaloo, Mississippi, with about 800 students. In 1963 the Tougaloo Board of Trustees invited Brown University to discuss ways and means by which Tougaloo might improve its academic program to help its students take advantage of broadening career opportunities. Initial contacts between the College and the University proved encouraging and resulted, during the 1963-64 academic year, in the inauguration of a Cooperative Program.

Like most independent colleges, Tougaloo has many needs. But it possesses the one essential asset that no amount of money can provide—a whole-hearted devotion to the ideal of academic freedom. This asset makes Tougaloo an irreplaceable institution not only in Mississippi but in the nation. It provides a solid foundation for the hopes of faculty and students that Tougaloo can achieve the goal which has been so cogently stated by its President, George A. Owens; to be the kind of college whose graduates are able to compare successfully with the graduates of other quality colleges.

The Cooperative Program is frankly educational in its orientation and developmental in its goals. Less a "program" than an intimate working relationship, the abiding assumption is that relevant and available resources at Brown will be employed to assist in the development and carrying out of programs initiated by Tougaloo's trustees, administration, faculty, and students. On the other hand, involvement in the working relationship provides members of the Brown community with new insights and understandings of the problems confronting both higher education and the nation, and the unique educational opportunities of Tougaloo.

Evidence of strong interest in the cooperative effort comes from students, faculty, administrators, and Trustees of both institutions. Members of the faculties exchange visits for purposes of consultation and teaching. Undergraduates occasionally spend summers or a semester on the Tougaloo or Brown campus. Trustee committees work together on policy studies and development opportunities. Members of the administrations share information and offer consultative services.

Currently, joint academic programs exist between the Tougaloo Pre-Health Program and the Brown Medical Program, and the Tougaloo Pre-Engineering Program and Brown's Division of Engineering.

Harold W. Pfautz of the Brown Sociology Department was appointed Director of the program in May, 1964 and was responsible for its early development. He was succeeded by Professor William R. Benford of the Brown Engineering Division in June, 1966. The program is directed at present by Committees at Brown and at Tougaloo, of which the current coordinator is Charles A. Baldwin, Chaplain of the University. Financial support has come from the U.S. Office of Education, the Huber Foundation, and other foundations and individuals.

Brown's commitment to the working relationship, which is without time limit, grows out of its conviction that the academic community must make meaningful use of its talents and resources, not only to improve educational opportunities and to assure the viability of the smaller private institutions that play so important a role in our society, but also to pay a proper and productive role in breaking down the barriers of segregation and provincialism that have too long afflicted higher education in our nation.

Students, faculty, and others having an interest in the Cooperative Program and wishing additional information should address inquiries to Chaplain Baldwin.

Concerts

Students may attend the concert series of the Boston Symphony Orchestra, the Rhode Island Philharmonic Orchestra, the Rhode Island Chamber Music Concerts, the Rhode Island Civic Chorale, and other musical events. Special student rates are offered for many of these concerts.

An annual schedule of musical programs at The University is arranged by the Department of Music. These programs include concerts by the International String Quartet, in residence at Brown, as well as by visiting professional and amateur performers. Student groups performing on campus include the Brown Chorus, Orchestra, Wind Ensemble, Balinese Gamelan Angklung, and African Drumming Ensemble. The MacColl Studio for Electronic Music sponsors a series of performances of contemporary music each year.

The Department also sponsors a series of recitals for advanced students in the Applied Music Program.

Preparation of Teachers

ARRANGEMENTS WITH THE STATE OF RHODE ISLAND

The Department of Education of the State of Rhode Island under act of the Legislature cooperates with Brown University for the professional instruction of college graduates who desire to become teachers in schools, and of those who already hold teaching positions. The courses must be approved by the chairman of the Education Department of the University. Candidates must fulfill the requirements for graduate students regularly determined by the University.

PROVISIONS FOR PRACTICE TEACHING

The School Committees of the City of Providence and other neighboring communities, by special agreement, appoint as student-teachers in public schools a limited number of students who are pursuing courses in education at Brown University. By this arrangement the student may meet certificate requirements for practice teaching. The student teachers are occupied in the schools each day during the usual school session. Each is placed under the guidance of a cooperating teacher. An opportunity is thus afforded students to gain at the same time a knowledge of the theory of education and experience in the art of teaching.

A practice teaching program is offered under the same auspices for a number of candidates for the degree of Master of Arts in Teaching in cooperation with local school systems.

Graphic Services

Brown Photolab

Brown Photolab, operated by the University's Graphic Services department, specializes in custom services for professional and scientific use. It also provides photographic services for the personal needs of faculty, staff, and students, such as passport photos, discount film sales, photo processing, poster mounting, and so on. The Photolab is equipped and staffed for photostats, slides and slide duplicating, enlargements, archival microfilming, news and commercial photographs, group pictures, photographic copying, and other services on a custom basis. The Photolab also serves institutions and scholars outside the University desiring reproductions of materials in the library collections, particularly incunabula and other rare works.

Brown Design group

Brown Design group, operated by the University's Graphic Services department, provides professional graphic design consultation and creative services for publications and environmental needs. Its services include typesetting, pasteup, calligraphy, signage and other design-related functions.

Copy Centers

The University's Graphic Services department operates two copy centers specializing in quick offset printing and copying of information-based work, limited to standard letter sizes. Both copy centers also have available several high-speed copiers for use on a self-service basis by faculty, staff, and students.

Printing Shop

The Printing Shop, operated by the University's Graphic Services department, specializes in high-quality printing, binding, mailing, and related services for both official and personal needs of faculty, staff, and students.

Public Lectures

THE MARSHALL WOODS LECTURESHIP was established in 1871 by Marshall Woods of the Class of 1845. The income is to be employed in "supplying lectures on the Fine Arts as applied broadly to human life and lectures on the Arts and Sciences as applied to all human progress."

THE CHARLES K. COLVER LECTURESHIP was established in 1915 by Jesse L. Rosenberger and his wife in honor of her father, Charles Kendrick Colver, of the Class of 1842. The lectures usually comprise a series given in alternate years. Many of them have subsequently been published by the Brown University Press.

THE JOHN HOWARD APPLETON LECTURESHIP was established in 1923 by friends and former students of Professor Appleton, in appreciation of his service of fifty years as teacher and professor of chemistry at Brown University, to provide special annual lectures on pure or applied chemistry, the lecturers to be selected by the Department of Chemistry.

THE MOLLIE B. MANDEVILLE LECTURESHIP was established in 1924 by Frank N. Mandeville, of the Class of 1905, in memory of his wife.

THE EDGAR JOHN LOWNES MEMORY DAY FUND, established in 1924 by Mrs. Theresa K. Lownes in memory of her husband, provides an income to be used annually for an organ recital by some distinguished artist.

THE PROFESSOR ALBERT BUSHNELL JOHNSON LECTURESHIP was established in 1930 under the terms of the will of Edward K. Aldrich, Jr. It provides for the holding of lectures primarily in the fields of French and Spanish Literature.

THE WETMORE FUND FOR LITERATURE was established in 1954 by Francis Whitney and Marguerite Reid Wetmore for the support of public lectures to be held at Pembroke College, principally on the subject of English Literature.

THE PETERSON CONCERT FUND was established in 1964 in memory of John and Amanda Monson Peterson by their daughter, Ruth Peterson Watjen, Pembroke 1919. This fund provides an income to be used annually to bring an interesting program of music or of the other allied performing arts to the University, for the enjoyment of Pembroke and Brown students, and alumnae and friends of Pembroke College.

THE STEVEN A. OGDEN, JR. MEMORIAL LECTURE SERIES was established in 1965 in memory of Stephen A. Ogden, Jr., '60, by his family and friends. This series is designed to further the understanding and knowledge of the international issues which confront today's world.

THE BROWN UNIVERSITY FACULTY LECTURES, established by the Corporation in 1938, are designed primarily for the purpose of offering to members of the Faculty an opportunity to share their intellectual interests and the results of their scholarly work with the Brown community.

BRUCE M. BIGELOW CLASS OF 1955 LECTURE SERIES, established in 1957 to support lectures to be arranged by the University Lectureships Committee.

ANNE PEIRCE BROWN SCHOLARSHIP FUND, established in 1967 by the gift of Professor Charles W. Brown, 1900, in memory of his wife, with the income to be used for scholarships (see *Scholarships for Men* and *Scholarships for Women*) and for lectureships. "At the close of each fiscal year, any unexpended income...to be divided into equal parts...one half to be used to provide an occasional lecture in geology which would be of general public interest..."

PETER B. KIRBY MEMORIAL LECTURE SERIES FUND, established in 1957 by gift of the Class of 1956 for the payment of lectures to be selected by the Senior Class Council.

CHARLES ALEXANDER ROBINSON, JR., MEMORIAL FUND, established in 1966 by gifts received in memory of Charles Alexander Robinson, Jr., to be used to meet expenses of a visiting lectureship.

CHARLES P. SISSON '11 MEMORIAL LECTURESHIP, established in 1964 by Mrs. Charles P. Sisson in memory of her husband.

CHARLES A. STUART MEMORIAL LECTURESHIP established in 1962 by gift from Mrs. Charles A. Stuart '22 and friends, to be used to provide an annual lecture, paralleling generally the scientific interests of Professor Stuart.

Prizes, Premiums, and Honors

Complete details concerning funds from which prizes and premiums are paid and special conditions which must be taken into consideration in making awards may be obtained from Barrett Hazeltine, Chairman of the Committee on Prizes and Premiums.

The University reserves the right to withhold any award for any reason it deems valid.

Prizes for Excellence in Preparatory Studies

Prizes for excellence in certain preparatory studies are awarded each year during the first semester to members of the entering classes on the basis of special examinations as described below. Examinations separately judged with separate awards but covering the same material are conducted simultaneously for both men and women.

The competitions in Greek, Latin, and Mathematics are each open to all freshmen. However, those in the French, German and Spanish languages, respectively, are open only to those freshmen whose knowledge of the language concerned has been gained through secondary school studies rather than from family or community contacts.

THE PRESIDENT FRANCIS WAYLAND PRIZES, derived from the income of a fund presented in 1843 by President Wayland, and later increased, are awarded each year to those members of the freshman class who upon examination are found to excel in preparatory Greek and Latin.

THE HARTSHORN PRIZES IN MATHEMATICS, derived from the income of a fund presented to the University in 1872 by Joseph Charles Hartshorn of the class of 1841, are awarded each year to the two members of the freshman class who are found to excel in an examination on elementary algebra (through quadratic equations and the binomial theorem) and plane geometry.

THE HYPATIA PRIZES IN MATHEMATICS, derived from the income of a fund named for Hypatia of Alexandria, and presented anonymously in 1951, parallel for women freshmen the Hartshorn prizes for men.

THE ALBERT BUSHNELL JOHNSON PRIZES IN FRENCH are derived from part of the income of the Albert Bushnell Johnson Fund bequeathed to the University in 1949 by Edward K. Aldrich, Jr. and are awarded each year to the two members of the freshman class who are found to excel in preparatory French.

THE CAESAR MISCH PRIZES IN GERMAN, established in 1913 by a gift of Mrs. Marion L. Misch, are awarded to the two members of the freshman class who are found to excel in preparatory German.

THE ASA CLINTON CROWELL PRIZES IN GERMAN, derived from the income of a fund established in 1928 by alumnae of the University, are awarded to the two women members of the freshman class who are found to excel in preparatory German.

THE LOPE DE VEGA PRIZES IN SPANISH, established in 1962 by anonymous gift, are awarded to two men of the freshman class who are found to excel in preparatory work in Spanish.

THE GABRIELA MISTRAL PRIZES IN SPANISH, ESTABLISHED IN 1962 BY anonymous gift, are awarded to two women of the freshman class who are found to excel in preparatory work in Spanish.

Prizes and Premiums for Excellence in Undergraduate Studies

THE KIM ANN ARSTARK MEMORIAL AWARD IN POETRY is derived from a fund established in 1971 by Mr. and Mrs. Lester D. Arstark in memory of their daughter. It is awarded annually for a poem or poems "In celebration of life."

THE ALBERT ARNOLD BENNETT, CLASS OF 1872, AWARD FUND was established by an anonymous donor through several gifts made between 1941 and 1949. The fund is in memory of the Reverend Albert A. Bennett, D.D., pioneer missionary to Japan, and is available annually for award purposes, but not continuously for any one object.

THE PHILO SHERMAN BENNETT PRIZE was established in 1904 by Philo Sherman Bennett for the "best essay discussing the principles of free government."

THE HONORABLE THOMAS WILLIAMS BICKNELL MEMORIAL AWARD was established in 1963 by the National Society of Sons and Daughters of the Pilgrims as a memorial to Thomas Williams Bicknell. The prize is awarded for an essay in American History.

THE BRAND MUSICAL PREMIUM is derived from a fund established in 1960 by William C. H. Brand as a memorial to William and Mina R. Brand and is divided equally between two seniors of Brown University, one man and one woman, on the basis of merit.

THE TRISTAM BURGESS PREMIUM IN ENGLISH, instituted in 1953, is given at the end of the junior year to the woman student "with the highest standing in rhetoric, English composition, and public speaking."

THE BUXTEHUDE PREMIUM FOR MUSICAL EXCELLENCE was established by a gift from an anonymous donor to provide annual premiums for one or more undergraduates in the junior year.

THE THOMAS CARPENTER PRIZES FOR ELOCUTION, derived from the income of a fund established in 1867 by Thomas Carpenter, are awarded each year to the three students to whom are assigned the first, the second, and the third rank of excellence in elocution.

THE THOMAS CARPENTER AND LYDIA CARPENTER PREMIUMS were established in 1869, by Lydia Carpenter, on behalf of her late brother. They are assigned at the end of the academic year to the two members of the senior class who, "already on scholarships, shall, in the judgement of the Faculty, unite in the highest degree the three most important elements of success in life—ability, character, and attainment."

THE HOPE CHATTERTON PRIZE IN MUSIC, to memorialize Hope Chatterton, was instituted in 1946, by anonymous donation. A prize is given in the spring to a woman student who in public audition is deemed to excel in piano performance.

THE CHEMISTRY PREMIUM is awarded annually (since 1930) to the most outstanding student in the junior class concentrating in the Department of Chemistry.

THE CLASS OF 1873 PRIZES are derived from the income of a fund presented in 1877 by the class of 1873 and are awarded each year to seniors for essays on such topic(s) as the "Faculty may, from time to time, deem most expedient."

THE CLASS OF 1906 MEMORIAL PREMIUM was established in 1956 by the will of Harry Knowles, Brown 1906. Currently the premium is awarded to a student who has completed with highest distinction the Honors Program in Russian Studies.

THE CLASS OF 1952 PREMIUM is derived from the income of a fund established in 1952 by the Class of 1952, at The College. It is awarded annually to an outstanding student at the end of his or her junior year, on the basis of excellence in scholastic achievement and extracurricular activity.

THE CLARKSON ABEL COLLINS JR., PRIZE IN AMERICAN MARINE HISTORY is derived from the income of a fund given to Brown University in 1941 by Letta I. Collins in memory of her son. An annual prize is offered for the best paper on any approved topic dealing with the American Merchant Marine or Navy. Competition is restricted to men in the junior or senior class.

THE RUTH ELECTA COLLINS PREMIUM IN FRENCH is derived from the income of a fund established in 1936 by Mrs. Clarkson Abel Collins in memory of her daughter Ruth Electa Collins. It is awarded annually to a male senior, distinguished for outstanding work in French.

THE CURT JOHN DUCASSE PREMIUM IN METAPHYSICS is paid from income of a fund established anonymously in 1958. The premium is awarded to a freshman, sophomore, or junior who excels in Metaphysics and related subjects.

THE ROBINSON POTTER DUNN PREMIUM. The income of a premium scholarship fund presented to the University in 1872 by pupils and friends of Professor Robinson Potter Dunn is given, at the end of the junior year, to the student "with the highest standing in rhetoric, English composition, and public speaking."

THE ADOLPH CONRAD ELY PREMIUM IN GERMAN is derived from a fund bequeathed in 1941 to Brown University by Adolph Conrad Ely, teacher, of the class of 1894. A premium is awarded annually to the senior with highest standing in Germanic Languages and Literature.

THE BETH LISA FELDMAN PRIZE IN ENGLISH COMPOSITION is derived from a fund established in 1966 by Mr. and Mrs. Robert Feldman. This competition is open to all students of the University. Preference is given to the writing of stories for children.

THE WILLIAM LEOPOLD FICHTER PREMIUM IN SPANISH was established in 1962 by anonymous gift. The premium is awarded to a member of the junior class who has the highest standing in courses in Spanish language and literature.

THE IRVING LYSANDER FOSTER PREMIUM IN FRENCH is awarded from the income of a fund established in 1940 by Warren Woden Foster and Hatie Foster Moore in memory of their father, Irving Lysander Foster, of the class of 1893. The premium is awarded at the end of the academic year to that freshman who excels in the work in French.

THE LAFAYETTE SABINE FOSTER PRIZE IN GREEK is derived from the income of a fund bequeathed in 1880 by the Hon. Lafayette Sabine Foster, of the class of 1828. This income is to be paid annually "to that scholar of the institution who passes the best examination in the Greek language, the examination to be made in the first, third, sixth, and twenty-fourth books of Homer's *Illiad*, or in the *Oration on the Crown* by Demosthenes."

THE GASPEE CHAPTER DAUGHTERS OF THE AMERICAN REVOLUTION PRIZE. This prize, instituted in 1895, is now paid from the income of a fund presented to Brown University in 1899. The prize is awarded annually to that woman student who presents the best paper written as a class assignment in an American History course.

THE WILLIAM GASTON PREMIUM SCHOLARSHIP is provided by the income of a fund established in 1899 by the widow and the children of the Hon. William Gaston, LL.D., of the class of 1840. The scholarship is awarded to a member of the senior class solely upon scholarly merit.

THE WILLIAM GASTON PRIZE FOR EXCELLENCE IN ORATORY. From the income of a fund established in 1894 as a memorial to the Hon. William Gaston, LL.D., of the class of 1840, a prize is awarded annually to the member of the graduating class who presents the best original address.

THE PRESTON GURNEY LITERARY PRIZES are derived from the income of a fund bequeathed in 1928 to Brown University by Preston Gurney, of the class of 1866. From the income of the endowment two prizes are awarded annually to members of the senior class for the best essays on approved literary topics.

THE MARION HASSENFELD PREMIUM IN MUSIC IS PAID FROM A FUND bequeathed in 1960 by Marion Hassenfeld. It is an annual award to a woman student who "excels in music or music appreciation."

THE MINNIE HELEN HICKS PRIZE FUND was bequeathed in 1942 to Brown University by Minnie Helen Hicks. The income is used to provide for various prizes and premiums awarded to women students as announced elsewhere.

THE MINNIE HELEN HICKS PREMIUM IN ENGLISH is awarded at the end of the senior year to the woman student who has "the highest standing in the courses in English literature and language."

THE MINNIE HELEN HICKS PRIZES IN ART are awarded from income of the Minnie Helen Hicks Fund, for creative work in Art by women students.

THE MINNIE HELEN HICKS PRIZES IN CLASSICAL APPRECIATION, instituted in 1953 from income of the Minnie Helen Hicks Prize Fund, is currently awarded to the woman undergraduate who presents the best paper in the course in Greek Art and Archaeology or in Greek and Roman history, these being offered in alternate years.

THE MINNIE HELEN HICKS PRIZES FOR ELOCUTION parallel, for women students, the Thomas Carpenter Prizes for Elocution established in 1867 for men students.

THE RATCLIFFE HICKS PREMIUM IN ENGLISH, established in 1915, from income from the Ratcliffe Hicks Fund of 1907, is awarded at the end of the senior year to the male student who has "the highest standing in the courses in English literature and language."

THE RATCLIFFE HICKS PRIZES AND PREMIUMS FOR EXCELLENCE IN DEBATE, established in 1891 by the Hon. Ratcliffe Hicks, of the class of 1864, and by bequest in 1907, are awarded annually for intercollegiate debates and interclass debates.

THE DAVID HOWELL PREMIUM is awarded from income of a premium scholarship fund presented to the University in 1866 by Gamaliel Lyman Dwight in honor of his grandfather, David Howell. The premium is given at the close of the first semester of the senior year to the student who, "having a good record of deportment, has the highest rank in Mathematics and Natural Philosophy."

THE DOMENICO A. IONATA FUND, established by gifts of the family of Domenico A. Ionata, Class of 1926, provides for a premium to be awarded annually to that senior concentrating in Engineering who demonstrates an unusual degree of creativity and imagination in an independent study project.

THE PROFESSOR I. J. KAPSTEIN FUND, established by friends, students, and colleagues of Professor Kapstein, provides a premium for that undergraduate who has done the best work in the areas of literature, creative writing, or theater arts.

THE SAMUEL C. LAMPORT PRIZES IN INTERNATIONAL UNDERSTANDING, first offered in 1943 by annual gift of the Trustees of the Samuel C. and Miriam D. Lamport Foundation, are now awarded from the income of a fund donated to Brown University in 1952 by these trustees. The prizes are offered to undergraduate students for papers on international understanding, with emphasis on cooperation and tolerance.

THE ROSAMOND WINSLOW WOODWIND PRIZE, established by Mr. and Mrs. Marcellus D. Lemaire and friends of Miss Rosamond W. Lemaire, Pembroke 1961, is given on the basis of a public audition.

THE LUCIUS LYON PRIZES IN LATIN are derived from the income of a fund presented in 1893 by Mrs. Caroline L. Lyon, in memory of her husband, Lucius Lyon, of the class of 1844. The prizes are awarded on the basis of a special examination relating to any or all of the following subjects; the Latin language, Latin literature, Roman history.

THE GEORGE H. MAIN '45 FUND, established by gifts of the family and friends of George H. Main, class of 1945, provides for a premium to be awarded annually to that senior in Engineering who is distinguished by his diligence and devotion to studies rather than for high grades and who holds promise of success in his field.

THE MURIEL HASSENFELD MANN PREMIUM IN MUSIC is paid from a fund bequeathed to the University in 1960. An annual award is made to a woman student who excels in music, music appreciation, or both.

THE HENRY PARKER MANNING MATHEMATICAL PRIZES, instituted in 1936 by annual gift, as the "Calculus Prizes," are now paid out of the annual income of a fund established anonymously in 1949, on the ninetieth birthday of Henry Parker Manning, Brown 1883, mathematician and scholar of ancient languages. Competition is restricted to juniors.

THE BISHOP McVICKAR PRIZES were instituted in 1909 by the Rt. Rev. William Neilson McVickar, Bishop of the Protestant Episcopal Diocese of Rhode Island, 1898-1910, and are now awarded from the income of a fund established in 1923 in his memory by his sister, Miss E. C. McVickar. The prizes are awarded for the best papers submitted under conditions designated by the Department of Religious Studies.

THE ALEXANDER MEIKLEJOHN PREMIUM IN LOGIC is paid from income of a fund established anonymously in 1951. The premium is awarded to a freshman, sophomore, or junior who excels in Logic and related subjects.

THE EVA A. MOOAR PREMIUM is derived from a fund established in 1967 by the gift of Mrs. Edward M. Kanzler (Lydia W. Mason '31) honoring Eva A. Mooar, Pembroke Dean of Admissions 1926-54. It is awarded annually to that woman student of the senior class "whose achievement over her college years gives evidence of the greatest mental growth and who has contributed to the college and to the community."

THE WALTER JOSEPH NELSON MEMORIAL PREMIUM FOR EXCELLENCE IN MUSIC, instituted in 1957, is paid from an expendable fund given to the University by friends of the late Dr. Walter J. Nelson, Brown 1934.

THE JAMES ALDRICH PIRCE PRIZE is awarded from the income of a fund established in 1927 by Miss Florence Pirce in memory of her brother, a member of the class of 1892. The prize is currently awarded to the male undergraduate who presents the best paper in the course in Greek Art and Archaeology or in Greek and Roman History, these being offered in alternate years.

THE ROSE LOW ROME MEMORIAL PRIZE IN POETRY, paid by gift by Mrs. Peter H. Ten Ecyk (Arlene B. Rome, Pembroke '43), is awarded annually for the best poem or poems submitted to the English Department by an undergraduate or graduate student.

THE SUSAN COLVER ROSENBERGER PRIZES were established in 1919 by Jesse L. Rosenberger, as a memorial to his wife, who was the daughter of Charles K. Colver, of the class of 1842. The awards are to be made under conditions to be laid down by the University.

- THE ROSTROPOVICH PRIZE IN MUSIC is awarded to the outstanding graduating string musician in the Brown Orchestra.
- THE HAROLD SCHLOSBERG MEMORIAL PREMIUM IN PSYCHOLOGY is derived from income of a fund established in 1964 by the colleagues, former students, and friends of Harold Schlosberg, Professor of Psychology and Chairman of the Department, 1954-1964. It is awarded annually to an outstanding male senior concentrating in Psychology.
- THE MURIEL FAIN SHER MEMORIAL PREMIUM IN PSYCHOLOGY is derived from the income of a fund established in 1952 by the friends of Muriel Fain Sher. It is awarded annually to the most outstanding woman student in the senior class "showing the greatest promise in the field of Psychology."
- THE GILBERT STUART PRIZES IN ART have been awarded since 1965, from income of the Gilbert Stuart Prize Fund, established in 1955-56 by friends of Brown University and of the Art Department, and named in honor of the renowned painter, a native of Rhode Island, for creative work in Art.
- THE ROHN TRUELL PREMIUM IN APPLIED MATHEMATICS is derived from income of a fund established in 1968 by friends of Rohn Truell, former Professor and Chairman of the Division of Applied Mathematics. It is awarded annually to a member or members of the senior class concentrating in Applied Mathematics, who during their studies at Brown have achieved high distinction.
- THE MARJORIE HARRIS WEISS MEMORIAL PREMIUM IN HISTORY is awarded annually to the outstanding undergraduate woman student majoring in History.

Advanced Awards

- THE WILLIAM ROBERT POTTER, 1877, PREMIUM IN CHEMISTRY, was established in 1942 from income of a fund bequeathed by William R. Potter. The premium is awarded "on the basis of a thesis of highest merit submitted by a postgraduate student specializing in Chemistry."
- THE BROWN CHAPTER OF SIGMA XI AWARD FUND was given to Brown University in 1954 by the Brown Chapter of Sigma Xi for an award toward the encouragement of science, whether for research, teaching, or otherwise.

Honorary Societies

Phi Beta Kappa

OFFICERS, 1983-85

	1981-83	1983-85
President:	VICTOR B. SCHWARTZ	BRUCE E. DONOVAN
Vice President:	BRUCE E. DONOVAN	GLADYS C. KAPSTEIN
Secretary:	KARL S. WEIMAR (1981-82) DUNCAN SMITH (1982-)	
Treasurer:	GLADYS C. KAPSTEIN (1981-)	
Historian:	BEVERLY S. RIDGELY (1981-82) ANDREW J. SABOL (1982-)	
Auditor:	VICTOR B. SCHWARTZ (1981-)	

The Rhode Island Alpha of the Phi Beta Kappa Society was established at Brown University in 1830. The Women's Section was organized in 1900. The two sections now elect as one body. The chapter annually elects to membership a certain number of the leading scholars of the senior and junior class.

Candidates for the degrees of Bachelor of Arts and Bachelor of Science are eligible for election to Phi Beta Kappa. Not more than one-sixth of the candidates for these degrees may be elected, and not more than one-third of the members from each class are elected in the junior year. At least 40% of a candidate's coursework must be in the humanities and/or social studies.

Two elections are ordinarily held each year, one after midyear and one in April. At midyear the juniors are elected, the choice being based primarily upon their scholastic standings as shown by the official college records. In April the seniors are selected.

In the language of its venerable by-laws, Phi Beta Kappa seeks to reward "acquisition of liberal culture; command of cultivated expressions in speech and writing; intellectual honesty and tolerance; breadth of intellectual interest; understanding not merely knowledge." In terms of present-day concerns and curricular structures, this is interpreted to mean that Phi Beta Kappa seeks to recognize, and thus to encourage, intellectual distinction among undergraduates, as attested by substantial formal evidence of outstanding academic accomplishment in the course of a broad educational experience that encompasses the humanities, social sciences, and natural sciences. Excessively narrow preoccupation with any discipline or field of study, to the exclusion of others, works against this purpose, and may constitute grounds for disqualification even in cases of unquestionably superior academic performance.

Sigma Xi

OFFICERS 1982-83

<i>President:</i>	JOSEPH KESTIN
<i>Vice-President:</i>	LEWIS P. LIPSITT
<i>Secretary:</i>	BARRETT HAZELTINE
<i>Treasurer:</i>	ANNETTE W. COLEMAN
<i>Board of Governors:</i>	STANLEY ARONSON
	HUMPHREY MARIS
	ROBERT C. RIPLEY
	JAN TULLIS
	MERWIN SIBULKIN

The Society of the Sigma Xi was founded in 1886 for the encouragement of original investigation in science, pure and applied. The Brown University Chapter, established in 1900, sponsors various lectures in the academic year.

Nominations are made by representatives of the various science departments. From the list of nominees the Board of Electors, meeting in February each year, elects those deemed eligible. This Board consists of the Chapter President, who acts *ex-officio* as Chairman, and a representative from each of the following departments: Applied Mathematics, Biology and Medicine, Chemistry, Computer Sciences, Engineering, Geological Sciences, Mathematics, Physics, and Psychology. The Board has full discretionary power within the conditions set forth in the Constitution of the Society and the By-Laws of the Chapter. The following are typical and traditional designations of persons eligible for election:

As Members:

- (a) Any professor, instructor, or other member of the staff of Brown University who has

shown noteworthy achievement as an original investigator in some branch of pure or applied science.

- (b) Any graduate student in Brown University who, judged by actual work of investigation, has exhibited an aptitude for scientific research.
- (c) Any graduate of Brown University of not less than five years standing, who has shown noteworthy achievement as an original investigator in some branch of pure or applied science, is eligible to alumni membership.
- (d) Any professor, instructor, or investigator connected with a neighboring educational, scientific, or professional institution not having a chapter who would otherwise be eligible for active membership.
- (e) Any associate within five years after graduation on the condition prescribed in (b) of this section.

As Associates:

- (a) Any graduate student in Brown University who has shown marked excellence in one or more departments of pure or applied science, and has given evidence of an aptitude for research in some field of science.
- (b) Any senior undergraduate student who has shown marked excellence in two or more departments of pure or applied science.

Tau Beta Pi

OFFICERS 1983-1984

<i>President:</i>	JANICE HUXLEY
<i>Vice President:</i>	MICHAEL R. ZURAW
<i>Corresponding Secretary:</i>	LORI S. WINTER
<i>Recording Secretary:</i>	BRUCE S. SIEGELL
<i>Treasurer:</i>	DAVID D. PARADISE

The Tau Beta Pi Association, national engineering honor society, was founded at Lehigh University in 1885 to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as undergraduates in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in the engineering colleges of America. Each chapter has full control of its individual affairs, the control being vested primarily in the undergraduate members. An alumni advisory board may act in an advisory and judiciary capacity.

To be eligible for election to membership as an undergraduate, the student must be in either the junior or senior year. To be eligible as a junior, scholastic records must fall within the top eighth of the class and as a senior the top fifth. Distinguished scholarship, while the primary requisite for admission, is not considered the sole criterion. After the scholarship requirements have been fulfilled, the selection is based on integrity, breadth of interest both inside and outside of engineering, adaptability, and unselfish activity. An alumnus, either of Brown University or other accredited engineering schools, may be elected to membership if he has a proven record of character, ability, and integrity, the election still being made by the undergraduate chapter.

The Rhode Island Alpha Chapter was installed at Brown University on February 12, 1954. At the time of the installation of the chapter, in addition to the charter members, 128 alumni members were initiated, mostly alumni who would have been eligible for membership in the society had the chapter existed prior to their graduation.

Rosenberger Medal

The Susan Colver Rosenberger Medal of Honor is awarded by designation of the Faculty. Provision for the medal was made in 1919 by Jesse L. Rosenberger as a memorial to his wife, with the stipulation that it be used to recognize "specially notable or beneficial achievement in scholarship, in authorship, in public life of any kind, or relating to the advancement of the public welfare, or for whatever it may be thought best thus to honor and commemorate..." The recipients and years of past awards are:

WILLIAM WILLIAMS KEEN	1925	ROWLAND ROBERTS HUGHES	1955
CHARLES EVANS HUGHES	1928	THEODORE FRANCIS GREEN	1956
JOHN DAVISON ROCKEFELLER, JR.	1931	ALEXANDER MEIKLEJOHN	1959
CHARLES VALUE CHAPIN	1935	WALDO GIFFORD LELAND	1965
MARY EMMA WOOLLEY	1937	THOMAS JOHN WATSON, JR.	1968
FRED TARBELL FIELD	1940	HENRY MERRITT WRISTON	1976
HENRY DEXTER SHARPE	1944	RICHARD SALOMON	1982
ZECHARIAH CHAFFEE, JR.	1947	CHARLES CARPENTER TILLINGHAST, JR.	1982
WARREN RANDOLPH BURGESS	1953	HOWARD ROBERT SWEARER	1983

Summary of Degrees

As of June 1983, there were enrolled the names of 62,721 graduates, both men and women. Of this number 49,841 had received the Bachelor's degree; 10,952 had received advanced degrees; 626 had received the degree of Doctor of Medicine; 1,302 had received honorary degrees.

Honorary Degrees Conferred by the University

Dedication of the Athletic Center, October 31, 1981

FREDERICK DOUGLASS POLLARD, *Doctor of Laws*

WALTER WELLESLEY SMITH, *Doctor of Letters*¹

February 11, 1982

HAROLD PINTER, *Doctor of Letters*

Commencement, June 7, 1982

AARON TEMKIN BECK, *Doctor of Medical Science*

WILLIAM MONTAGUE COBB, *Doctor of Medical Science*

ROBERT HALE IVES GODDARD, JR., *Doctor of Laws*

ELMA INA LEWIS, *Doctor of Fine Arts*

CLAUDE PETER MAGRATH, *Doctor of Laws*

CATHLEEN SYNGE MORAWETZ, *Doctor of Science*

KENNETH HARRY OLSEN, *Doctor of Science*

IEOH MING PEI, *Doctor of Fine Arts*

PINDAROS ROY VAGELOS, *Doctor of Science*

¹ Listed in 1981-1983 Catalogue.

Commencement, June 6, 1983

THEODORE (TEDDY) KOLLEK, *Doctor of Laws*

ROBERT GEORGE PETERSDORF, *Doctor of Medical Science*

BARBARA WERTHEIM TUCHMAN, *Doctor of Letters*

ADAM BRUNO ULAM, *Doctor of Laws*

JOHN WATTS YOUNG, *Doctor of Science*

The Associated Alumni of Brown University

Officers, 1983-84

<i>President:</i>	LACY B. HERRMAN '50	Darien, CT
<i>President-Elect:</i>	ROBERT P. SANCHEZ '58	Greenwich, CT
<i>Secretary:</i>	JUDITH KOREY CHARLES '46	New York, NY
<i>Treasurer:</i>	MARTHA CLARK BRILEY '71	Newtown, PA

Directors, 1982-83

F. GREGORY ABERNATHY '84	JOHN B. HENDERSON '46
HAROLD BAILEY, JR. '70	WILLIAM JACKSON '75
GEORGE L. BALL '60	JON KENT '86
THOMAS BILLINGS '63	ROBERT KLINE '61
WILLIAM BRISK '60	THOMAS LANDRY '52
JAMES D. BROWN '54	FRASER A. LANG '67
JOHN W. BROWN '58	ALAN J. LEVENSON '56
J. RICHARD CHAMBERS '69	GAIL E. MCCANN '75
ROBERT H. COLE '72	JAY R. MILLER '72
ANNE J. COMPTON '60	STEVE G. MILLER '72
JAMES CORBETT '62	JOHN J. MONAGHAN, JR. '55
SHIRLEY DARLING '44	ROBERT MOORE '76
JOEL DAVIS '56	ANDREA D. NEAL '80
ELLEN R. FREEMAN '84	JAVETTE PINKNEY '80
EDWIN N. FORMAN '56	DAVID PORTER '70
BARBARA S. GARDNER '73	EDGAR A. ROBINSON '55
STEPHEN A. GLASSMAN '72	ELIZABETH SHERMAN '77
MICHAEL GOLRICK '75	ANN C. STREET RUE '82
DAVID B. GOSHIE '59	SCOTT W. SMITH '76
DAVID M. GRAY '55	FREDERICK STAVIS '55
MICHAEL GROSS '64	JOAN WEBSTER '58
CLIFTON S. GUSTAVSON '41	DAVID WHITMAN '70
STEPHEN A. HAIRE '74	ELINOR WILSON '62
SCOTT BLAKE HARRIS '73	BREWSTER P. WYCKOFF '71

Brown Alumni Monthly

BOARD OF EDITORS, 1982-83

HAROLD BAILEY, JR. '70
CORNELIA D. DEAN '69
JAMES E. DuBOIS '50
DANTE G. IONATA '59

JOHN J. MONAGHAN '55
TONI H. OLIVIERO '65, '73 Ph.D.
DONALD B. SMITH '42
ELIZABETH WEED '73 Ph.D.
JOHN A. WORSLEY '56

Editor: ROBERT M. RHODES

Managing Editor: ANNE HINMAN DIFFILY '73

Associate Editor: KATHERINE A. HINDS

Editorial Associate: PETER MANDEL '81 A.M.

Summary of Enrollment

THE COLLEGE SEPTEMBER, 1982¹

	Men	Women	Total
Freshmen	695	692	1387
Sophomores.....	691	661	1352
Juniors	753	662	1415
Seniors.....	636	579	1215
Special Students	45	59	104
Total	2820	2653	5473

SEPTEMBER, 1983²

	Men	Women	Total
Freshmen	734	733	1467
Sophomores.....	715	718	1433
Juniors	668	637	1305
Seniors.....	676	526	1202
Special Students	41	55	96
Total	2834	2669	5503

GRADUATE SCHOOL SEPTEMBER, 1982

	Men	Women	Total
Full time	657	403	1060
Part time	60	85	145
Total	717	488	1205

SEPTEMBER, 1983

	Men	Women	Total
Full Time	703	458	1161
Part Time	35	27	62
Total	738	485	1223

PROGRAM IN MEDICINE SEPTEMBER, 1982

	Men	Women	Total
Full time	171	93	264

SEPTEMBER, 1983

	Men	Women	Total
Full time	173	105	278

¹ Figures do not include 26 seniors who were enrolled in the Medical Education Program.

² Figures do not include 18 seniors who were enrolled in the Medical Education Program.

GENERAL SUMMARY
SEPTEMBER, 1982

	Men	Women	Total
The College	2820	2653	5473
Graduate School.....	717	488	1205
Program in Medicine	171	93	264
Total	3708	3234	6942

SEPTEMBER, 1983

The College	2834	2669	5503
Graduate School.....	738	485	1223
Program in Medicine	173	105	278
Total	3745	3259	7004

Geographical Distribution

United States	The College	
	September 1982	September 1983
Alabama	12	10
Alaska	6	9
Arizona	17	17
Arkansas	6	8
California	302	325
Colorado	38	42
Connecticut	408	374
Delaware	16	14
District of Columbia	62	65
Florida	92	94
Georgia	35	33
Hawaii	37	30
Idaho	2	6
Illinois	161	172
Indiana	20	20
Iowa	13	16
Kansas	7	12
Kentucky	16	13
Louisiana	18	15
Maine	50	56
Maryland	161	166
Massachusetts	799	720
Michigan	64	61
Minnesota	61	57
Mississippi	2	1
Missouri	63	69
Montana	6	5
Nebraska	3	2
Nevada	1	1
New Hampshire	61	66
New Jersey	413	392
New Mexico	9	9
New York	1178	1138
North Carolina	25	25
North Dakota	1	3
Ohio	138	141
Oklahoma	19	15
Oregon	25	18
Pennsylvania	248	251
Puerto Rico	18	24
Rhode Island	329	338
South Carolina	6	8
South Dakota	2	1

Tennessee	38	41
Texas	71	73
Utah	8	3
Vermont	25	21
Virginia.....	90	87
Virgin Islands.....	1	1
Washington	37	40
West Virginia	10	11
Wisconsin	45	50
Wyoming.....	3	4
FOREIGN	195	172

Index

- Academic Freedom, 99
- Academic Status, 92
- Achievement Tests in Foreign Language, 92
- Activities, *see* Student Organizations
- Administration, Officers of, 14
 - Admission—The College, 81
 - Achievement Tests, 87
 - Advanced Placement, Admission with, 87
 - Application Fee, 83
 - College Entrance Examination Board Tests, 87
 - December Notifications, 82
 - Early Action Plan, 84
 - Early Evaluation Procedure, 82
 - From Other Colleges, 88
 - General Procedures, 82, 83
 - Graduate Students, 132
 - Ivy Group Admission Procedure, 81
 - Personal Interview, 85
 - Resumed Education Program, 88
 - Scholastic Aptitude Test, 87
 - Subject Requirements, 86
 - Transfer Admission, 88
 - Visits, 85
- Advanced Awards, 519
- Advanced Placement, Admission with, 87
- Afro-American Studies, Courses in, 162
- Alcohol Studies, Center for, 168
- Alumni, Associated, 524
- American Academy in Rome, 509
- American Civilization, Courses in, 168
 - Concentration in, 106
- American School of Classical Studies at Athens, 509
- American Schools of Oriental Research, 509
- Ancient and Medieval Culture,
 - Concentration in, 106
- Ancient History and Literature, Courses in, *see* Classics
- Ancient Studies, 171
- Ancient Studies, Concentration in, 107
- Andrews House, 502
- Annmary Brown Memorial, 494
- Anthropology, Courses in, 172
- Anthropology—Linguistics,
 - Concentration in, 107
- Appleton Lectures, 512
- Applied Mathematics, Courses in, 181
- Applied Mathematics—Biology,
 - Concentration in, 107
- Applied Mathematics—Computer Science, Concentration in, 108
- Applied Mathematics—Economics,
 - Concentration in, 109
- Applied Mathematics—Psychology,
 - Concentration in, 109
- Aptitude Test, 87
- Aquatic Biology, Concentration in, 110
- Archaeological Excavation in Greece and Italy, 510
- Archaeology, *see* Classics; *see* Anthropology
- Arrangements with Other Institutions, 509
- Art, Courses in, 190
 - At Rhode Island School of Design, 197
- Art Collections, 509
- Associated Alumni, 524
- Astronomy, Courses in, 391
- Athenaeum, 495
- Athletics, Intercollegiate, 503, 508
- Athletics, Intramural, 507
- Athletics, Officers in Division of, 22
- Attendance, 89
- Auditing, 89
- Bachelor of Arts, 102
- Bachelor of Science, 102
- Bacteriology, *see* Biology
- Balinese Gamelan Angklung, 378
- Biblical Literature, *see* Religious Studies
- Bibliography, Courses in, 198
- Bigelow Lecture Series, 513
- Bills, Payment of 148, 156

- Biochemistry, 198
- Biochemistry, Concentration in, 110
- Biology and Medicine, Courses in, 199
- Bio-Medical Ethics, 223
 - Concentration in, 111
- Biophysics, Concentration in, 111
- Board of Fellows, 9
- Board of Trustees, 9
- Bookstore, 508
- Brown Alumni Monthly, 524
- Brown Resource Center, 507
- Brown Scholarship Fund, 513
- Brown Union, *see* Faunce House,
- Brown University Bookstore, 508
- Brown University Lectures, 512
- Buildings and Grounds, 501

- Calendar, 6
- Career Planning Services, 101
- Certificates, State, 264
- Certification, Teacher, 264
- Chapel, 504
- Chaplain, Office of, 504
- Charges, Refund of, 149, 155
- Charges, Payment of, 148
- Charges, Student
 - The College, 147
 - Graduate School, 153
 - Program in Medicine, 154
- Chemistry, Courses in, 226
- Chemistry-German Concentration in, 112
- Child Study Center, 231
- Chinese, Courses in, 362
- Chorus, 375
- Classics, Courses in, 232
- Co-Educational Intramural Activities, 507
- Cognitive and Neural Research,
 - Institute for, 241
- Cognitive Science, 242
- Cognitive Science, Concentration in, 112
- College Entrance Examination Board, 87
- College Scholarship Service, 156
- Collegium for Liberal Learning,
 - Francis Wayland, 303
- Colver Lectures, 512
- Committees
 - Of the Corporation, 67
 - Of the Faculty, 70
- Comparative Literature, Courses in, 243
- Comparative Study of Development,
 - Center for, 247
- Computer Science, Courses in, 247
- Concentration Requirements, 104
 - Interdepartmental Programs, 106
- Concentration Evaluations, 91
- Concerts, 511
- Contents, 4
- Corporation of the University, Standing
 - Committees of, 67
- Correspondence, *inside front cover*
- Councils, 73
- Counseling, 100
- Course Announcement, 161
- Course Performance Reports, 91
- Courses of Instruction, 161
- Credit, Unit of, 161
 - Semester Hours of, 161

- Degrees, Requirements for
 - Bachelor of Arts, 102
 - Bachelor of Science, 102
 - Combined Baccalaureate-Masters
 - Degree Program, 125
 - Combined Five-Year Program, 124
 - Doctor of Medicine, 126
 - Doctor of Philosophy, 142
 - Integrated Baccalaureate Master's, 125
 - Master of Arts, 141
 - Master of Arts in Teaching, 363
 - Master of Medical Science, 128
 - Master of Science, 141
 - M.D.-Ph.D. Program, 128
 - Quantity Requirements, 102
 - With Distinction, 129
- Degrees Conferred
 - The College, 522
 - The Graduate School, 522
 - Honorary Degrees, 522
- Degrees with Distinction, 129
- Departmental Courses, 161
- Departments, Divisions, Centers,
 - Programs, 161
- Developmental Studies, 254
 - Concentration in, 113

- Dining Rooms, *see* University Food Services
- Discipline, 93
- Dismissal, 92
- Doctor of Medicine, 126
- Doctor of Philosophy, 142
- Dormitory Accomodations, *see* Student Residences
- Dynamical Systems, Lefschetz Center for, 256
- Early Action, 84
- East Asia Language and Area Center, 256
- Economics, Courses in, 257
- Education, Courses in, 263, *see also* Preparation of Teachers
- Egyptology, Courses in, 267
- Emeriti Officers, 12
- Employment, Student, 160
- Energy Studies,
 - Concentration in, 114
 - Courses in, 268
- Engineering, Courses in, 269
- Engineering and Economics,
 - Concentration in, 115
- Engineering Society, 521
- English, Courses in, 292
 - Honors Courses, 299
- English Requirement, 103
- Enrollment, 89
 - Full-time, 129
 - Graduate Students, 138
 - Summary of, 526
 - Undergraduates, 89
 - Without Academic Credit, 89
- Entrance Requirements, *see* Admission
- Environmental Studies, Courses in, 302
 - Concentration in, 115
- Equal Employment Opportunity, 101
- Examinations, 92
 - Achievement, 87
 - Entrance, 87
 - Fees, *see* Charges, Student
 - Final, 92
 - For Graduate Degrees, 133
 - Placement and Achievement, 92
 - Special, 92
- Executive Officers, *see* Officers of Administration
- Extradepartmental Courses, 463
- Faculty, 28
 - Standing Committees of, 70
- Faculty Lectures, 513
- Family Educational Rights and Privacy Act of 1974, 101
- Faunce House, 506
- Fees, *see* Charges, Student
- Fellows, Board of, 9
- Fellows Emeriti, 10
- Fellowships, 134
- Financial Aid
 - The College, 156
 - The Graduate School, 134
- Financial Information, 145
- Foreign Language Placement Tests, 92
- Foreign Students and Faculty, Advisor to, 504
- Foreign Students, Health Insurance for, 503
- Foreign Study, *see* Study Elsewhere
- Foreword, 3
- Foundations Courses, 484
- Francis Wayland Collegium for Liberal Learning, 303
- Fraternities, 505
- French Studies, Courses in, 304
- Full-time Enrollment, 129
- Gardner House, 497
- General Fee, *see* Charges, Student
- General Regulations, 81
- General Romance, Courses in, 332
- Geographical Distribution of Students, 528
- Geological Sciences, Courses in, 309
- Geology-Biology, Concentration in, 116
- Geology-Chemistry, Concentration in, 116
- Geology-Physics/Mathematics,
 - Concentration in, 117
- German, Courses in, 320
- Government, *see* Political Science
- Grading System, 90, 140
- Graduate Council, 73
- Graduate School, 132
 - Admission, 132
 - Aptitude and Achievement Tests, 133
 - Fellowships, Scholarships, Assistantships, 134

Financial Aid, 134
 Foreign Students, 133
 Grading System, 140
 Requirements for Degrees, 141
 Graduates, Statistics of, 522
 Graphic Services, 512
 Greek (Ancient and Modern), Courses
 in, 232
 Grounds and Buildings, 501
 Group Study, 488
 Guides, Student, 85

 Haffenreffer Museum, 497
 Health and Society, Concentration in,
 117
 Health Insurance, 503
 Health Service, 502
 Hispanic and Italian Studies, Courses
 in, 324
 Historical Society Library, 495
 History, Courses in, 333
 History and Chinese Language,
 Concentration in, 118
 History of Mathematics, Courses in,
 345
 History of the University, 74
 Honorary Degrees, 522
 Honorary Societies, 519
 Honors Program, 105
 Hospital Care, 502
 Human Biology, Concentration in, 118

 Independent Study Plans, 488
 Infirmary, *see* Medical Care Charges,
 Instruction, Officers of, 28
 Instructors, 28
 Insurance
 Accident and Sickness, 503
 Property, 505
 Intercollegiate Athletics, 503, 508
 Intercollegiate Center for Classical
 Studies, 510
 Interdepartmental Concentration
 Programs, 106
 International Relations
 Concentration in, 119
 Internships, 488
 Intramural Athletics, 507
 Italian Studies, Courses in, 330
 Ivy Group Admission Procedure, 81

Japanese, 363
 John Carter Brown Library, 493
 John D. Rockefeller, Jr., Library, 489
 John Hay Library, 490
 Johnson Lectures, 513
 Judaic Studies, 346
 Junior Year Abroad, 130

 Kirby Lecture Fund, 513

 Laboratories, 498
 Languages and Literatures, 353
 Latin, Courses in, 232
 Latin American Studies, Concentration
 in, 119
 Law and Liberal Education, 354
 Law and Society, Concentration in, 120
 Law Library, 495
 Lecturers, 28
 Lecturers, Public, 512
 Libraries
 Of Brown University, 489
 Annmary Brown Memorial,
 494
 John Carter Brown, 493
 John Hay, 490
 John D. Rockefeller, Jr., 489
 Pembroke, 493
 Sciences, 489
 Of Providence, 494
 Picture Lending, 506
 Linguistics, Courses in, 355
 Literature in English Translation, 353
 Literatures, Concentration in, 120
 Literature and Society, Concentration
 in, 120
 Loans to Students, 158
 Lownes Fund, 513

 Magna Cum Laude, 129
 Mandeville Lectures, 513
 Manning Chapel, 504
 Map, *last page*
 Master of Arts, 141
 Master of Arts in Teaching, 363
 Master of Medical Science, 128
 Master of Science, 141
 Mathematics, Courses in, 365

- Mathematical Economics,
 - Concentration in, 121
- Mathematics and Physics,
 - Concentration in, 121
- Medical Care, 502
- Medical Council, 73
- Medical Education, Program in, 142, 371
 - Charges, 154
 - Payment of Charges, 156
- Medical Examinations, 502
- Medical Library, 495
- Medical Science, Master of, 128
- Medical Staff, 502, 503
- Medieval Studies, Concentration in, 121
- Modern Language Board, 73
- Modern Literature and Society,
 - Programs in, 371
- Modernization, Concentration in,
 - see* Development Studies
- Modes of Thought Courses, 480
- Museums, The University, 497
- Music, Courses in, 371

- Neural Sciences, Courses in, 378
 - Concentration in, 122

- Officers
 - Emeriti, 12
 - Of Administration, 14
 - Of Instruction, 28
 - Of the University, 9
- Ogden Lectures, 513
- Old World Archaeology and Art,
 - Center for, 379
- Operations Research—Economics,
 - Concentration in, 122
- Orchestra, 375
- Organizational Behavior,
 - Concentration in, 122
- Organizations, Student, 508
- Oriental Research, American School of, 509
- Orientation Program, 89
- Other Institutions, Arrangements with, 509

- The College, 148
- The Graduate School and Program in Medicine, 156
- Pedagogy, *see* Education,
- Pembroke Campus Library, 493
- Pembroke Center for Teaching and Research on Women, 380
- Peterson Concert Fund, 513
- Phi Beta Kappa, 519
- Philology, *see* Linguistics,
- Philosophy, Courses in, 381
- Physical Education, 507
- Physical Plant, 501
- Physical Sciences Council, 73
- Physics, Courses in, 388
- Physiology, *see* Biology,
- Picture Lending Library, 506
- Placement, 92
- Placement Tests, 92
- Political Economy, *see* Economics,
- Political Science, Courses in, 395
- Population Studies and Training Center, 400
- Portuguese and Brazilian Studies,
 - Courses in, 402
- Practice Teaching, Provisions for, 511
- Preparatory Studies, Prizes for Excellence in, 514
- Prizes and Premiums for Excellence in Undergraduate Studies, 515
- Prizes, Premiums, Honors, 514
- Professors, 28
 - Assistant, 28
 - Associate, 28
- Providence Athenaeum, 495
- Providence Libraries, 494
- Providence Public Library, 494
- Providence, Teaching Arrangements with the City of, 511
- Psychological Services, 503
- Psychology, Courses in, 407
- Psycholinguistics, Concentration in,
 - see* Cognitive Science
- Psychological Tests, *see* Aptitude Test
- Public Lectures, 512
- Public Library, 494

- Quantity Requirements, 102

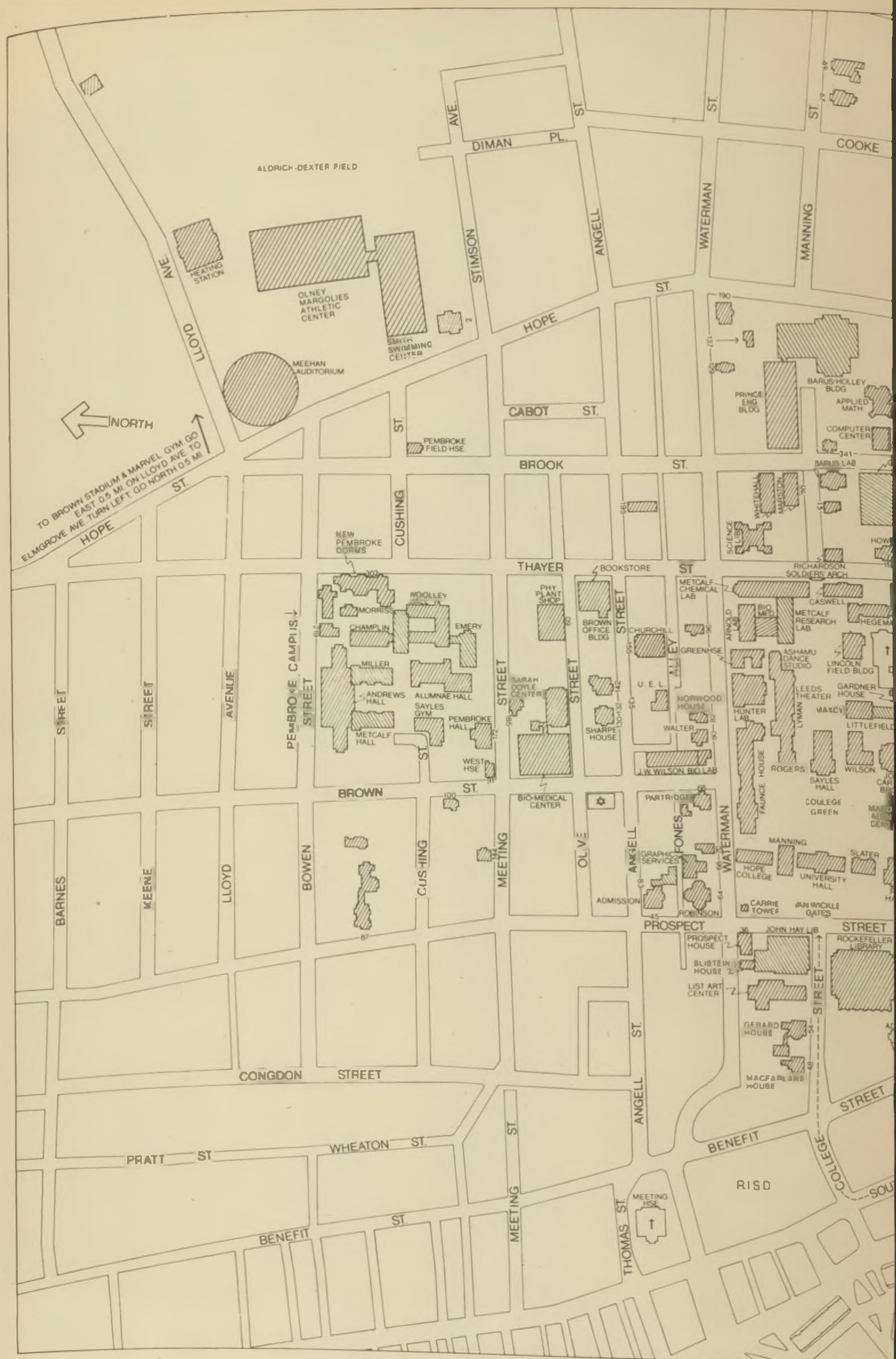
- Refectory, *see* Dining Rooms

- Payment of Charges

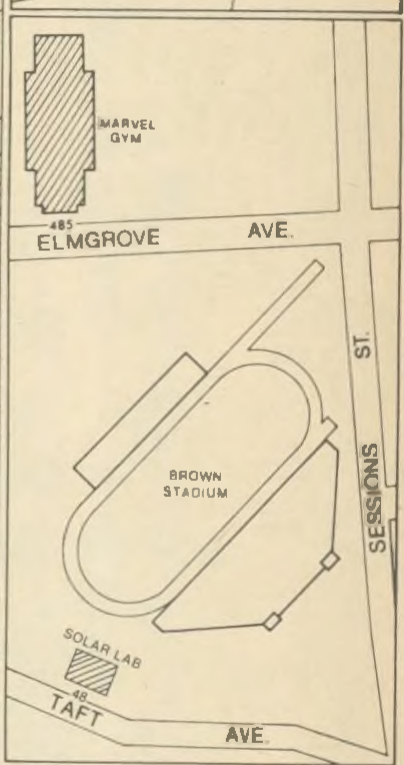
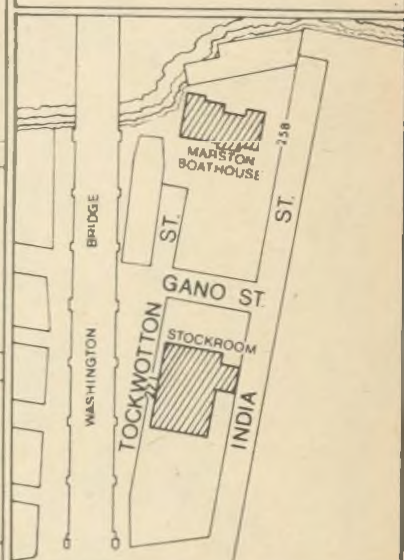
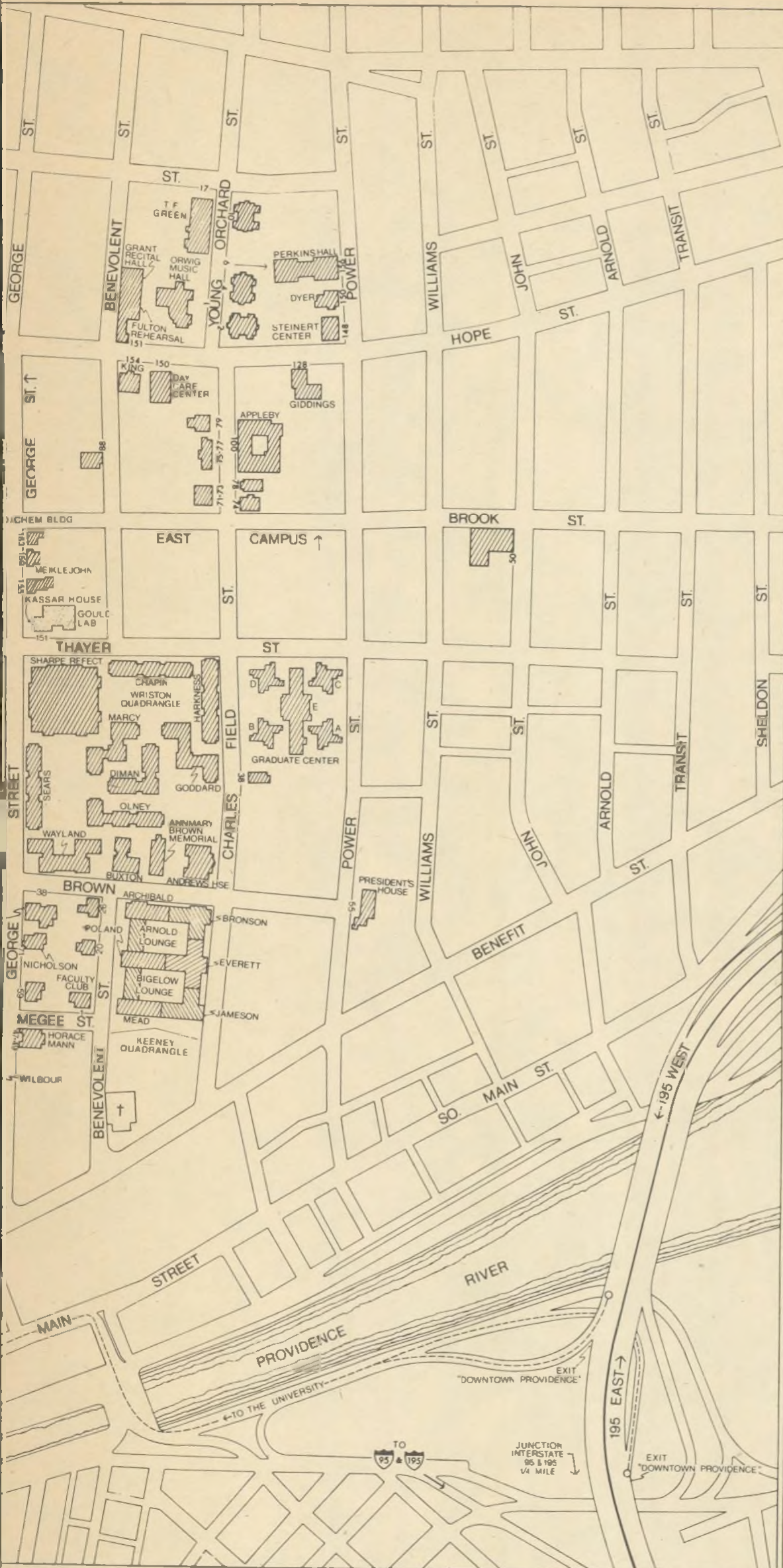
- Refund of Annual Charges—The College, 149
- Refund of Annual Charges—Program in Medicine, 155
- Registration and Enrollment, Enrollment without Academic Credit, 89
 - Fees for Lateness or Changes, the College, 148
- Registration of Graduate Students, 138
- Registration, Summary of, 526
- Regulations, General, 81
- Religion, Philosophy and History of, *see Religious Studies and Philosophy*
- Religious Studies, Courses in, 415
- Renaissance Studies,
 - Concentration in, 123
 - Program in, 427
- Reports of Attendance and Grading, 89
- Requirements for Entrance, *see Admission*
 - For Baccalaureate Degrees, 102
 - For Combined Degree Programs, 125
- Residence Halls, 505
- Residence Requirement, 103
- Resource Center, 507
- Resumed Education Program, 88
- Rhode Island, Arrangements with State Department of Education, 511
- Rhode Island Historical Society, Library of, 495
- Rhode Island Medical Society Library, 495
- Rhode Island School of Design, 197, 496, 509
- Rhode Island State Library, 496
- Robinson Memorial Fund, 513
- Rooms, *see Student Residences*
- Rosenberger Medal, 522
- Russian, Courses in, 433
- Russian Studies, Concentration in, 123
- Sanskrit, 241
- Sarah Doyle Women's Center, 507
- Scholarships
 - The College, 157
 - Endowed, 157
 - Gift, 157
 - The Graduate School, 134
- Scholarship Service (C.E.E.B.), 87
- Scholastic Aptitude Test, 87
- Semester Hours, 161
- Seminar Courses, 480
- Semiotics, Courses in, 428
- Serious Warning, 92
- Sigma Xi, 520
- Sisson Memorial Lectureship, 513
- Slavic, Courses in, 434
- Slavic Languages, Courses in, 431
- Social Science Data Center, 439
- Sociology, Courses in, 439
- Spanish, Courses in, 326
- Special Examinations, 92
- Special Graduate Study, 144
- Special Students, Admission of, 88
- Special Themes and Topics, 463
- Special Themes and Topics/ Seminar Courses, 481
- State Library, 496
- Stuart Memorial Lectureships, 513
- Student Aid
 - The College, 156
 - Graduate School, 134
- Student Charges
 - The College, 147
 - Graduate School, 153
- Program in Medicine, 154
- Student Employment, 160
- Student Life and Organizations, 504
- Student Loan Funds, 158
- Student Organizations, 508
- Student Residences
 - Undergraduates, 505
 - Graduate Students, 506
- Student Support Program, 100
- Student Teachers, 511
- Students, Summary of, 526
- Study Elsewhere, Guidelines for, 129
- Summary of Degrees, 522
- Summary of Enrollment, 526
- Surveying, *see Engineering*
- Tau Beta Pi, 521
- Teachers, Preparation of, 511, *see also Education*
- Tests, *see Examinations*
 - Placement and Achievement Tests in Foreign Languages, 92
 - Scholastic Aptitude Test, 87
- Theatre Arts, Courses in, 453

- Tougaloo College Cooperative Program, 510
- Transfer Applicants—The College, 88
- Transcripts, 147, 153
- Trustees, Board of, 9
- Trustees, Emeriti, 10
- Tuition Regulations (*see also* Charges)
 - The College, 145
 - The Graduate School, 150
- Types of Courses Offered, 161
- Undergraduate Studies, Prizes and Premiums for Excellence in, 515
- Union, Brown, *see* Faunce House,
- Unit of Credit, 161
- University Calendar, 76
- University Council on Student Affairs, 73
- University Courses, 471
- University Food Services, 505
- University Health Service, 502
- University Library, Special Collections, 490
- Urban Studies, 458
 - Concentration in, 123
- Vagabonding, 89
- Warning, 92
- Wetmore Fund, 513
- Women's Center, Sarah Doyle, 507
- Woods Lectures, 512
- Worship, 504
- Zoology, *see* Biology

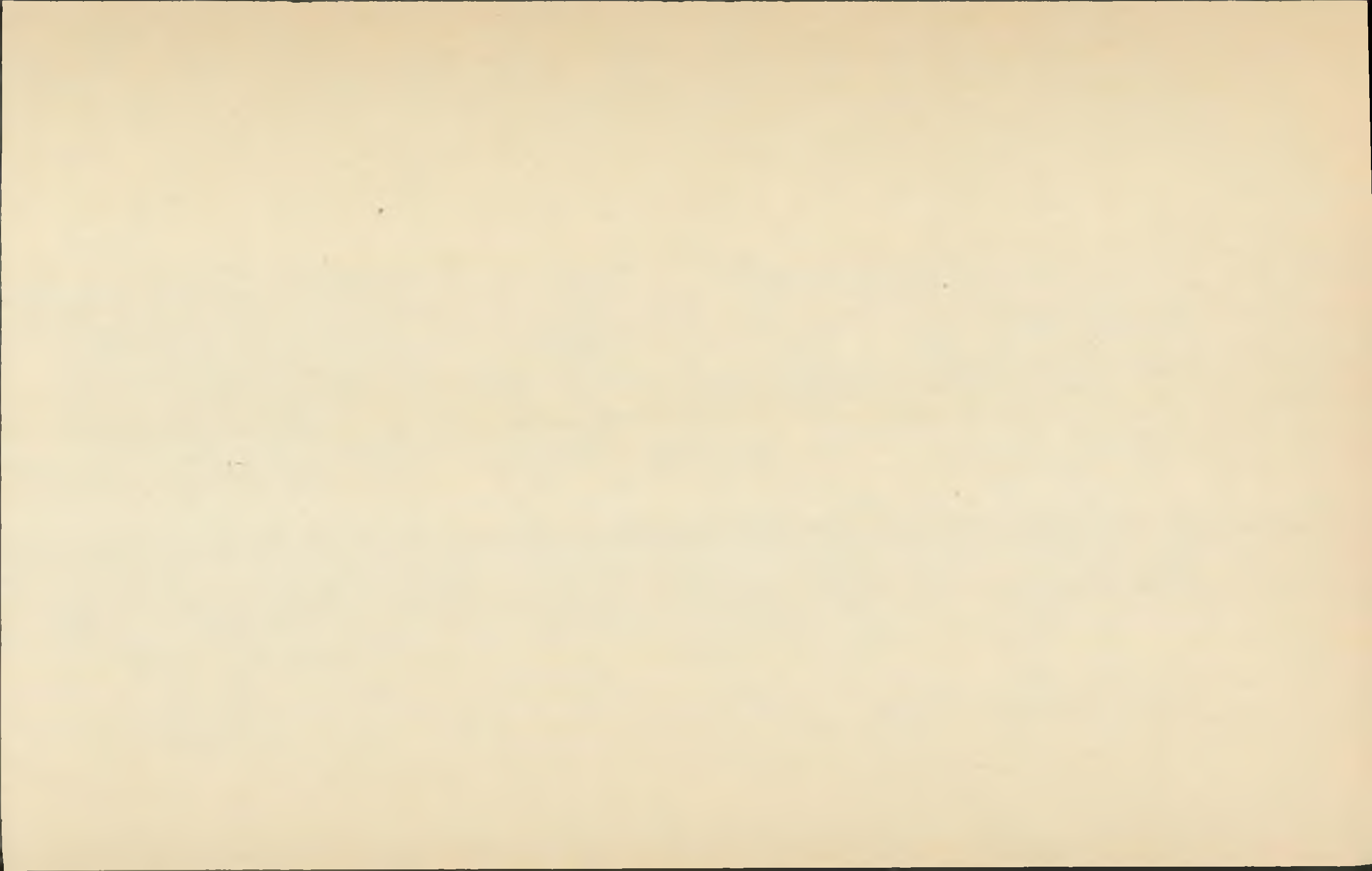




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