

BROWN



Catalogue of the University
for the years
1979 - 1981

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This catalogue is intended to provide only general information concerning Brown University and is not in any manner contractually binding. The information contained herein is subject to revision and change at any time.

CORRESPONDENCE

Correspondence addressed to Brown University, 79 Waterman Street, Brown Station, Providence, Rhode Island 02912, may be expected to reach the proper department but, in order to avoid delay, information and/or inquiries concerning the following matters should be addressed as noted below:

<i>Item</i>	<i>Address to:</i>
Matters directly in the charge of or concerning the general interests of the:	
Corporation	President
University	President
The College	Dean of The College
Graduate School	Dean of the Graduate School
Program in Medicine	Dean of Medicine
Alumnae and Alumni	Director of Alumni Relations
Inquiries from applicants for admission for information of any nature (e.g., courses, financial aid, loans, housing, etc.)	For undergraduates, the Board of Admission; for graduate students, the Dean of the Graduate School; for the Program in Medicine, the Dean of Medicine
Catalogues	Registrar

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POSTMASTER

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BROWN



Catalogue of the University
for the years
1979 - 1981

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, "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 21-27.

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 *all* its students, and a distinct campus close to an urban center.

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1979

SEPTEMBER							OCTOBER							NOVEMBER							DECEMBER						
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1980

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18	19	20	21	22	23	24	22	23	24	25	26	27	28	20	21	22	23	24	25	26	17	18	19	20	21	22	23
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1981

JANUARY							FEBRUARY							MARCH							APRIL						
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18	19	20	21	22	23	24	22	23	24	25	26	27	28	22	23	24	25	26	27	28	19	20	21	22	23	24	25
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31	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	31	..	..	..	..	..

University Calendar



1979-1980

1979

JUNE 13-JULY 27	<i>Wednesday to Friday.</i> Graduate Summer School for Teachers.
AUGUST 5	<i>Sunday.</i> Last day for payment of charges.
SEPTEMBER 5	<i>Wednesday.</i> Annual Meeting of the Corporation (<i>first Wednesday in September</i>).
SEPTEMBER 10	<i>Monday.</i> Orientation Week begins (<i>second Monday in September</i>).
SEPTEMBER 10-14	<i>Monday through Friday, 12 noon.</i> Registration of new graduate students.
SEPTEMBER 17	<i>Monday.</i> Opening of the 1979-80 Academic Year (<i>third Monday in September</i>). Convocation.
SEPTEMBER 17	<i>Monday.</i> Classes of the first semester begin.
OCTOBER 8	<i>Monday.</i> Columbus Day Holiday.
NOVEMBER 3	<i>Saturday.</i> Mid-semester (<i>first Saturday in November</i>).
NOVEMBER 12	<i>Monday.</i> Veterans' Day Holiday.
NOVEMBER 21-26	<i>Wednesday, 12:00 noon, to Monday, 8:00 a.m.</i> Thanksgiving recess.
DECEMBER 20	<i>Thursday, noon.</i> Classes end for those courses in which the Reading Period will be observed.
DECEMBER 20, 1979- JANUARY 7, 1980	<i>Thursday, noon, to Monday, 8:00 a.m.</i> Christmas recess.

1980

JANUARY 7	<i>Monday, 8:00 a.m.</i> Classes resume for those courses in which the Reading Period will not be observed.
JANUARY 7-11	<i>Monday through Friday.</i> Reading Period.
JANUARY 11	<i>Friday.</i> Classes of the first semester end for those courses in which the Reading Period was not observed (<i>Friday following second Thursday in January</i>).
JANUARY 14-23	<i>Monday to Wednesday, inclusive, omitting Sunday.</i> Final examinations of the first semester (<i>including third Thursday in January</i>).
JANUARY 15	<i>Tuesday.</i> Applications due for fellowships, scholarships, assistantships for 1980-1981 in the Graduate School.
JANUARY 21-25	<i>Monday through Friday.</i> Registration of new and readmitted graduate students for the second semester.
JANUARY 29	<i>Tuesday.</i> Last day for registration of undergraduate new and readmitted students for Semester II.
JANUARY 30	<i>Wednesday, 8:00 a.m.</i> Classes of the second semester begin (<i>Wednesday after last Sunday in January</i>).
MARCH 1-3	<i>Saturday through Monday.</i> Long weekend. No University exercises (<i>fifth Monday and preceding Saturday of Semester II</i>).

MARCH 15	<i>Saturday. Mid-semester (Saturday preceding third Sunday in March).</i>
MARCH 21	<i>Friday. Theses of candidates for the degree of Doctor of Philosophy in June due.</i>
MARCH 29- APRIL 7	<i>Saturday to Monday, 8:00 a.m. Spring recess (including first Wednesday in April).</i>
APRIL 14	<i>Monday. Theses of candidates for Masters degree in June due.</i>
APRIL 29	<i>Tuesday, 7:50 p.m. Classes end for those courses in which the Reading Period will be observed.</i>
APRIL 30-MAY 12	<i>Wednesday through Monday. Reading Period.</i>
MAY 12	<i>Monday, 6 p.m. Classes of second semester end for those courses in which the Reading Period was not observed (Monday preceding third Friday in May).</i>
MAY 14-23	<i>Wednesday to Friday, inclusive, omitting Sundays. Final examinations of the second semester (including fourth Friday in May).</i>
MAY 30	<i>Friday. Meeting of the Board of Fellows.</i>
MAY 31	<i>Saturday. Annual Meeting of Phi Beta Kappa.</i>
MAY 31	<i>Saturday. Commencement Meeting of the Corporation.</i>
JUNE 1	<i>Sunday, 3 p.m. Baccalaureate Sermon.</i>
JUNE 2	<i>Monday. Commencement and Graduate School Convocation (first Monday in June).</i>

1980-1981

1980

JUNE 18-AUGUST 1	<i>Wednesday to Friday. Graduate Summer School for Teachers.</i>
AUGUST 5	<i>Tuesday. Last day for payment of charges.</i>
SEPTEMBER 3	<i>Wednesday. Annual Meeting of the Corporation (first Wednesday in September).</i>
SEPTEMBER 8	<i>Monday. Orientation Week begins (second Monday in September).</i>
SEPTEMBER 8-12	<i>Monday through Friday, 12 noon. Registration of graduate students.</i>
SEPTEMBER 15	<i>Monday. Opening of the 1980-81 Academic Year (third Monday in September). Convocation.</i>
SEPTEMBER 15	<i>Monday. Classes of the first semester begin.</i>
OCTOBER 13	<i>Monday. Columbus Day Holiday.</i>
NOVEMBER 1	<i>Saturday. Mid-semester (first Saturday in November).</i>
NOVEMBER 11	<i>Tuesday. Veterans' Day.</i>
NOVEMBER 26- DECEMBER 1	<i>Wednesday, 12:00 noon, to Monday, 8:00 a.m. Thanksgiving recess.</i>
DECEMBER 18	<i>Thursday, noon. Classes end for those courses in which the reading period will be observed.</i>
DECEMBER 18, 1980- JANUARY 5, 1981	<i>Thursday, noon to Monday, 8:00 a.m. Christmas Recess.</i>

1981

JANUARY 5	<i>Wednesday, 8:00 a.m. Classes resume for those courses in which the Reading Period will not be observed.</i>
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JANUARY 5-9	<i>Monday through Friday. Reading Period.</i>
JANUARY 15	<i>Tuesday. Applications for fellowships, scholarships, and assistantships for 1981-82 in the Graduate School due.</i>
JANUARY 9	<i>Friday. Classes of the first semester end for those courses in which the Reading Period was not observed. (Friday following second Thursday in January).</i>
JANUARY 12-21	<i>Monday to Wednesday, inclusive, omitting Sunday. Final examinations of the first semester (including third Thursday in January).</i>
JANUARY 19-23	<i>Monday through Friday. Registration of new and readmitted graduate students for the second semester.</i>
JANUARY 27	<i>Tuesday. Last day for registration for Semester II.</i>
JANUARY 28	<i>Wednesday, 8:00 a.m. Classes of the second semester begin (Wednesday after last Sunday in January).</i>
FEBRUARY 28- MARCH 2	<i>Saturday through Monday. Long weekend. No University exercises (fifth Monday and preceding Saturday of Semester II).</i>
MARCH 14	<i>Saturday. Mid-semester (Saturday preceding third Sunday in March).</i>
MARCH 27	<i>Friday. Theses of candidates for the degree of Doctor of Philosophy in June due.</i>
MARCH 28-APRIL 6	<i>Saturday to Monday, 8:00 a.m. Spring recess (including first Wednesday in April).</i>
APRIL 13	<i>Monday. Theses of candidates for Masters degrees in June due.</i>
APRIL 28	<i>Tuesday, 7:50 p.m. Classes end for those courses in which the Reading Period will be observed.</i>
APRIL 29-MAY 11	<i>Wednesday through Monday. Reading Period.</i>
MAY 11	<i>Monday, 6 p.m. Classes of the second semester end (Monday preceding third Friday in May).</i>
MAY 13-22	<i>Wednesday to Friday, inclusive, omitting Sundays. Final examinations of the second semester (including fourth Friday in May).</i>
MAY 29	<i>Friday. Meeting of the Board of Fellows.</i>
MAY 30	<i>Saturday. Annual Meeting of Phi Beta Kappa.</i>
MAY 30	<i>Saturday. Commencement Meeting of the Corporation.</i>
MAY 31	<i>Sunday, 3 p.m. Baccalaureate Sermon.</i>
JUNE 1	<i>Monday. Commencement and Graduate School Convocation (first Monday in June).</i>

1981-1982

1981

SEPTEMBER 21	<i>Monday. Opening of the 1981-82 Academic Year (third Monday in September).</i>
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The Corporation

Officers

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THOMAS JOHN WATSON, JR., A.B., L.H.D., LL.D., *Vice Chancellor*
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¹Term expires June 1980.

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¹Term expires June 1980.

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HAROLD HERBERT YOUNG

Committees



*Standing Committees of the Corporation*¹

Advisory and Executive Committee

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

Members 1978-79: Messrs. CHOQUETTE, LITTLEFIELD, SALOMON, Mrs. FARNHAM, Messrs. UDIS, WATSON, ALDEN, BUTCHER, and Ms. LEVEN.

Members 1979-80: Mrs. FARNHAM, Messrs. UDIS and WAY (to 1980); Messrs. ALDEN, BUTCHER, and Ms. LEVEN (to 1981); Messrs. SHARPE, TAYLOR, and TILLINGHAST (to 1982).

*Athletic Advisory Council*²

Three officers of the administration designated by the President, all *ex officio*.

Members 1978-79: Mr. BRIAN (Chairman), Mrs. FAIRCHILD, and Mr. BUONANNO; Messrs. J. W. KLING, A. GLEASON, and F. S. LEVIN; Mr. R. D. VAUGHAN, Ms. K. W. SCALA, and Mr. D. M. COLEMAN.

Members 1979-80: Mrs. FAIRCHILD, Mr. GLEASON, and Ms. SCALA (to 1980); Messrs. BUONANNO (Chairman), G. M. SEIDEL,³ and COLEMAN (to 1981); Messrs. TAURO, T. F. MORSE, and K. G. KNOWLES (to 1982).

Audit Committee

The TREASURER, nonvoting member, *ex officio*.

Members 1978-79: Messrs. CHOQUETTE (Chairman), HUNT, and BUONANNO.

Members 1979-80: Mr. CHOQUETTE (Chairman) (to 1980); Mr. BUONANNO (to 1981); and Mr. LITTLEFIELD (to 1982).

Committee on Budget and Finance

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

Members 1978-79: Mr. BUTCHER (Chairman), Ms. LEVEN, Messrs. ROGERS, JOSLIN, and MACMILLAN.

Members 1979-80: Ms. LEVEN and Mr. ROGERS (to 1980); Messrs. BUTCHER (Chairman) and JOSLIN (to 1981); Mr. TILLINGHAST (to 1982).

Committee on Computers in Education

Members 1978-79: Messrs. C. S. SMITH, TUKEY (Chairman), WALLERSTEIN, W. M. GENTLEMAN, E. T. IRONS, W. F. MILLER, H. COHEN, D. L. KREIDER, and TEAL.

Members 1979-80: Messrs. GENTLEMAN, IRONS, and MILLER (to 1980); Messrs. COHEN, KREIDER, and TEAL (to 1981); Messrs. SMITH and TUKEY (Chairman) (to 1982).

Committee for Consultation Between the Corporation and the Faculty

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

Members 1978-79: Mrs. NOWLIS, Messrs. LITTLEFIELD and UDIS; the EXECUTIVE COMMITTEE OF THE FACULTY POLICY GROUP.

Members 1979-80: Mr. LITTLEFIELD (to 1980); Mr. UDIS (to 1981); and Mrs. POLLOCK (to 1982); the EXECUTIVE COMMITTEE OF THE FACULTY POLICY GROUP.

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

²Student members not listed.

³Replaced F. S. LEVIN (on leave).

COMMITTEE ON BUDGET AND FINANCE, and the SENIOR CO-CHAIRMAN OF THE BROWN FUND, all *ex officio*.

Members 1978-79: Mr. CADWGAN, Mrs. FARNHAM, Mr. UDIS, Mrs. WOLF, Messrs. SALOMON, SHARPE (Chairman), Mrs. SMULLYAN, Messrs. HARMON, LIPPITT, PENNER, and TAYLOR.

Members 1979-80: Messrs. RESS, SHARPE (Chairman), Mrs. SMULLYAN, and Mr. TILLINGHAST (to 1980); Messrs. HARMON, LIPPITT, PENNER, and TAYLOR (to 1981); Mr. R. J. CARNEY, Mrs. L.D. GILLESPIE, Ms. LEVEN, and Mrs. WOLF (to 1982).

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 1978-79: Messrs. J. O. KAMM, PAINE, WALLERSTEIN, Mrs. EKSTROM, Messrs. A. B. KERNAN, R. W. MORSE (Chairman), Mrs. HARTLAND-THUNBERG, Messrs. HUDSON and LITTLEFIELD.

Members 1979-80: Mrs. EKSTROM, Messrs. KERNAN and MORSE (Chairman) (to 1980); Mrs. HARTLAND-THUNBERG, Messrs. HUDSON and LITTLEFIELD (to 1981); Mr. KAMM, Mrs. PRAGER, and Mr. WALLERSTEIN (to 1982).

Investment Committee

The PRESIDENT and the TREASURER, *ex officio*.

Members 1978-79: Messrs. FAIN, FAY, GOSNELL (Chairman), H. E. BIGLER, Mrs. HARTLAND-THUNBERG, Messrs. JOHNSON and D. B. CLAYSON.

Members 1979-80: Mr. BIGLER, Mrs. HARTLAND-THUNBERG, and Mr. JOHNSON (to 1980); Mr. CLAYSON (to 1981); Messrs. CADWGAN (Chairman) and RESS (to 1982).

Lectureships Committee

The PROVOST and DEAN OF THE FACULTY, *ex officio*.

Members 1978-79: Messrs. TRACY, REYNOLDS, and HART; Messrs. R. A. ELLIS, H. KOLSKY, G. R. RUSSOM, M. J. MCGRATH, and J. H. CLARKE.

Members 1979-80: Messrs. REYNOLDS, RUSSOM, and MCGRATH (to 1980); Messrs. HART and CLARKE (to 1981); Messrs. D. H. AVERY and V. TERRAS (to 1982).

Library Committees

Annmary Brown Memorial Committee of Management

The PRESIDENT (Chairman), the UNIVERSITY LIBRARIAN, and the LIBRARIAN OF THE JOHN CARTER BROWN LIBRARY, *ex officio*.

Members 1978-79: Mrs. P. GORDAN, Mr. R. HIRSCH, Ms. B. K. LEWALSKI, Messrs. F. R. GOFF, A. S. TRUEBLOOD, and A. MOLHO.

Members 1979-80: Messrs. GOFF and TRUEBLOOD (to 1980); Messrs. HIRSCH and MOLHO (to 1981); Mr. W. H. D. GODDARD and Ms. LEWALSKI (to 1982).

John Carter Brown Library Committee of Management

The PRESIDENT (Chairman), *ex officio*.

Members 1978-79: Messrs. LIPPITT, BROWN, A. P. LORING, and A. OLIVER.

Members 1979-80: Messrs. BROWN and LORING (to 1980); Mr. OLIVER (to 1981); Mr. LIPPITT (to 1982).

University Library Committee

The PRESIDENT (Chairman), *ex officio*.

Members 1978-79: Messrs. R. W. BOSS, KASMIRE, LIPPITT, TUKEY, FERNALD, J. K. LUCKER, A. E. LOWNES, Mrs. S. F. PILAVIN-ROBINSON, Mr. ALDEN, Mrs. BLISTEIN, Mrs. A. S. K. BROWN, and Mr. A. B. MERKIN.

Members 1979-80: Messrs. FERNALD, LUCKER, REDDING,¹ and Mrs.

¹Replaced A. E. LOWNES (deceased).

PILAVIN-ROBINSON (to 1980); Mr. ALDEN, Mrs. BLISTEIN, Mrs. BROWN, and Mr. MERKIN (to 1981); Messrs. J. DAVIS, LIPPITT, J. P. McDONALD, and TUKEY (to 1982).

Committee on Medical Education

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

Members 1978-79: Mr. R. H. I. GODDARD, Mrs. LEEDS, Messrs. R. G. PETERSDORF, WHITE, Mrs. FISCHER, Mrs. E. M. SILVER, Messrs. R. E. GOSSELIN, E. D. PELLEGRINO, S. F. GREENWALD, T. H. HUNTER, PFAFFMAN (Chairman), and H. F. SPALTER.

Members 1979-80: Mrs. FISCHER, Mrs. SILVER, Messrs. GOSSELIN, and PELLEGRINO (to 1980); Messrs. GREENWALD, HUNTER, PFAFFMANN, and SPALTER (to 1981); Mr. BUONANNO, Mrs. P. L. LEVEN, Messrs. PETERSDORF (Chairman), TARP, and WHITE (to 1982).

Committee on Minority Affairs¹

Members 1978-79: Mrs. BLISTEIN, Mr. D. M. BOLLE, Ms. C. C. MARKS, Messrs. W. S. POOLE, J. J. RAMOS, REDDING, B. BECKHAM, T. J. BROWN, E. F. GREENE, Ms. D. E. JORDON, Mrs. MICHAELSON, Messrs. NEWMAN, R. A. NURSE, TERRY (Chairman), J. W. HAITH, W. MCK. JACKSON, F. S. LEVIN, and LIPPITT.

Members 1979-80: Messrs. BECKHAM, BROWN, GREENE, Ms. JORDON, Mrs. MICHAELSON, Messrs. NEWMAN, NURSE, and TERRY (Chairman) (to 1980); Messrs. HAITH, JACKSON, LEVIN, and LIPPITT (to 1981); Mrs. BLISTEIN, Mr. BOLLE, Mrs. GREENWALD, Ms. MARKS, Messrs. POOLE and RAMOS (to 1982).

Nominating Committee

Members 1978-79: Mrs. FARNHAM, Messrs. SLICK and LITTLEFIELD (Chairman).

Members 1979-80: Mr. SLICK (to 1980); Mr. LITTLEFIELD (Chairman) (to 1981); Mr. HART (to 1982).

Planning and Building Committee

The PRESIDENT, *ex officio*.

Members 1978-79: Messrs. CASPERSEN, F. B. DAVIS, SAUNDERS, J. N. BROWN (Chairman), FERNALD, LIPPITT, GAMMINO, HUGHES, and PENNER.

Members 1979-80: Messrs. BROWN (Chairman), FERNALD, and LIPPITT (to 1980); Messrs. GAMMINO, HUGHES, and PENNER (to 1981); Messrs. CASPERSEN, DAVIS, and SAUNDERS (to 1982).

Committee on the Presidency

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

Standing Committee Vacancies Committee

Members 1978-79: Mrs. FISCHER (Chairman), Messrs. ROGERS and CADWGAN.

Members 1979-80: Mr. ROGERS (Chairman) (to 1980); Mr. CADWGAN (to 1981); Ms. HOWARD (to 1982).

Student Life Committee

Members 1978-79: Mr. F. B. DAVIS, Mrs. FAIRCHILD, Messrs. FEARON (Chairman), BERRY, Ms. LEVEN, Mrs. MICHAELSON, Ms. HOWARD, Mr. ITTLESON, and Mrs. WHITTAKER.

Members 1979-80: Mr. FEARON (Chairman), Ms. LEVEN, Mrs. MICHAELSON, and Mr. TROTTER (to 1980); Ms. HOWARD, Mr. ITTLESON, and Mrs. WHITTAKER (to 1981); Messrs. EHRLICH, GIBBONS, and TROTTER (to 1982).

Trustee Vacancies Committee

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

Members 1978-79: Mrs. NOWLIS, Messrs. SLICK and ITTLESON.

¹Committee established January 1, 1978; student members not listed.

Members 1979-80: Mr. SLICK (to 1980); Mr. ITTLESON (to 1981); Mrs. WHITTAKER (to 1982).

*Standing Committees and Officers of the Faculty*¹

NOTE: All terms begin on 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 AND ACADEMIC AFFAIRS, the VICE-PRESIDENT (Biology & 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 1978-79: M. ANDERSON, J. BAIRD, D. BUCHDAHL, W. DINNEEN, D. FORSYTH, L. GOLDSTEIN, W. HOLLINSHEAD, M. HOLLOS, D. JOSEPHSON, F. KOBRIN, H. PFAUTZ, S. REISS, J. SAVAGE, G. SHAPIRO, S. TWISS, W. VANECH, R. WINKES, and W. WOLOVICH.

Members 1979-80: J. BAIRD, W. DINNEEN, D. FORSYTH, F. KOBRIN, S. REISS, G. SHAPIRO, R. WINKES, and W. WOLOVICH (to 1980); C. DAFERMOS, A. HOLOWINSKY, D. JOSEPHSON, J. LENZ, A. SENFT, M. SIBULKIN, E. SOSA, CHUNG-I TAN, and B. WOOTEN (to 1981).

Advisory Committee on University Planning (established March 1973)

The PROVOST and DEAN OF THE FACULTY AND ACADEMIC AFFAIRS, the VICE-PRESIDENT (Administration & Finance), the DEAN OF THE GRADUATE SCHOOL, the DEAN OF THE COLLEGE, and the VICE-PRESIDENT (Biology & Medicine) as *ex officio* members.

Members 15 April 1978-79: B. ANDERSON, E. BLISTEIN, B. HAZELTINE, J. IMBRIE, H. NACE, and J. REEDER.

Members 15 April 1979-80: E. BLISTEIN and B. HAZELTINE (to 15 April 1980); H. NACE (to 15 April 1981); A. OLDCORN, and G. WOOD (to 15 April 1982).

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 1978-79: B. DONOVAN, G. HAGY, W. PERKINS, and J. WRENN.

Members 1979-80: W. PERKINS (to 1980); B. DONOVAN and J. WRENN (to 1981); P. RIEGER (to 1982).

Committee on Admission and Financial Aid (reorganized November 1969)

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

Members 31 January 1978-79: I. CROSMAN, R. BELANCE, K. KANG, F. KOBRIN, R. PARKS, R. ROHR, and J. WRENN.

Members 31 January 1979-80: R. ROHR (to 1980); R. BELANCE and R. PARKS (to 1981); J. AMOR Y VAZQUEZ, E. KORNHAUSER, and J. SILVERBERG (to 1982).

NOTE: Full membership of this Committee includes four undergraduates selected annually by the duly-elected undergraduate government.

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

Committee on Awards and Benefits (established May 1973)

The DEAN OF THE FACULTY AND ACADEMIC AFFAIRS, the VICE-PRESIDENT (Administration & Finance), *ex officio*.

Members 1978-79: S. COBB, H. DYER, D. FELDMAN, L. LIPSITT, S. SHERMAN, and D. SIMONS.

Members 1979-80: S. COBB and S. SHERMAN (to 1980); E. LEDUC and D. SIMONS (to 1981); B. HARRIS and P. RICHARDSON (to 1982).

Committee on Commencement Speakers

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

Members 1978-79: J. AMOR Y VAZQUEZ, D. HEATH and J. WORKMAN.

Members 1979-80: J. WORKMAN (to 1980); J. AMOR Y VAZQUEZ (to 1981); J. VAN CLEVE (to 1982).

Committee on Drafting (established November 1971)

Members 1978-79: P. ARANT, H. PFAUTZ, and D. ROHR.

Members 1979-80: P. ARANT, F. KOBRIN, and D. ROHR.

Committee on Educational Policy (established November 1969)

The PRESIDENT, the PROVOST AND DEAN OF THE FACULTY AND ACADEMIC AFFAIRS, the DEAN OF THE GRADUATE SCHOOL, the DEAN OF THE COLLEGE (Chairman) and the CHAIRMAN OF THE COMMITTEE ON ACADEMIC STANDING, as *ex officio* members. The REGISTRAR serves as secretary.

Members 1978-79: J. CROWLEY, A. DZIDZIENYO, P. FENTON, C. FORNARA, R. PADDEN, R. SARASON, P. STEWART, V. TERRAS, K. WEIMAR and S. WOODS.

Members 1979-80: J. CROWLEY, P. FENTON, C. FORNARA, A. PIPKIN, V. TERRAS, and K. WEIMAR (to 1980); S. GERO, M. HOLLOS, J. LADD, M. PARMENTIER and R. SHAW (to 1981).

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

Committee on Faculty Reappointments and Tenure (established October 1977)

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

Members 1978-79: R. HENKLE, E. INFANTE, E. LEDUC, G. SEIDEL, and N. STULTZ.

Members 1979-80: G. SEIDEL and N. STULTZ (to 1980); A. GORTON, H. KUCERA, and S. ZIMMERING (to 1981).

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 31 January 1978-79: G. HELLER, J. SCHNEIDER, and D. WILMETH.

Members 31 January 1979-80: J. SCHNEIDER and D. WILMETH (to 31 January 1980); L. FRUZZETTI (to 31 January 1981).

NOTE: Full membership includes three undergraduate students selected by the duly-elected undergraduate government for staggered two-year terms.

Committee on Consultation Concerning Honorary Degrees (established November 1970)

Members 1978-79: P. BRAY, W. DIETRICH, S. DRIVER, J. GRIEDER, J. LADD, D. LATTIMORE, and N. SCHOR.

Members 1979-80: W. DIETRICH, J. GRIEDER, and N. SCHOR (to 1980); P. BRAY and

S. DRIVER (to 1981); L. COOPER and M. SCHUPACK (to 1982).

NOTE: Full membership includes two undergraduate students selected by the duly-elected undergraduate government and one graduate student elected by the Graduate Student Council for one-year terms.

Committee on the Library (established October 1974)

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

Members 1978-79: B. HARRIS, P. HEYWOOD, D. KOSSOFF, J. SCHULZ, R. SHAW, and D. UNDERDOWN.

Members 1979-80: D. KOSSOFF and J. SCHULZ (to 1980); R. SHAW and D. UNDERDOWN (to 1981); H. CHUDACOFF and R. CHURCH (to 1982).

NOTE: Full membership includes two undergraduate students elected by the duly-elected student government for one-year terms, and two graduate students elected by the Graduate Student Council for a one-year term.

Committee on Nominations

Members 31 January 1978-79: L. CLAPP, J. DWYER, J. HERMAN, L. MONTIERO, B. ROSENBERG, and A. TRUEBLOOD.

Members 31 January 1979-80: L. CLAPP, J. DWYER, J. HERMAN, B. ROSENBERG, and A. TRUEBLOOD (to 1980); D. BROCK, P. HEYWOOD, and J. QUINN (to 1981).

Committee on Prizes and Premiums

DEAN B. HAZELTINE, Appointed Chairman.

Members 1978-79: D. ACKERMAN, T. ENGEN, and A. LANDMAN.

Members 1979-80: A. LANDMAN (to 1980); T. ENGEN (to 1981); D. ACKERMAN (to 1982).

Committee on Student Support Programs (until May 1977, the Committee on the Transition Program)

The DIRECTOR OF THE STUDENT SUPPORT PROGRAMS. Two representatives of the DEAN OF THE COLLEGE as non-voting, *ex officio* members.

Members 1978-79: R. BELANCE and F. LEVIN, J. LUBIN, W. SCHNERR, and R. WARNOCK.

Members 1979-80: W. SCHNERR, M. VAN WINKLE, and R. WARNOCK (to 1980); L. FRUZZETTI and P. HEYWOOD (to 1981).

NOTE: Full membership includes five students. Three of these students are to be selected by the Executive Committee of the Third World Coalition in consultation with the Dean of the College. Two students are to be selected by the duly-elected student government in consultation with the DEAN OF THE COLLEGE.

Advisory Committee on the University Press

The CHAIRMAN who shall be appointed by the President who shall also fix the term of office; the DEAN OF THE GRADUATE SCHOOL; the DIRECTOR OF THE PRESS, *ex officio*. R. CHISHOLM, Appointed Chairman.

Members 1978-79: E. KIRK, V. TERRAS, and G. WOOD.

Members 1979-80: V. TERRAS (to 1980); G. WOOD (to 1981); B. LEWALSKI (to 1982).

Committee on Women Faculty (established December 1970)

The DEAN OF THE FACULTY AND ACADEMIC AFFAIRS as a non-voting member.

Members 1978-79: B. ARONSON, M. BUHLE, M. ROSEN, M. VAN WINKLE, J. WHITT and D. WULFF.

Members 1979-80: B. ARONSON, M. ROSEN, and M. VAN WINKLE (to 1980); A. SHAPIRO and J. TULLIS (to 1981).

Officers of the Faculty

Members 1978-79: Secretary: P. ARANT; Parliamentarian: D. ROHR; Chairman of the

Faculty Forum: R. ARCHAMBAULT; Secretary of the Faculty Forum: J. KOETTING.

Members 1979-80: Secretary: P. ARANT; Parliamentarian: D. ROHR; Chairman of the Faculty Forum: R. ARCHAMBAULT; Secretary of the Faculty Forum: J. KOETTING.

Councils

Graduate Council

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

Members, 1978-79: Messrs. GERBI, KORNHAUSER, LYON, and AMOR Y VAZQUEZ (to 1979); Messrs. CARPENTER, ESCHENBACHER, KOETTING, and MCCLURE (to 1980).

Members, 1979-80: Messrs. CARPENTER, ESCHENBACHER, KOETTING, and MCCLURE (to 1980); Messrs. BOEGEHOLD, CORBIT, ESTRUP, and PINGREE (to 1981).

NOTE: Full membership of this Council includes four graduate students selected annually by the Graduate Student Council.

Medical Council

The VICE-PRESIDENT (BIOLOGY AND MEDICINE), the DEAN OF BIOLOGICAL SCIENCES, the DEAN OF MEDICINE (Chairman), the DEAN OF THE FACULTY AND ACADEMIC AFFAIRS, the DEAN OF THE GRADUATE SCHOOL, and the DEAN OF THE COLLEGE, all *ex-officio*.

Members, 1978-79: Messrs. HENKLE and MARSHALL (to 1979); Messrs. HOPKINS and MILHAVEN (to 1980); Messrs. RIDGELY and WESSEN (to 1981); and Messrs. BLOUGH and WESTLAKE (to 1982).

Members, 1979-80: Messrs. HOPKINS and MILHAVEN (to 1980); Messrs. WEIMAR and WESSEN (to 1981); Messrs. BLOUGH and WESTLAKE (to 1982); and Mr. BRADEN (to 1983).

Modern Language Board

Members, 1978-79: Ms. BLUMSTEIN, and Messrs. DRIVER, KOSOFF (Chairman), MAJEWSKI, MONTEIRO, SCHMITT, and WEINSTEIN; Mrs. MUELLER (Coordinator); Mr. RYAN (Director of the Language Laboratory).

Members, 1979-80: Ms. BLUMSTEIN, and Messrs. DRIVER, KOSOFF, MAJEWSKI, MONTEIRO, SCHMITT (Chairman), and WEINSTEIN; Mrs. MUELLER (Coordinator); Mr. RYAN (Director of the Language Laboratory).

Physical Sciences Council

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

MEMBERS, $\frac{1}{8}$ & $\frac{7}{8}$ —/ $\frac{7}{8}$ &: Messrs. CLIFTON, FREIBERGER, GILETTI, HELLER, LUBIN, RISEN, and STILES.

Members, 1979-80: Messrs. BROWDER, CLIFTON, FREIBERGER, GILETTI, RISEN, and STILES.

University Council on Student Affairs

The DEAN OF THE COLLEGE, the DEAN OF STUDENT LIFE, and the DEAN OF THE GRADUATE SCHOOL, all *ex-officio* (in the absence of any Dean, his or her Associate Dean).

Members, 1978-79: Messrs. CUTTS (to 1979), ERMEY (to 1981 - Chairman), Ms. GARFIELD (to 1981; alternate, Ms. GORTON).

Members, 1979-80: Mr. ERMEY (to 1980 - Chairman), Mr. DAVIDS (to 1981), Ms. GARFIELD (to 1982); alternate, Mr. BAUER.

NOTE: Full membership of this Council also includes five undergraduates selected annually by the duly elected undergraduate government and one graduate student selected

annually by the Graduate Student Council. In addition, there are alternate members as follows: two undergraduates to be selected by the duly elected undergraduate government and one graduate student to be selected by the Graduate Student Council.

Administrative Committee

Commencement Committee

The PRESIDENT, the SECRETARY OF THE CORPORATION, and the PRESIDENT OF THE ASSOCIATED ALUMNI, all *ex officio*.

Members, 1978-79: Messrs. ARONSON, BECHTEL, CHRISTIE, and CLAPP; Mesdames EVRARD and FAIRCHILD; Messrs. FRERICHS, GLICKSMAN, HONE, and KENNEDY; Mrs. LOVE; Messrs. MASSEY, McCONNELL, McLAUGHRY (Chairman), NOBLE, REICHLEY, and REYNOLDS; Mrs. RIGGS; Messrs. SEIFERT and WORKMAN.

Members, 1979-80: Messrs. ARONSON, BECHTEL, BILOTTA, CHRISTIE, and CLAPP; Mesdames EVRARD and FAIRCHILD; Messrs. FRERICHS, GLICKSMAN, HONE, and KENNEDY; Mrs. LOVE; Messrs. McCONNELL, McLAUGHRY (Chairman), and NOBLE; Mrs. PICKARD; Messrs. REICHLEY and REYNOLDS; Mrs. RIGGS; and Mr. WORKMAN.

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 today we remember 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 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 the 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 Expansion

Brown called Francis Wayland in 1827 to be its fourth President. He became one of the best known college presidents of his time, and, towards 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, in course, 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 23 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 30 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 was over 200 in number.

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.

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 towards national pre-eminence. 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, in 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 have attracted widespread interest within the medical profession and among medical educators. In the spring of 1964 the University entered into a far-ranging program of cooperation with Tougaloo College of Tougaloo, Mississippi, 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 the completion of his eleventh year in office. He said that when he was chosen for the presidency, he had decided to pace himself for a term of about that length, and that he had accomplished about what he had set out to do.

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 \$17.1 million 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 Science 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 and 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 rules 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 parietales.

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 the 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 began his academic career as an Assistant Professor of Chemistry at Brown in 1946 and who, over eleven years, served the University as Professor of Chemistry, Acting Dean of the Graduate School, and Director of Brown's Metcalf Research Laboratory.

After serving as the first Donner Professor of Science and chairman of the Department of Chemistry at Princeton for six years, he was named Presidential Science Advisor by President John F. Kennedy shortly before the late President's assassination in the fall of 1963. He served in the post throughout the Johnson Administration and left government service in 1969 to become 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 \$4.1 million deficit, and an endowment in decline as a result; ahead was a period of rising costs generally, particularly in the area of energy. Through a series of sometimes-difficult decisions, that deficit was reduced as part of a three-year retrenchment program calling for a stabilized budget in 1977-78.

Other accomplishments of the Hornig years include the merger of the Undergraduate College with Pembroke College in 1971 to create a totally consolidated, co-educational undergraduate institution, important additions to the physical plant of the University, and the establishment of a full M.D.-granting program in medicine. Efforts were also made to foster the new curriculum.

Dr. Hornig, citing the importance of "fresh energy and new outlook" at that moment in the University's history, resigned as Brown's fourteenth president in June of 1976. Once again, Provost Merton P. Stoltz was called upon 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. "To be a part of assisting this university continue to define and refine its mission is a weighty task but a joyous one, I think, if approached in a spirit of expectant accomplishment and adventure," the fifteenth President told the Corporation following his August 14, 1976 election.

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, a small but prestigious liberal arts institution established in 1866 with the intent to become "The Harvard of the Midwest." His guidance enabled the Minnesota institution consistently to balance its budget at a time of severe financial crisis for most private colleges. At Carleton, he oversaw the planning and execution of a \$19.5 million capital campaign, and directed a physical improvement effort which not only resulted in new facilities, but older buildings renovated for new uses as well. In working closely with students, faculty, and staff, he involved those groups 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 multi-million 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, the specialist in the contemporary politics of the Soviet Union taught in the political science department of the University of California at Los Angeles. While at UCLA, he founded and directed a faculty-administration committee concerned with administering the university's international exchange and research programs. 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.

Speaking on April 16, 1977 before the largest inaugural audience in Brown history (4,400 assembled in Meehan Auditorium), Dr. Swearer noted that Brown had faced up to its financial troubles and was in a position to plan for the future. But, he cautioned, "steady state is more difficult to manage than growth." He spoke of the need to replace "the endless search for elusive compromises in an age of acrimonious dissension" with a "genuine consensus." And he defined the president's role as that of a catalyst, saying that good leadership, to him, means the ability to bring people together and make things happen. "We college and university presidents are prone to take the credit when things go well and talk about irresistible social forces when they do not," he said. "In fact, I think our role should largely be as catalyst. If there is one overriding function of the president, it is to encourage and nurture the many initiatives from all sectors of the University."

In his role as catalyst and to nurture those "many initiatives," Dr. Swearer sought the best advice of able men and women both within and without the University as to Brown's future directions. A seven-point plan charting the future physical development of the University was compiled; a substantial reorganization of residential services and programs affecting student life, recommended by a visiting committee, was launched with Dr. Swearer's creation of a new academic position, Dean of Student Life; and the University began to consider means of serving a wider community through more extensive continuing education programs.

In the first years of the Swearer presidency, Brown's leadership in curricular innovation and improvement was underscored by the receipt of a \$1.2 million, three-year grant from the Commonwealth Fund in support of an effort to relate more closely pre-medical and liberal arts education. The efforts of faculty members to develop and to offer courses intended to further the goals of Brown's student-centered curriculum received increased support in the form of grants, free time to facilitate planning, and through the appointment of a faculty member as a special advisor to assist them. At the same time, faculty from diverse disciplines continued to demonstrate an eagerness to associate themselves in centers devoted to furthering common interests in research and teaching, as well as an ability to attract new sources of support for those interests.

During those years the University addressed goals both long range and more immediate. A major capital development campaign was begun to ensure a sound financial base for future endeavors. The difficult task of reducing reliance on the endowment for operating funds was successful: in 1978-79 the University recorded its first balanced budget in over a decade. For 1979-80 Brown adopted a second balanced budget, yet one providing for important institutional improvements. The Brown Fund continued to attract new donors as annual giving reached the \$2.25 million mark.

Under Dr. Swearer's leadership, Brown recorded the largest percentage increase in applications of any competitive institution in the country. A 25 percent increase in applications between 1977-1979 made Brown, after Harvard, the most sought after Ivy League university.

Other notable achievements included the creation of new performing arts centers at Lyman Hall and on the East Campus, dedicated in April, 1979, ending a \$2.9 million renovation project assisted by a challenge grant from the Kresge Foundation and freeing up additional space for other departments. The new Department of Computer Science found a home at the renovated Richmond Viall House. Planning commenced for a transformation of Rogers Hall into a media center with the support of a major gift.

In tribute to Dr. Swearer's guidance, the Class of 1978 awarded him a "Senior Citation" at Commencement, honoring him as "more than an administrator ... truly a leader and motivating force within this University." That fall he was named one of the 100 "most respected emerging leaders in higher education" in a national poll conducted by *Change Magazine* and the American Council for Education.

In the spring of 1978 Dr. Swearer was notified that the New England Association of Schools and Colleges had voted to renew Brown's membership in that regional association for a 10-year period, the maximum term voted. The letter of announcement characterized Brown as "an institution of great strength and quality which fully deserves its high national reputation" and commended the University for "its excellent faculty, its ability to attract first-rate students, the flexibility of its undergraduate curriculum and its success in maintaining the balance between attention to undergraduate education and a collegiate atmosphere on the one hand, and emphasis on graduate work and research on the other."

General Regulations



Admission – The College

NOTE

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 31).

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 plans. 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 a \$30 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 Reports, 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 approximately eleven 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 communications 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 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 next year's freshman class. A commitment deposit of \$50 is required.

Early Action Plan

Along with four 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's 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.

An on-campus interview may be requested 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 by 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 all major domestic airlines. For the 15 minute ride into Providence, both limousine and bus service are available. 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 other major highways converging on 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 Wickles 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

The specific secondary school courses which applicants elect are of less importance than the degree to which they have been involved in and concerned with their education. From the University's commitment to fostering a liberal education, however, it follows that a candidate for admission will most profit from pursuing a comprehensive college preparatory program.

Applicants for admission to the baccalaureate degree programs should have completed the following at the secondary school level:

1. Four years of English.
2. Three years (preferably four) of mathematics.
3. Two years (preferably three) of a foreign language.
4. One year of science.
5. Elective subjects, preferably in the fields of English, foreign language, mathematics, history, science, and the humanities.

Students should carefully balance breadth and specialization in the selection of courses on the secondary school level. Those who have already planned a college program, may find themselves best prepared by early specialization in a specific area. All students should carefully consider, however, that a broad exposure to different disciplines may be useful, not only for the innate educational value, but also as preparation for possible changes in one's field of study, and as an aid to understanding the interdependence of many academic disciplines.

The Board of Admission recognizes the growth of experimental and innovative schools, and welcomes applications from students of varying educational backgrounds who have shown outstanding intellectual promise. Exceptionally able students, who are well prepared to enter college before the completion of secondary school, may also be admitted.

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 interests of the student to take that 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. The Program's aims are "to give able students challenging educational experiences in school, to lessen unnecessary duplication in college of work done in school, and to increase for these able students the opportunity to take advanced work in college." If students enrolled in secondary schools participating in this program have had the equivalent of a one-year college-level course in one or more of the subjects listed below, they may take the appropriate examinations given in May, and have the scores sent to the Office of the Dean of Freshmen. Credit and/or placement is determined after recommendation by the appropriate academic department of Brown University, which reviews the student's examination paper and/or scores as well as other materials. Course credit in the given subject is offered to the student who qualifies. Students will be notified of such credit upon matriculation at Brown. Students who receive three or more course credits may apply for advanced standing.

Subjects in which course credit may be granted include American History, Art, Biology, Chemistry, English, 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 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 wholly academic and detailed in writing; and 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 traditionally defined academic disciplines (nursing, radio electronics and/or broadcasting, journalism or business administration, to name a few). The assigning of transfer credits for courses taken at another college takes place within the first week that an incoming transfer 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, Guest, and Foreign 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.

Foreign students interested in applying for admission should request information and instructions by October 1 of the year before they wish to enter. All candidates applying to Brown under these exceptional circumstances are encouraged to write the Admission Office for detailed information regarding their prospective status.

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 some 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.

Tuition for 1979 will be charged at the rate of \$681.25 per course for part-time students and \$5,450.00 per year for a full academic program of six to ten courses. A monthly payment plan can be arranged and some financial aid is available. See section on Financial Information for complete details concerning finances.

Interested people should call or write Dean John Eng-Wong, Box 1875, Brown University, Providence, Rhode Island 02912. The telephone is 401-863-2135.

Course Registration and Enrollment

Orientation Week

The program of Orientation Week 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 a free 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 participation 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 mid-semester of Semester II; for Semester II, by the first day of classes of the following semester. Extensions beyond these dates 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*.
6. If a student is absent from a regularly scheduled final examination for a course, the 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.

¹See section on the Graduate School, page 74, for grading system for graduate students.

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 performance in the concentration program which may not be fully reflected in 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 Week in the fall and during the first week of classes in each semester. Achievement tests in foreign languages are given during Orientation Week in the fall and during the final examination period of 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

Dean's List

The Dean of The College, at his discretion, may place on the Dean's List each semester those students in Semesters III through VIII whose academic performance for the previous semester is of high quality.

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 and/or the cumulative record to date.

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.

Discipline

Academic Discipline

All cases of academic dishonesty, as defined in the Academic Code in Written Work, 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 of the representative. Such appeal must be taken within three days after the decision is rendered.

Non-Academic Discipline

In order to protect personal and academic freedoms, Brown University seeks through appropriate policies, rules 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.

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 student may elect to have the case heard by the dean or the University Council on Student Affairs which is composed of students, faculty members, and deans. Special procedural guarantees exist which are intended to assure the student of a fair hearing. The decision in any such case may be appealed to the President of the University.

University Policies and Rules Governing Student Conduct

The following was prepared by the University Council on Student Affairs and approved by the President of the University and the Advisory and Executive Committee in May, 1969.

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 or disturbance in or adjacent to the residential units is prohibited during the weekday hours between 12 midnight and 7 a.m., and between 1 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 he shall deem it 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 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 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.)

Offenses

Listed below are offenses which could warrant suspension or dismissal:

- 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 unreasonably disruptive. This includes drug and alcohol-related behavior.
- III. The selling of drugs, or the possession of drugs with the intent to sell.
- IV. Theft or attempted theft of personal or University property.
- V. Altering, forging or contributing to the fraudulent use of University identification cards.

- VI. Possession or distribution of firearms, ammunition, or explosives.
- VII. Violation of the terms of 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 eighteen 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 (under 18) are prohibited.

Procedural Guarantees

The preliminary decision that an alleged offense is serious enough to warrant possible suspension or dismissal shall be made by the appropriate Dean of Students or the Graduate School, as the case may be. The following procedural guarantees shall be applicable to cases involving such offenses:

- a. 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 the case is considered. Such notification shall indicate the right of the student to elect to have the case heard by the University Council on Student Affairs and shall inform the student of the right to appeal and to assistance in his or her defense. If the student does not elect to have the case heard by the Council, it shall be heard and decided by the Dean of Students or the Graduate School, as the case may be.
- b. If the student elects to have the case heard by the University Council on Student Affairs, he or she may request that the student members of the Council not participate in the case.
- c. The student shall be notified in writing of the time and place of the hearing of the case. Such hearing shall be held within a reasonable time.
- d. The student shall have reasonable time and opportunity to prepare a defense and the right to be represented by a person of his or her choice. The student shall be entitled to a summary of the evidence and the names of witnesses against him or her.
- e. 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.
- f. The student shall have an opportunity to testify and to present witnesses and evidence in his or her behalf and shall have an opportunity to hear and question adverse witnesses. Technical rules of evidence and court procedure need not be followed.
- g. 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 or her or to the immediate well-being of the University community, in which situation appropriate interim measures may be taken.
- h. Minor disciplinary cases shall be considered by the Deans with a minimum of procedural formality but in accordance with the principles basic to the procedural guarantees of the Council.

- i. Any decision of a Dean or the Council in any such disciplinary matter may be appealed only to the President, who may affirm, reverse or modify such decision but may not increase the severity of any penalty imposed. Such appeal must be taken within three days after the decision is rendered.

Records and Notice

I. University File Entry

Records of penalties imposed by the appropriate University officer or the UCSA will be placed in a student's 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 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 probation, suspension or dismissal.

III. Public Record

The outcome of disciplinary proceedings will be a matter of public record through 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 UCSA will withhold release of the record form until it is ascertained that an appeal will not be filed, or, in 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 in the Office of Student Affairs.

Penalties

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, probation, or suspension or dismissal may be imposed by the appropriate officer of the University or the UCSA.

Offense:	1st Offense	2nd Offense
Damage to University property	\$25.*	\$50.*
Fire Extinguisher misuse	25.*	50.*
Theft/University Property	50.*	50.*
Pet Rule Violations	10.	25.
I.D. Card Misuse	10.	10.

II. Reprimand

A letter of reprimand will be given for minor offenses or some first occurrence major offenses. After three reprimands, a student's case will automatically be considered serious enough to warrant the possible sanction of suspension or dismissal.

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

1. Fine as specified in the fines schedule.
2. A file record.

III. Limited Probation

For repeated minor offenses or major offenses found not serious enough to warrant the possible sanction of suspension or dismissal. 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 a 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 be offered the choice of a Dean or the UCSA hearing his or her case and making a decision on the basis of all past disciplinary actions.

IV. Probation

For repeated minor offenses or major offenses found serious enough to warrant the possible sanction of suspension or dismissal. Written notification from the Dean or the UCSA, as the case may be, 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 probation may include any and all steps the Dean or UCSA feel 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. A file record.
3. Parental Notification.
4. Public Record.

V. Suspension or Dismissal

For major offenses, repeated minor offenses, or violation of probation. Written notification from the UCSA or the Dean, as the case may be, 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 sanction shall be entered on the student's transcript. In addition an explanation of the offense and sanction 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. A file record (permanent).
3. Parental Notification.
4. Public Record.

Academic Freedom

Consonant with Brown's traditions 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 the 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-two freshmen and three or four upperclass counselors. The counseling units are residually based, and upperclass counselors live with their unit. 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. Counselors are available to students throughout the academic year.

When the 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.

Other resources for personal, career, and academic counseling are available through the University Health Service, Chaplains, Resident Counselors, Minority Peer Counselors, Sarah Doyle Women's Center, Deans, and Career Development.

Student Support Program (SSP)

Starting in September, 1977, minority and other students at Brown will 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 will begin with Transition Week, just after Labor Day, and will include also academic Tutorial, a non-credit course in reading and study skills, special sections in certain courses, faculty advisors, the 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.

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 will develop and from time to time update an affirmative action program and will insist on a good faith effort on the part of its employees to comply 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 Development

Career Development is a center for the career decision-making and planning process. The staff of Career Development offers counseling, guidance, and job matching services to assist undergraduates, graduate students, alumni, and alumnae throughout their lifetimes with their career planning relative to further education or training and future employment. Students and alumni/alumnae are welcome to make appointments with members of the Career Development staff to assess personal capabilities, to explore career fields, to estimate employment opportunities, and to clarify future career plans. A "Pathfinder Workshop" of six sessions aids in the self-assessment that must precede the sorting out and focusing process. Direct and video taped instruction on the self-conducted job search and the preparation of resumes, job applications, and job interviews is also provided. Career conferences open to all students are held on the campus and include various workshops, seminars, and forums. In the Career Library reference room, students and alumni/alumnae

have access to current career resource information on fellowships and scholarships, graduate and professional schools, occupations and career fields, professional directories, civil service, work and travel abroad, private companies, non-profit organizations, and listings of full-time job vacancies. Student interviews are scheduled by Career Development with representatives of business, industry, government, non-profit organizations, and some school systems. Career Development also offers a dossier service to all students and alumni/alumnae.

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 48). 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 Requirements

Twenty-eight semester courses must be completed satisfactorily by all candidates. Transfer credits 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 or, in the case of courses in concentration, on the recommendation of the student's concentration advisor. Summer school courses are not acceptable for transfer credit.

¹See section on the Graduate School, page 76, for degree requirements for advanced degrees.

Quality Requirements

The student must satisfactorily complete at least six courses by the end of the first year, thirteen courses by the end of the second year, twenty courses by the end of the third year, and twenty-eight courses by the end of the fourth year. Students who do not meet this requirement will have their cases referred to the Committee on Academic Standing for action, which may take the form of either warning or dismissal.

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 twelve courses at Brown. Students in the Resumed Education Program must complete satisfactorily a minimum of twelve courses at Brown, and be in residence not less than four semesters. Resumed Education students may study either on a part-time or a full-time basis. Every student must spend sufficient time in concentration studies to permit faculty evaluation of his or her concentration.

English Requirement

Competence in reading and writing the English language is required for all degrees.

In general, it is expected that such competence will have been demonstrated prior to entrance by superior performance in secondary school courses requiring considerable verbal skill, supplemented by scores on various tests required of all candidates for admission. Those students who, in the opinion of the Dean, have not clearly demonstrated such competence must enroll in English 1 for course credit in their first semester.

All students are expected to continue to demonstrate competence in reading and writing English during the period of their degree candidacy. Students who, in the opinion of any of their instructors, fail to do so will be referred to the Dean and may be required to enroll in English 1.

Students who are required to take English 1 and who fail to pass it, or who have already passed it but have been later judged by the Dean to need further assistance, must enroll in the following semester in a tutorial section of English 1 without course credit. Students who, in the opinion of the Department of English, have failed to demonstrate the required competence in reading and writing after completing this tutorial work, or by the beginning of the fifth semester, whichever comes first, will be refused registration until such time as they are permitted to continue by the Committee on Academic Standing, whose responsibility it shall be to establish the conditions for the completion of this 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.

¹See also the section on Interdepartmental Concentration Programs, page 50.

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 38 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-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 as 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 a 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 inter-departmental 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 inter-departmental 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; 159, 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 must 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 concentrations, candidates for honors must complete the honors seminar (American Civilization 180) and an honors project (American Civilization 192). Candidates must enroll in American Civilization 190 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 semesters 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 CIVILIZATION

Requirements: Two courses in history, literature, art, or archaeology from each of four of the five relevant cultures (Egypt, Greece, Mesopotamia, Palestine, Rome), plus four courses in two languages within the chosen areas.

4. ANCIENT STUDIES

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

Requirements: Ancient Studies 1, 2 (currently listed as F13, F14). (Ancient History pattern) 4 courses from: Classics 121, 122, Classics 131, 132, History of Math. 141, 142. (Ancient Religion pattern) 4 courses from: Religious Studies 15, 51, 63, 71, 81, 82, 161, 164.

4 other related courses. Recommended electives are:

Art 42, 43, 143; Classics 54, 57, 58, 106, 113, 115, 116, 121, 122, 129, 131, 132, 151, 157; History of Mathematics 141, 142, 152, 153; Religious Studies 15, 51, 63, 71, 72, 81, 82, 117, 135, 161, 164, 188, 190, 194, 195, 196; 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 (Akkadian, 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, Akkadian, Sanskrit, Hebrew, Aramaic, plus 2 courses in the literature or culture associated with the same language.

Honors Thesis (Ancient Studies 191, 192).

Concentration advisor: Mr. Toomer (History of Mathematics).

5. 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 equip concentrators with a basic knowledge of formal linguistic analysis, and a battery 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 a 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 will consist of the following courses: Anthropology 114, 160; Linguistics 22, 121 and 131; Anthropology 132, 135, or another course dealing with analysis of social structure; Anthropology 141, 142, 143, 146, 147, 148, 149, 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.

6. 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:

1. Applied Mathematics 33, 34, 115, and one of 117 or 120.
2. Biomed 110, and any 3 other Biomed courses to be agreed upon by the student and his or her advisors.
3. Mathematics 9, 10, 18 and 52 (or the Applied Algebra course in Applied Mathematics if appropriate).
4. Chemistry 3, 11 (recommended for certain concentrators in addition(Chemistry 12, 63, and Biomed 123).
5. Physics 3, 4 or 5, 6.
6. Two additional courses in Applied Mathematics, Biomedical Sciences, Chemistry, Mathematics, or Physics.
7. 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.

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, or 50 or 51 or 116, 165, 166, Mathematics 52 or Applied Mathematics 151, and two other approved courses. Economics (8 courses) 111, 121, 122 and five other approved courses with the student urged to take Economics 163, 164.

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, 50 or 51 or 116, 165, 166; Economics 111, 121, 122 and four other approved courses. The student is urged to take Economics 163, 164.

The Sc.B. requirement of one semester of an independent study course must be fulfilled by taking Applied Mathematics 193, 194; Economics 164; Economics 195; or an approved equivalent.

8. APPLIED MATHEMATICS—PSYCHOLOGY

The standard Sc.B. concentration program is designed to cover the fundamental theories, principles and methods of psychology and to provide background in the basic mathematical methods applied to problems in psychology.

Prerequisites: Mathematics 9, 10 and Psychology 1.

Requirements: Applied Mathematics 33, 34; two semester courses in computer science (A.M. 51, 100 or A.M. 51, Psychology 109 or 82, A.M. 51, Linguistics 170 are recommended); two semester courses in probability and statistics (A.M. 115, 116, 120, 165, 166 and Math. 161, 162 are recommended alternatives); two Psychology courses with laboratory (Psychology 19, 20, 52 are recommended—the Honors research course, Psychology 199, may also be included); two courses involving formal science, other than a mathematical science (Psychology 160, 221, 222, Psycholinguistics 141, 142, and Philosophy 163, 188, 193 are recommended); two additional courses in Psychology (Psychology 10, 102, 103, 197 are recommended).

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 27, 61, 111, 112, 118, 185; ii) at least three additional Biomed courses; highly recommended are Biomed 11, 12, 42, 46 or 47, 51, 103, 149.
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 Sc.B. degree. The concentration leading to the Sc.B. with concentration in Biochemistry is designed to provide a rigorous foundation for research in biophysical chemistry, biochemistry, and molecular biology as well as a background also for graduate study in chemistry, biochemistry, and the medical sciences. It is administered by the Chemistry Concentration Advisor.

Program: Twenty semester courses in Chemistry, Mathematics, Physics, Biology, with a minimum of eight semester courses in Chemistry, three semester courses in Mathematics (or Applied Mathematics), two in Physics, and four in Biology. The Chemistry courses will generally include Chemistry 124, 125 and the Biology courses will generally include Biology 123 and Biology 151. The Independent Study requirement may be met by Chemistry 97, Biology 195, or other approved courses. See Bachelor of Arts program for a list of suggested courses in biology and chemistry. Other specific requirement: reading knowledge of one or more of the modern languages: German, Russian, or French. The language requirement 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. Students are advised to take at least six courses in the humanities and social sciences.

Standard Program for the A.B. degree. The concentration leading to the A.B. with concentration in Biochemistry is designed to provide a firm foundation in physiological chemistry, biochemistry, and molecular biology as well as a background for graduate study in biochemistry and the medical sciences. It is administered by a Concentration Advisor in the Division of Biology and Medicine.

Program: Chemistry 3, 11, 12 and 63 or 151. Physics 3 and 4 (or the equivalent), Mathematics 9 and 10 (or the equivalent), Biomed 123 and 151, one semester of Independent Study or research (Chemistry 97 or 98 or Biomed 195 or 196), and five additional courses, at least two of which must be in biology, chosen from the following:

1. Biomed 46 or 47, 104, 110, 122, 124, 128, 129, 153, 154, 156, 220, 222, 223, 224, 226, 227, 228, 229, 252, 255.
2. Chemistry 15, 106, 114, 124, 125, 137, 145, 151, 292.
3. Advanced mathematics, advanced physics, or advanced applied mathematics courses approved by the Concentration Advisor.

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 143, 158, 164, and Religious Studies 22, 125, 128; at least one of these must be Philosophy 158, 164, or Religious Studies 125; 2) at least two courses

in biomedical science selected from Biomedical Sciences 46, 47, 104, 110, 117, 123, 124, 126, 127, 128, 129, 140, 141, 142, 151, 152, 158, 181, 184; 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. 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 both semesters of the senior year) directed by a member of the Committee on Biomedical Ethics. Students interested in this concentration should contact Professor Twiss in the Department of Religious Studies.

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 concentration, 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, 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 p. 151).
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. 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, 121, and 122 are required and a minimum of three additional courses should be chosen from other 100-level Economics courses.

15. ENVIRONMENTAL STUDIES

The Center for Environmental Studies has developed a standard concentration in environmental studies. Students with environmental interests should visit the Center offices, Metcalf 324, or see Mr. Ward, Metcalf 321, for assistance in program design.

16. HEALTH AND SOCIETY

Health and Society will examine health, 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: Biomed 6 or a more advanced course, one introductory course in either Sociology or Anthropology, Sociology 110, Political Science 155 or the equivalent.

Required courses: Biomed/Community Health 31, 132 (191 and 192, approval pending), Sociology 154 and 155. Four additional courses selected from the following list or from other University courses with the approval of the concentration advisor: Biomed 1, 11, 12, 47, 102, 129, 268; Sociology 120, 123, 127, 133, 136, 150, 158, 164; Anthropology 112, 114; Psychology 21, 140, 141, 171; Economics 135, 136; Political Science 22, 182C, 182E, Urban Studies 21, 135; History 186; Biomedical Ethics 150, 154; Engineering 9; Special Themes and Topics 36, 105; University 135.

Concentration Advisor: Professor Lois A. Monteiro

17. 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.

18. 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 (Human Prehistory) or an approved substitute; Mathematics 9 (Calculus); Chemistry 3 (Equilib-

rium, Rate and Structure) and 11 (Organic Chemistry), or Chemistry 7 (Thermochemistry and Chemical Equilibrium) and 8 (Chemical Bonding, Reactions, and Inorganic Chemistry).

Program A (Biology/Psychology): Five courses in the Biomedical Sciences, including one in morphology (Biomed 32, 82, 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 Biomed 149 (Statistical Methods); three courses in Psychology including at least two of the following: 119 (Sensory Psychology), 120 (Learning), 152 (Human Information Processing and Cognition), 102 (Physiological Psychology); 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, 82, 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 Biomed 149; 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 these 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).

19. 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. 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 advisers. Courses in Anthropology or Sociology may be included.

20. 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 132; 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 1971; 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 128, 136, 150; Political Science 121; Portuguese 11, 12, 19, 150; Sociology 15 or 60. At the end of the second semester of the sophomore year, the interested student should consult with Professor Garfield of the Department of Hispanic and Italian 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 junior year abroad in a Latin American institution. Research in the Latin American community of Rhode Island is also encouraged as part of the student's first-hand experience with the people and culture of Latin America.

21. 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.

22. 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.

23. 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, 121, 122, 162, 186 and one 100-level elective in economics. Mathematics 9, 10, 29, 52, or their equivalent, and Mathematics 161, 162 or Mathematics 111, Applied Mathematics 115.

24. 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.

25. MODERNIZATION

The concentration in Modernization is designed to provide a broad coverage of the many types of changes which a society makes or undergoes as it evolves from a pre-industrial stage to a modern industrialized state. Breadth is achieved by drawing on courses from all of the social sciences. Ten courses will be chosen from the following: Anthropology 112, 131, 141, 142, 146; Economics 111, 121, 151, 158; History 118, 127, 143, 176, 177, 185; Political Science 128, 129, 135, 136, 148, 182-L; Sociology 15, 20, 160, 187-D, 187-E. The courses chosen must be from at least three different departments. An 11th course will be taken as an independent study paper usually completed during the senior year. This paper should be done with two faculty members from two different departments. Normally, these individuals will be chosen from among the faculty who teach the above courses. For further information see Professor Peter Evans, Department of Sociology, Maxcy Hall, Room 410.

26. 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 will minimize formal requirements in order to enhance flexibility in the design of individual programs.

The core program for both A.B. and Sc.B. includes Neural Science 1, 2 (Biomed 91, 92) and 100 (Biomed 161), Biomed 110, Mathematics 9, 10 or equivalent, and Physics 3, 4 or equivalent. The Sc.B. requires Chemistry 3, 11, plus either a course in electronics or computer science. At least two 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.

27. OPERATIONS RESEARCH—ECONOMICS

Designed to cover the decision-making tools of operations research plus the economic problems and analysis which form much of the motivations for the tools and a major area for applications. *Prerequisites:* Mathematics 9, 10. *Courses:* Applied Mathematics 33, 34, 115, 120, 122; Engineering 131; Economics 111, 121, 162, 186, and a 100-level Economics elective.

28. 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. 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. (History 162 is strongly

recommended.) In addition, six more courses will be chosen, with the approval of the concentration advisor, from the following: Applied Mathematics 51, 115; Economics 71, 132, 145, 146, 148, 161, 165; Engineering 90, 94A, 131; History 161, 162, 197E; Political Science 113, 118, 182A; Psychology 21; Sociology 110, 142, 154, 158, 159. 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: Peter B. Evans (Sociology), Barrett Hazeltine (Engineering), Robert M. Marsh (Sociology).

29. PSYCHOLINGUISTICS

Standard program for the A.B. degree. The Psycholinguistics program offers an interdisciplinary concentration relating language and behavior. The aim of the concentration is to apply the theoretical and experimental bases of both Linguistics and Psychology to a study of the psychological and neurological processes involved in the use of language and speech. Concentration programs may be designed which focus on areas of interest within the discipline. For example, students may develop programs emphasizing the acquisition and development of language in children; human linguistic processing; human memory, semantics and information processing.

Prerequisites: Psychology 1, 9, and Linguistics 22.

Requirements: a total of eight courses including 1) 3 background courses in Linguistics and Psychology, with at least one course from Psychology and one from Linguistics (Linguistics 119, 121, 123, 131; Psychology 27, 81, 102, 119); 2) Linguistics 141 and Psychology 152; and 3) 3 electives (Linguistics 45, 124, 132, 142, 143, 165, 170, 172, 251, 252, 253; Psychology 48, 180, 181, 182, 183, 185, 233; Anthropology 160, 260, 261).

30. 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 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 Lewalski (English, Chairman), Benedict (History), L. Durand (French Studies), Jayne (English), Josephson (Music), Molho (History), Newman (Comparative Literature), Oldcorn (Italian Studies), Pingree (History of Mathematics), Putnam (Classics), Sabol (English), Schulz (Art History), Trueblood (Hispanic Studies), and Woods (English), and Mr. Hough (Annmary Brown Memorial Library). Interested students may discuss the program with any member of the committee and with Professor Lewalski.

31. RUSSIAN STUDIES

Prerequisite: A reading knowledge of Russian to be demonstrated by passing Russian 4 or by demonstrating equivalent training by examination.

Courses: Russian 19, *Writing and Speaking Russian I*; 41, 42, *Russian Literature: Introductory Course*; 131, *Introduction to Nineteenth-Century Realism*; 132, *Russian Literature from the Symbolists to the Present*; History 131, 132, *Russian History*; plus one of the following: Political Science 143, *World Communism*, or 127, *The Government of the U.S.S.R.* With the approval of the concentration advisor, two other 100-level courses in Russian literature may be substituted for Russian 131, 132; a relevant 100-level course may be substituted for one of the area studies courses listed.

32. 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 four other course groups:

1. *Quantitative methods* (one course): selected from among Psychology 9; Economics 162; Sociology 110; Political Science 155; Mathematics 162; Applied Mathematics 115; and Biomed 149.
2. *Core curriculum* (one course from each of four disciplines): selected from among Art 56 and 59; Economics 141 and 142; History 175 and 176; Political Science 22 and 118; and Sociology 116, 130, 132, 133, 135 and 154, and Urban Studies 102.
3. *Seminar* (one course): selected from among Urban Studies 187C, 188; Anthropology 222; Art 159; History 197C; Political Science 182; and Sociology 210, 228, and 231.
4. *Complementary curriculum* (three courses): selected from among Urban Studies 23, 101, 190, and 191; Afro-American Studies 110; American Civilization 152; Anthropology 121 and 122; Economics 148, 151, and 195; Engineering 90, 132, 194D, 194F; Political Science 147, 182, (selected topics); Psychology 22; Sociology 15, 102, 127, 144, 148, 158, and 187G; Education 100-101, 161. (Courses listed under groups 2 and 3 above, and not used to satisfy those requirements, may be used to fulfill this requirement.) Other courses may be substituted with approval of Concentration advisor.

Honors: Candidates for honors concentration should apply during the second semester of junior year. Eleven courses are required of an honors concentrator, including two courses of thesis preparation taken in the senior year. An honors concentrator is exempt from the seminar requirement. To receive an honors degree, a candidate must be examined orally on

the thesis by an appropriate committee. The candidate's thesis and course record must be of outstanding quality.

Concentration advisors: Professors Feldman, Henderson, and Zimmer.

Tuition Requirement

Prior to the awarding of a baccalaureate degree, each candidate must have accumulated credit for the payment of a minimum of thirty-two tuition units. See Student Charges, page 83, 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 a minimum of forty tuition units. See Student Charges, page 83, 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 must be applied for and granted, (2) the Graduate Council, in consultation with the department, involved, shall 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 p. 65), or to enroll, at the end of four years, in a joint M.D.-Ph.D. program (usually nine years overall).

Following completion of the first five (or seven) semesters, the MEP student may either drop out of the program and continue as a regular senior in The College, or ask to be promoted into the Program in Medicine, which is Brown's accredited medical school. In the latter case, a check by the undergraduate MEP Academic Affairs Committee of his or her

ability, personal characteristics, and motivation will be made on the basis of academic performance, MCAT scores, and interviews.

Years 1 through 3 (or 4)

Before entering the second half of the Medical Education Program, undergraduates in the MEP will have complete approximately 24 courses 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 option, 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 undergraduate degree requirements. Minimum requirements for the two options are:

A. THE MEDICINE/SCIENCE OPTION

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

Physics 3, 4 or equivalent

Chemistry 3, 11, 12 or equivalent

Biomed: 4 courses, approved by concentration advisor

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

Concentration in Biology or Biochemistry or any Natural Science, including Mathematics.

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, 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 PIM, 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 A)
2. Medical Histology (Biomed 181 B)
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 327)*
8. Social and Behavioral Science (Biomed 390)**

* recommended elective

YEAR II:

1. Neurosciences (Biomed 361, 362)
2. Integrated Medical Science (Biomed 363-382)
 - 361: 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
 - 382: Laboratory Medicine
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. MEP continuum 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 (the senior undergraduate year). Required courses: the six basic science courses (currently Biomed 117, 128, 158, 184 and 181 double credit) normally required in the senior year, at least one but no more than two thesis-research courses, and one 200-level course in a field relevant to the area of thesis research. It is strongly recommended that scheduling of required courses be planned early in the last four years. Interested students should prepare a written description of the proposed thesis work approved by a faculty sponsor as part of the application to Graduate School.

M.D.-PH.D. DEGREE PROGRAM

This is available to students enrolled in the medical program who have completed at least one year of the Program in Medicine. Normally students will finish the first two years of the Program in Medicine and then will coordinate the last two years of the Program in Medicine with two additional years of graduate study in the Division of Biology and Medicine resulting in a six year program leading to an M.D. and Ph.D. degree.

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 except that students who at the beginning of their senior year lack less than six semester courses of completing their course requirement, may 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 Abroad

Brown students who wish to study abroad 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 programs which have been acceptable in the past and which continue to maintain academic quality.

Information about foreign universities and about programs abroad sponsored by American institutions is available in the Dean's Office, in the Rockefeller Library, and in appropriate departments. Students planning study abroad must be in good academic standing. If a student plans to study in a language other than English, he or she should present evidence of satisfactory language proficiency as established by the appropriate language department (usually completion of work at the 19-level or beyond).

Students planning study abroad should obtain an instruction sheet and a preliminary transfer credit approval form from the Dean responsible for foreign study. The student should then work out a program and present it to his or her concentration adviser and other appropriate faculty members for approval. When the preliminary transfer credit form is returned to the Dean responsible for foreign study, that Dean will approve it for CAS or advise the student 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, but normally no more than four concentration credits may be awarded. Credit cannot be granted until the student has completed the work and has obtained documentation of what has been accomplished.

Transfer credit can be granted for work done in an American affiliated program abroad or in a foreign institution from which an official transcript which is comparable to those issued by an American institution is available. In the absence of such an official transcript, it will be necessary to submit appropriate documents verifying enrollment in and completion of work in the institution, as for example: (1) proof of enrollment and (2) course certificates, evaluations, letters of reference from individual instructors indicating nature and quality of work done; (3) any written work (papers, lab reports, etc.) done for specific courses, as well as syllabi and reading lists.

Official transcripts should be sent to the Registrar. Where evaluation and/or other documenting materials are to be used, they should be brought by the student when he or she returns to Brown. The individual student may then be asked to take the materials to the faculty advisers for review and final approval.

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 taken abroad 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 foreign study are registered on leave of absence and are asked to write the Dean responsible for foreign study 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.

As an exception to the faculty rule, credit may be awarded for summer study abroad, particularly for language study. Students considering specific programs should confer with the Dean responsible for foreign study.

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 Aptitude and Achievement Tests, below. Completed applications are due in the Office of the Dean by January 15. Applications received after this date will be considered in so far 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 \$25 is charged for each application submitted to the Graduate School.¹ This fee should be sent with the basic application form. No application will be accepted until the fee is deposited. The fee is not refundable. Checks and money orders should be made payable to the order of Brown University.

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

Aptitude and Achievement Tests

Applicants for admission in Applied Mathematics, Art History, Biological and Medical Sciences, Biochemistry, Comparative Literature, Computer Science, Economics, Egyptology, English, French Studies, German, Hispanic and Italian Studies, Linguistics, Mathematics, Psychology, Religious Studies, and Sociology must submit Graduate Record Examination scores. Applicants to other departments should, if they have already taken the Examination, submit the scores. Information on the Graduate Record Examination may be obtained from the Educational Testing Service, Box 592, Princeton, New Jersey 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 10. 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 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

¹As of 1979-80: the fee is subject to change without prior notice given. The fee is \$30 for applicants not in the United States at the time of applying.

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.

Financial Aid¹

Fellowships and Scholarships

BROWN UNIVERSITY makes provision 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 FELLOWSHIPS. 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 graduated 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 graduating 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

¹See page 86 for information concerning charges.

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. Descendants 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.

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 graduated 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 F. 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 FELLOWSHIP. 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.

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 1978-79:

The Agency for International Development

AMIDEAST

Bank of Denmark

Belgian American Education Foundation

Bell Laboratories

Beneficial Foundation

Brazilian Government

Canada Council

Coordenacao do Aperfeicoamento de Pessoal de Nivel Superior (CAPES)

Danforth Foundation
 Ford Foundation
 Ford Motor Company
 The Foxboro Company
 General Electric Foundation
 Harvard-Yenching Institute
 HEA, Title IX-B
 HEW, Title VII Traineeship Grant
 IBM
 Institute of International Education
 Islamic Government of Iran
 Japanese Government
 Kress Foundation
 National Fellowships Fund
 National Science Foundation
 National University of Ireland
 NATO Scientific and Technical Research Council of Turkey
 NDEA Title VI
 Population Council
 Rockefeller Foundation
 Saudi Arabian Educational Mission
 U.S. Air Force
 U.S. Coast Guard
 U.S. Navy
 United States Public Health Service
 Yarmouk University

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. Research Assistantships pay a sum including a stipend and sufficient money to cover tuition charges 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-institutional academic employment. They pay a stipend, tuition, and the Health Fee.

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 for them. They pay a stipend, tuition, and the Health Fee.

Federally Insured Student Loans in amounts not exceeding \$2,500 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.

Withdrawal. A student who wishes to withdraw from the Graduate School at any time should receive permission from the Dean of the Graduate School. Failure to secure such official permission subjects the student to dishonorable dismissal and refusal of readmission.

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 37.

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 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, Doctor of Arts 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, and Portuguese Studies and Bilingual Education. 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, Biochemistry, Biology, Chemistry, Classics, Comparative Literature, Computer Science, Economics, Egyptology, Engineering, English, French Studies, Geological Sciences, German, Hispanic and Italian Studies, History, History of Mathematics, Linguistics, Mathematics, Medical Science, Music, Philosophy, Physics, Psychology, Religious Studies, Slavic Languages, Sociology. The Doctor of Arts is offered in Creative Writing¹. 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. A candidate must be present at the Commencement unless excused in advance by the Dean.

¹Prospective candidates for admission for study toward the Doctor of Arts degree should, before making application, communicate directly with the Director of the Program in Creative Writing.

Degree Requirements

NOTE: In the Spring of 1971 the Faculty and the Board of Fellows approved proposals for changes which have altered significantly the character 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 also 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 individually 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 of the major and by the Registrar. However, the equivalent of at least seven semester courses must be done in residence at Brown University. Students 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, p. 269.

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 Departmental program is wanted, the Department should be directly consulted. The following paragraphs describe typical Departmental Requirements.

¹Degree requirements for the Master of Arts in Teaching will be found on page 270.

Foreign Language. In many Departments, a candidate must demonstrate a reading knowledge of one or more foreign languages sufficient for the purposes of his or her special studies. While there is considerable variation in Departmental usages, competency in a foreign language is presently 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 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 Office of Institutional Research, no later than four weeks before the examination. 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, it must be typewritten on standard thesis paper and two copies deposited in the Office of the Graduate School by the date specified in the Calendar (page 8). Both copies of the thesis must bear the written approval of the professor under whose direction the thesis is written. A detailed statement concerning the preparation and presentation of theses may be obtained in the Office of 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 in study at Brown University. During this year of residency, a student may not be employed by the University or hold a position elsewhere. With the approval of the Graduate Council, however, assistants and teaching fellows at Brown University may fulfill this year of residency in four consecutive semesters.

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.

For tuition payments, see page 86.

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 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 8, 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, unless already published, must be presented in typewritten form on standard dissertation paper, unbound; it must be in duplicate and accompanied by an abstract, also in duplicate, of 600 words or less accurately describing the contents of the dissertation. 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 the 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 the 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 and the negative microfilm copy deposited with University Microfilms, Ann Arbor, Michigan, from which positive microfilm copies may be ordered. The abstract is published in *Dissertation Abstracts* by University Microfilms. 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.

A detailed statement concerning the preparation and presentation of typescripts and of printed copies may be obtained from the Graduate School Office.

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 of the Graduate Council.

Departmental Requirements. The minimum General Requirements for the degree of Doctor of Philosophy are stated in the foregoing paragraphs. Individual Departments often have additional requirements as to course-work, foreign languages, computer training, Preliminary and Final Examinations. For detailed information about a specific Departmen-

¹A schedule of all fees connected with the dissertation is available at the Graduate School.

tal program, the Department should be directly consulted. The following paragraphs describe typical Departmental requirements.

Foreign Languages. In some Departments, a student must demonstrate a reading knowledge of one or more foreign languages sufficient for the purposes of his or her special studies. For the modes by which competency in a foreign language is commonly shown, see the statement on Foreign Languages under MASTERS' DEGREES (page 77).

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 at present 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 departmental or inter-departmental 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.

Doctor of Arts

The Faculty and the Board of Fellows of Brown University in 1971 approved a new degree, the Doctor of Arts. The purpose of the Doctor of Arts program is to facilitate the development of people capable of making distinctively original and creative applications of the materials of one or more academic disciplines. The Doctor of Arts program is presently available only in Creative Writing; the degree may not be pursued under the provisions for Special Doctoral Study.

The degree of Doctor of Arts is awarded in recognition of high achievement in a program of advanced study and practice emphasizing the original application of academic and creative skills. The program of study must be planned in consultation with the department concerned and must be approved by the Graduate Council.

General Requirements. The requirements as to tuition, residency, admission to Candidacy, Final Certification, and Period of Candidacy are for the degree of Doctor of Arts identical with those for the degree of Doctor of Philosophy. The program for the A.D. culminates in a Doctoral Work. The Doctoral Work has typically two interdependent parts, (1) a substantial experimental field experience and (2) a formal Project, written or otherwise recorded. The Project must demonstrate high intellectual attainment and must represent the creative and original application of significant materials. Doctoral Projects may be works of art or artifacts, original programs or designs, original syntheses or integrations of ideas.

Departmental Requirements. The minimum General Requirements for the degree of Doctor of Arts are stated in the foregoing paragraphs. Individual Departments may, with the approval of the Graduate Council, set additional requirements as to coursework, foreign languages, examinations, etc.

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.

REGULATIONS

The regulations noted below were approved by the Corporation of the University to become effective for students entering for the first time in Semester I, 1979-80, and thereafter — see following section for provisions for the implementation of these regulations for undergraduate students enrolled at any time prior to Semester I, 1979-80.

Definitions:

Annual Tuition — such amount as is fixed by the Corporation of the University for a given year

Tuition Unit — one-eighth of the annual tuition

Full Time Enrollment — registration for 3, 4, or 5 courses per semester

1. Annual tuition entitles a student to full-time enrollment and is payable in advance.
2. The minimum total tuition which must be paid for a baccalaureate degree is an amount equal to four annual tuition payments (32 tuition units), for which a student is entitled to eight semesters of full-time enrollment; for each candidate for the combined degrees of Bachelor of Arts and Bachelor of Science, the minimum total tuition which must be paid is an amount equal to five annual tuition payments (40 tuition units), for which a student is entitled to register for ten semesters of full-time enrollment.
3. Advanced Placement and college courses taken prior to matriculation as a freshman at Brown.

Students who are granted Advanced Placement credits and/or are granted academic credit for courses taken at another college prior to matriculation as a freshman at Brown or any other college or university may apply for and will be granted Advanced Standing and tuition credit in accordance with the following table:

<i>Total No. of Course Credits Granted</i>	<i>No. of Semesters of Advanced Standing</i>	<i>Credits for Tuition Units</i>	<i>Remaining Entitlement of Semesters of Full-Time Enrollment</i>
3, 4, 5, or 6	1 sem.	4 TU's	7 sem.
7, 8, 9, or 10	2 sem.	8 TU's	6 sem.
11, 12, 13, or 14	3 sem.	12 TU's	5 sem.
15 or more	4 sem.	16 TU's	4 sem.

Once Advanced Standing has been granted, students wishing to extend their period of enrollment beyond the number of remaining semesters of full-time enrollment to which they are entitled must apply to do so and must declare the number of courses for which

they will register by December 15 for the spring semester and by June 15 for the fall semester. In such cases, tuition will be charged at the rate of one tuition unit per course.

4. *Transfer Credits:*

Students who are granted transfer credits for work completed at another college or university prior to or after enrollment at Brown may apply for and will be granted Advanced Standing and tuition credit in accordance with the table in (3) above. For the purposes of these regulations, transfer credit for work completed prior to enrollment will be treated separately from transfer credit for work completed after enrollment; however, advanced placement credits and transfer credits earned prior to enrollment may be combined in determining eligibility for Advanced Standing. Once Advanced Standing has been granted, students wishing to extend their period of enrollment beyond the number of remaining semesters of full-time enrollment to which they are entitled must apply to do so and must declare the number of courses for which they will register by December 15 for the spring semester and by June 15 for the fall semester. In such cases, tuition will be charged at the rate of one tuition unit per course.

If a student, after enrollment at Brown, is permitted by the Committee on Academic Standing to transfer only one or two course credits (i.e., less than the minimum of three courses required to establish eligibility for one semester of Advanced Standing), he or she will also be granted credit for an equivalent number of tuition units. If at the beginning of the academic year in which a student's semester level will be 8, he or she lacks less than a full annual tuition payment to meet the minimum requirement for his or her degree, the student will be charged only the balance of tuition units needed to meet the requirement. In such cases, i.e., when less than a full annual tuition is charged, the student will be eligible to register for one course for each tuition unit charged.

5. *Seven-Year Continuum/Baccalaureate Degree and Doctor of Medicine (Medical Education Program):*

Students in the seven-year continuum 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 third year a student lacks less than a full annual tuition payment to accumulate credit for twenty-four tuition units, only the balance of tuition units required to bring the total credit for tuition units to twenty-four will be charged. In such cases, i.e., when less than a full annual tuition is charged, the student shall be eligible to register for one course for each tuition unit charged.

6. *Charge Per Course:*

The following students only, other than those noted in (4) and (5), will be charged at the rate of one tuition unit per course (all others will be charged at the annual tuition rate):

(a). Degree candidates who have been permitted by the Dean to register part-time (less than three courses in a given semester or, on an exceptional basis for RUE students, three courses or less);

(b). Degree candidates who choose or are required to enroll beyond the period and/or number of courses covered by the minimum tuition requirement for the degree(s) (eight full-time semesters for the baccalaureate and ten full-time semesters for the combined A.B. and Sc.B. degrees);

(c). Special Students (non-degree candidates).

7. Awarding of Degree:

The tuition requirement must be satisfied prior to the awarding of the degree(s), and no portion thereof will be waived on the basis of either the number of courses or the number of semesters for which the student has registered.

IMPLEMENTATION OF NEW TUITION REGULATIONS FOR UNDERGRADUATE STUDENTS ENROLLED AT ANY TIME PRIOR TO SEMESTER I, 1979-80

In accordance with the instructions of the Advisory and Executive Committee of the Corporation to the President to establish procedures designed to implement the provisions of the new tuition regulations (approved January 12, 1979) to the maximum extent appropriate and at the earliest possible date for students currently or previously enrolled, it has been determined that the new tuition regulations shall apply to such students, subject to the provisions of the implementation guidelines noted below. The item references are to the new tuition regulations in the section above entitled, Regulations.

Item of New Tuition Regulations

Definitions These definitions involve no changes from current practice.

1 and 2 These items will take effect as of the end of the 1978-79 academic year. This means that a student is eligible to register for 3, 4, or 5 courses each semester for the annual tuition payment and removes the previous limit of nine courses per year with a maximum of thirty-six for the required four annual tuition payments. Because these limits have been removed, the previous definition of a course being taken if a student registers for it and does not drop it prior to mid-semester is no longer needed and has been eliminated from the tuition regulations.

3 This item, dealing with Advanced Placement credits and/or academic credit for courses taken at another college prior to matriculation as a freshman at Brown or any other college or university, will not apply to students enrolled prior to Semester I, 1979-80. Such students will retain the credits for tuition units which they have been granted for course credits of this nature. See Note under 4 below.

4 This item provides for students entering in Semester I, 1979-80, the manner whereby transfer credits, those earned both before and after matriculation at Brown, are converted to semesters of Advanced Standing and credits for tuition units.

Except as noted in the next paragraph, these provisions will apply also for students enrolled prior to Semester I, 1979-80, for all transfer credits earned after the end of the 1978-79 academic year; however, for transfer credits earned prior to the end of the 1978-79 academic year, tuition credit is based on one tuition unit for each semester course transfer credit.

For students who are currently on a Leave of Absence to study away through Semester I, 1979-80, or who are currently enrolled and, prior to May 15, 1979, have been granted a leave to study away during the 1979-80 academic year, tuition credits will also be based on one tuition unit for each semester course transfer credit earned for work completed during the original official leave period.

- Note: If at the beginning of the academic year in which a student's semester level will be 8, he or she lacks less than a full annual tuition payment to meet the minimum requirement for his or her degree, the student will be charged only the balance of tuition units needed to meet the requirement. In such cases, i.e., when less than a full annual tuition is charged, the student shall be eligible to register for one course for each tuition unit charged; however, if such a student has taken less than the normal load of eight courses in any previous academic year, the number of courses which he or she will be eligible to take will be adjusted appropriately.
- 5 This item, concerning students in the Seven-Year Continuum of the Medical Education Program, presently is effective only for students entering in Semester I, 1979-80. A determination is still to be made re implementation guidelines for current first and second year students.
- 6 This item indicates enrollment situations wherein tuition will be charged at the rate of one tuition unit per course and involves no change from current practice.
- 7 This item specifies that the tuition requirement must be satisfied prior to the awarding of a degree and involves no change from current practice.
- Tuition Refund Policy The new tuition refund policy will go into effect as of the end of the 1978-79 academic year (see page 85).

Note

One goal of the new 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 who have been or will be granted Advanced Placement and/or transfer credits for work completed prior to the end of the 1978-79 academic year, will be assigned an appropriate number of semesters of advanced standing by the Registrar and an expected completion date. This information will be sent to the students involved and these students will be expected to confirm the assignments or to work out any necessary adjustment with the Registrar. Once agreement has been reached on the student's proper semester-level and expected completion date, any extension of enrollment 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 1979-80 is \$5450.00 or eight tuition units. The tuition charge for part-time and special students is \$681.25, or one tuition unit, per course.

Room — The dormitory charge for the academic year 1979-80 in the undergraduate residence halls is \$1100.00 for regular accommodations, \$1130.00 for the Graduate Center, \$1215.00 for Dormitory Apartments, and \$1360.00 for Young Orchard Apartments.

A \$100.00 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, ten, or seven meal contract at an annual charge of \$1160.00, \$1065.00, \$925.00, or \$805.00 respectively. Resident sophomores, juniors, and seniors as well as all non-resident, 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.

Non-Resident Fee — A \$50.00 fee is charged all non-resident students. It underwrites the cost of services provided by the Housing Office to off-campus students.

Commuter Fee — A \$100.00 fee is charged commuting students using the full facilities of the commuter houses. This fee supports the facilities of Plantations House and West House which serve as a campus residence for those students.

Health Services Fee — A \$90.00 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) and it does not include student health insurance coverage.

Student Activity Fee — A \$40.00 fee is charged 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 \$30.00 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 \$15.00 fee is charged for late course registration.

Student Deposit — Each student at the time of admission and all readmitted students, prior to registration for the first semester after readmission, are required to pay a \$50.00 deposit. 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 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. If an accepted candidate for admission fails to matriculate, the entire deposit shall be forfeited.

Transcripts — Students, former students and graduates who request transcripts are subject to the advance payment of a \$2.00 fee for the first transcript in each order and \$1.00 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 399.

Accident Insurance — See page 396.

Payment of Charges – The College

University bills for students' annual charges are mailed to parents in early July.

Annual charges are payable on or before August 5 or in two payments, one-half on or before August 5 and one-half on or before January 5. A late charge of \$25.00 is incurred if the payment is not received on or before the date due. 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 9% on the actual amount borrowed. A late charge of 2% of the monthly payment, or \$5.00, whichever is less, will be charged on any monthly payment in default for a period of 10 days or more.

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.

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 halls rooms are rented on an academic-year basis, students who leave the University or change their status to commuting or married student 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 Housing 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 "room-sharing" room if the total occupancy of the residence halls is in excess of its normal capacity.

Prorated room refunds will be made from a schedule prepared by the Director of Housing and on file in the Housing Office. A student suspended or dismissed from the University or withdrawing when under investigation for misconduct is not entitled to any refund of room rental charges for the balance of the current semester.

3. *BOARD*

All board contracts are for the academic year; however, students may cancel or change from one contract to another once during the first four weeks of Semester I and again during the first four weeks of Semester II.

A credit or debit will be applied to the student's University account based on a weekly pro-ration of contract value modified by the following conditions:

A \$10.00 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, \$50.00 of the cost is non-refundable and retained by the University to cover non-reducible 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 rata refund schedule is available in the Food Service Office and on file with the Bursar. 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.

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.

Student Charges – The Graduate School

Tuition — Tuition fees for 1979-80 are charged at the rate of \$5,450.00 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 \$681.25 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 \$681.25 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 he or she has received credit for work completed at other institutions.

Every candidate for the degree of Doctor of Philosophy must pay tuition fees for the equivalent of three years 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.

Ph.D. candidates who have paid tuition fees at the reduced rate at any time during the first three years of residence shall in the fourth years be charged the balance of the tuition requirements.

Registration Fees — 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 \$35.00 is required at the time of final acceptance.

Late Registration Fee — A fee of \$15.00 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 \$50.00. This deposit serves for the duration of the student's enrollment in the University as a guaranty 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 1979-80 academic year charge for a room in the Graduate Center is \$1,130.00. A room reservation deposit of \$100.00 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 \$90.00 fee is charged all degree candidates both full and part-time. This fee is designed to cover the costs of the health services facilities (Andrews House) and it does not include student health insurance coverage.

Student Activity Fee — A \$10.00 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 \$25.00 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 a fee of \$2.00 for the first transcript in each order and \$1.00 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 in The College — see page 85.

Student Charges – Program in Medicine

Tuition — The 1979-80 annual tuition fee for the Program in Medicine is \$7,100.00. This charge covers all courses taken during the twelve month period including the summer preceding the academic year. For 1979-80, students in the first year of the Program in Medicine who have not yet received a Bachelor's degree from Brown shall not be subject to the above charge but shall be charged the tuition for undergraduate students (\$5,450.00).

Late Registration Fee — A fee of \$15.00 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 \$50.00. This deposit serves for the duration of the student's enrollment in the University as a guaranty of payment of his or her account; it is not an account against which the student himself 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 \$90.00 fee is charged all graduate candidates both full and part-time. This fee is designed to cover the costs of the health services facilities (Andrews House) and it does not include student health insurance coverage.

Student Activity Fee — A \$20.00 fee is charged all medical students for the support of registered student organizations and the activities of the Medical Student Council.

Readmission Fee — A \$30.00 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 transcript requests are subject to the advance payment of a fee of \$2.00 for the first transcript in each order and \$1.00 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 period 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 August.

Annual charges are payable on or before September 5, or in two payments, one-half on or before September 5 and one-half on or before January 5. A late charge of \$10.00 is incurred if payment is not received on or before the date due.

Upon applications, payment may also be made in eight monthly installments, beginning on October 5 and ending on May 5. If any monthly payment is not received on the due date, the full balance of the installment will be due and payable immediately, and subject to a late payment fine of \$5.00 except in the months of October and January when the fine is \$10.00. A \$60.00 service charge is made for the eight payment plan. The service charge is waived for Research and Teaching Assistants. Installment Application must be filed with the Bursar on or before September 5.

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 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 to 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 \$6,500. 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 1, 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 the Financial Aid Form Supplement and should arrange to have a copy of this sent to Brown. Copies of the FAF and the Supplement 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 and whose family contribution towards the cost of education constitutes half or less of total educational costs. Students who are eligible for such grants are given them as part of their total financial aid package. An SEOG cannot be less than \$200 or more than \$1,500 a year. 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. The total that may be awarded is \$4,000 for a four-year course of study or \$5,000 for a five-year course.

If a student is selected for an SEOG, the University must provide him or her with additional financial assistance at least equal to the amount of the grant.

Basic Educational Opportunity Grants

For most students, Federal student aid begins with Basic Grants, which provide 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 1979-80 award period (July 1, 1979 to June 30, 1980) will range up to \$1,800, depending on the student's eligibility as determined by a standard formula.

To be eligible for a Basic Grant, a student must: (a) be determined to have financial need based on the Basic 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 Basic Grants.

In general, students may receive Basic Grants for four full years. However, they can receive a Basic 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 Office of Education determines their eligibility. The financial aid officer at the University uses a standard procedure established by the Office of Education to calculate the amount of the award. Financial aid officers cannot make any adjustments in the amount of a Basic Grant beyond those required by the calculation procedure.

A student's need is determined on the basis of a formula developed annually by the Office 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 Basic 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 Federally Insured 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 this 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 Assistant Director of Financial Aid — Student Loans.

In most cases the interest rate is 7 per cent per year 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 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 \$2,500 may be loaned to an undergraduate student over a two year period, with an additional \$2,500 amount permissible for the next two year period of undergraduate education. A maximum of \$5,000 may be loaned to an undergraduate.

Repayment provisions include: (a) a nine 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) 3 per cent 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.

Federally Insured Student Loan Program

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; has been turned down by a bank or other commercial lending agency and has provided proof thereof; is in need of a loan; is eligible to receive a Federally Insured Student Loan from the University. Present annual limitations are \$2,500 annually for undergraduate study and a total of \$7,500 for the normal undergraduate curriculum.

Repayment provisions include: (a) a twelve 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) 7 per cent annual interest rate computed on the unpaid balance.

DEFERMENT PROVISIONS FOR NATIONAL DIRECT AND FEDERALLY INSURED 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 (FISL), 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) with terms very similar to the Federally Insured Student Loan Program (FISL). These loans are arranged by the student with his or her local bank. The Federal Government will subsidize the 7% simple interest charge while the student is at Brown. The maximum annual loan varies from state to state but is usually either \$1,000 or \$1,500. In a few states, however, the annual maximum is \$2,500. In all cases the maximum for undergraduate study is \$7,500. 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 either the Federally Insured Student Loan Program (FISL) or 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.

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 at Brown earn from \$50 to \$900 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 \$500 CW-S award, regardless of the hourly wage, once he or she receives the \$500, 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 95

Extra-departmental Courses, page 361

Special Themes and Topics Courses, page 361

University Courses, page 366

Seminar Courses, page 372

Modes of Thought Courses, page 372

Special Themes and Topics/Seminar Courses, page 374

Foundations Courses (Special Themes and Topics/Foundations), page 378

Independent Study Plans, page 381

Independent Study Projects, page 381

Group Study Projects, page 381

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 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 undergraduates 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 BASS³, BELANCE, FORT, R. JONES (Director)¹; Assistant Professors KENNEDY and MCHENRY; Instructor, Mr. DZIDZIENYO²; Lecturers, Messrs. HICKS and NORTHERN.

The central thrust of the Afro-American Studies Program is methodological rather than thematic in that it has established a dialectic between artists and social scientists for the better understanding of the black experience. The dialogue between these two types of faculty is paralleled by a similar exchange of views between faculty and members of the Rhode Island community. Artists in Afro-American Studies through the powerful media of music, dance, and drama attempt to communicate the research of the Program's social scientists to the public. Rites and Reason (the arts component of the Program), and Sound Awareness (its music organization) are the vehicles by which information is presented to the public, 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 who are interested in Africana and Afro-Americana. The John Hay Library has the Harris Collection on American Poetry, Popular Entertainment and Plays, the McLellan 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 early 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. In addition, 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 103 *or* 104, and 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.

¹On leave of absence, 1979-80.

²On leave of absence, 1979-80.

³Acting Director, 1979-80.

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 recommendation would be made by the end of the first semester of the junior year. Honors students must take 103 *or* 104 and 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 formally review his work.

I. PRIMARILY FOR UNDERGRADUATES

9, 10. *An Introduction to Afro-American Studies*

Mr. NORTHERN.

The course is designed primarily for freshmen but is open to all undergraduates to familiarize them with the influence of African culture on European music and art. An investigation and analysis of African music and African diaspora music in its wider setting, and European music and European diaspora music will help understand these influences. Increased interest in communications among the various cultures will be stressed. Lectures, slides, music listening and readings will cover Africa, Europe, and the Americas with emphasis on the United States. Afro-American Studies 9 is a prerequisite to Afro-American Studies 10.

11. *Philosophy and Critique of the Black Movement*

The STAFF.

An analysis of the theoretical and practical options open to the Black movement. Consideration will be given to historical events and conditions that have engendered ideological conflict and to current events as they affect the direction of the Black movement.

15, 16. *African History and Society, 1450-1970*

Mr. MCHENRY.

An interdisciplinary approach to the examination of the consequences of the African-European contact and their implications for socio-political reconstruction in the post-colonial phase. History texts, novels and writings by Africans as well as non-Africans are used. The themes covered are traditional societies, the slave trade, patterns of colonialism, nationalist movements, Pan-African ideology, literature and politics in contemporary Africa.

II. FOR UNDERGRADUATES AND GRADUATES

101, 102. *Special Topics in Afro-American Studies*

Ms. KENNEDY and STAFF.

Particular aspects of the black experience and problems of the community; e.g., African Independence Movements, The Family, Black Revolutionary Thought. Enrollment limited. Written permission required.

103, 104. *Junior Seminar in Afro-American Studies*

Mr. MCHENRY.

Research seminars are organized about the treatment of topics in Africana and Afro-Americana from the perspective of two or more traditional disciplines. The seminars are open to juniors and seniors and enrollment is limited.

105, 106. *Senior Research Project in Afro-American Studies* Mr. McHENRY.
Students are provided direction in bibliographical and methodological concerns prior to undertaking a substantial research project. Limited to seniors and graduate students; juniors may enroll by special permission of the instructor.

107, 108. *Interpretations of Black American Folk Traditions* Mr. BASS.
The course investigates myths and images of black people's experience in the United States as reflected in their own folk literature and traditions: slave narratives, rhymes, tales, songs, dances, customs, rituals and games. The course also includes the reading of black writers who have utilized folk forms. Students are required to write original materials in the folk manner.

109. *Negritude in Caribbean Poetry* Mr. BELANCE.
A comparative study of representative poets from the West Indies, including Luis Pales Matos (Puerto Rico); Nicholas Guillen (Cuba); Aime Cesaire (Martinique); Rene Depestre (Haiti); and others from an esthetic, thematical, and sociological perspective.

110. *Urban Affairs and Inner City Problems* Ms. FORT.
The course will consist of weekly lectures covering the historical background of urban planning and the urban crisis, the development of practices and methods in the field. Also, an indepth analysis of contemporary issues and activities within the urban planning field will be exercised.

111. *The Narrative in Emerging Africa* Mr. BELANCE.
The course will examine various aspects of the clash of cultures among Black Africans as discussed by Francophone Black authors, and will explore their writing, particularly during the period of decolonization. The works of Mongo Beti, Camara Laye, and Ousmane Sembene are among those studied.

113. *Sound Awareness* Mr. NORTHERN.
The course deals with natural sounds that influence black musicians. We will integrate rhythms, melodies, and harmonies of black cultures and perform student compositions based on this material.

114. *Creative Music Workshop* Mr. NORTHERN.
Student instrumentalists will explore African American concepts and will create spontaneous compositions in free form. Open to all performers by permission.

119. *Problems in Afro-American Historiography, 1863-1954*
The course will examine Afro-American historical reality. The works of Afro-American and white chroniclers will be examined against the reality of Afro-American experience, 1863-1954. The course will examine how the requirements of post-civil war industrialization, capitalism and emergent imperialism placed Afro-Americans in a peculiar class and caste position in American society. No prerequisites.

120. *Sociology of Black Literature*
The course will be divided into three parts: 1) a comparative analysis of 18th, 19th, and 20th century (up to the 1950's) Afro-American and European writers, from the standpoint of cross-cultural sociological impact; 2) an examination of the works of Richard Wright and Ralph Ellison, post WW II Afro-American writers who stand astride the past and the present; 3) a survey examination of Afro-American writers of the 1960's and early 1970's. Each of the three sections will seek to put a sociological fix on how these writers deal with culture, social control, socialization and self perception, urbanization, family and religion, deviant behavior, and racism. If time permits, the course will also deal with Afro-American writers of the mid and late 1970's and their response/appraisal of social anomie. No prerequisites.

121. *The African Diaspora and Afro-Brazilians*
The examination and reconsideration of the African Diaspora in the New World primarily

through the perspective of Afro-Brazilians. Comparisons are drawn between their historical and contemporary situation and the position of other Afro-Americans in the Americas as a whole. While a reading knowledge of Portuguese is an added asset, non-Portuguese readers may also register for the course.

150. *Portuguese-Speaking Africa and the Portuguese-Speaking World* (Portuguese 150)
This course provides the underpinnings and assumptions upon which Portuguese colonialism was built in Africa. The tripartite relationship between Portuguese-speaking Africa, Portugal and Brazil is examined diachronically. Interested students should register for Portuguese 150.

153. *Multi-Racial Societies in the Americas Before 1800* (History 153) 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 nineteenth century. Interested students should register for History 153.

166. *Problems in Afro-American History* (History 166) 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. Interested students should register for History 166.

American Civilization

The Program in American Civilization is directed by an Executive Committee composed of Professor JOHN L. THOMAS (History); Professor BRUCE ROSENBERG (American Civilization and English); Associate Professor BARTON ST. ARMAND (English); Associate Professor JOHN M. SILVERMAN (English); Assistant Professor DAVID BUCHDAHL (American Civilization and Anthropology); Assistant Professor MARI JO BUHLE (American Civilization and History); Assistant Professor PATRICIA CALDWELL (English); STUART SHERMAN (Library Bibliographer); Mr. PATRICK M. MALONE (Lecturer in American Civilization and Director, Slater Mill Museum Site); and Mr. RICHARD MECKEL, 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 McLellan 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 I, 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 Co-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 Archeology, Religion in America, The Novel in 20th Century America) or topically (e.g., 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. Topics will likely include — Individualism and Identity, Cultural Ecology, Popular Culture, American Values and Moral Order, Women, Authors and Artists in America, Race, Technology, Religion. The course will include lectures by faculty members from a number of different University departments as well as a few films. Open to all undergraduates, especially freshmen or sophomores contemplating a concentration in American Civilization.

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 of the course will be to develop techniques for the study of civilization from the perspective of small, homogenous "folk" groups.

151. *Theories of Religious Symbolism and Myth*

Messrs. BUCHDAHL AND TWISS.

(Religious Studies 131).

152. *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.

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 1960s. Interdisciplinary methods and research will be emphasized.

180. *Honors Seminar*

Mr. MECKEL.

Interdisciplinary interpretations of American experience. Selected topics. Required for Honors 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 1979-80 are Women as Healers and as Patients, American Sea Fiction, The Home Front: American Society and Culture in World War II, Religion and Revolution, Issues in American Social Welfare Policy.

192. *Independent Reading and Research*

Required of Honors candidates in the senior year. May be repeated for credit.

193. *Seminar in Printed Sources*

Mr. ADAMS.

Investigation of source material in the John Carter Brown Library culminating in the writing of a long paper. Open to graduate students and to seniors by written permission.

II. 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 1979-80: 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 fieldwork 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*

Anthropology

Professors HEATH, JAY, LEIS; Associate Professors ANDERSON, DWYER, HICKS (Chairman), LAMPHERE¹, NEWMAN; Assistant Professors BEEMAN, BUCHDAHL, FRUZZETTI, HOLLOS, SCHMIDT²; Visiting Assistant Professor RUBERTONE; Instructor, Mr. THORBAHN; Visiting Instructor Mr. BAKER.

The program of graduate instruction in the Department of Anthropology prepares students for a professional career in social and cultural anthropology, including archaeology and linguistics. Faculty research experience covers many areas of the world: North and South America; the Circumpolar Region; Europe; Middle East; Asia; and Africa.

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 isolated 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 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. Laboratory facilities, 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 communicative processes in human behavior. Students are encouraged to pursue research topics related to the study of cognitive development in cross-cultural context, the dynamics of interpersonal 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 a mandatory summer internship at various museums. Possible facilities for internships will include Plimoth Plantation and the Haffenreffer Museum of Anthropology.

¹On sabbatical leave, 1979-80.

²On leave of absence, Semester I, 1979-80.

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 IBM 360/370 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. One member of the anthropology faculty holds a joint appointment with American Civilization.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

Anthropology. Eight anthropology courses are required for concentration. At least one must be an area course, either at the 100 level (Anthropology 141, 142, 146, 147, 148) or a seminar which focuses on an ethnographic area. At least three other courses are to be distributed among three of the following categories:

1. Archaeology and Human Prehistory (Anthropology 50, 153, 154, 157, 186)
2. Language (Anthropology 160, 161, Linguistics 101, 102)
3. Aspects (Anthropology 130, 131, 132, 133, 135, 190, 191)
4. Thematic and Cross-Cultural Studies (2, 10, 98, 112, 114, 121, 122, 123)

Appropriate graduate seminars may be substituted in each category. The Senior Conference (Anthropology 98) is required for students in Honors, highly recommended for others expecting to go on to graduate work in anthropology, and open to all interested concentrators.

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.

Honors. The Honors Program in Anthropology comprises at least ten semester courses including, in addition to the concentration requirements, 98, 193 and/or 194, and a second world area course. Independent study is utilized by the Honors student to prepare a thesis with the guidance of one of the faculty members. The Honors candidate is examined on his thesis by a committee selected by the Anthropology faculty.

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 qualifying examination.

Students are encouraged to study foreign languages and to acquire other skills, such as computer applications, related to their areas 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 no 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 faculty committee, composed of his 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 at 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

2. *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.

50. *Human Prehistory*

Mr. BAKER.

A survey course concerned with the physical origins of man and the development of human culture as revealed by archaeology. Discussion will 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. Also an introduction to basic principles and method of archaeological research.

91. *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.

98. *Senior Conference*

Mr. BEEMAN.

Intensive analysis of selected contemporary theoretical approaches and topics in anthropology. An effort will be made to relate these to wider intellectual and social issues.

112. *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.

114. *Culture and Human Behavior*

Ms. HOLLOS.

A survey of significant problems and results in psychological anthropology, including the relation between culture and personality, cross-cultural differences in perception, cognition, intellectual and personality development, and the comparative study of mental disorders. These topics are organized within the general framework of the human life cycle from infancy to old age.

123. *Comparative Sex Roles: Roles and Ideology in Society*

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.

124. *Phenomenological Approaches in Anthropology*

Mr. JAY.

To reveal and subject to critical examination the situatedness of anthropological description, as exhibited in that of the writer (fieldworker) and that of its readers (course members). A small number of outstanding descriptive works that reveal specific phenomenological approaches are selected for study.

130. *Magic, Science, and Religion*

Mr. JAY.

"What is 'religion'?" is the central topic of the course, 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.

132. *Aspects of Social Relationships*

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. *The Art of Tribal Peoples*

Ms. DWYER.

Art in an anthropological perspective. An analysis of the form, style, meaning, and function of art among selected tribal peoples. Discussion will also include theoretical aspects of creativity and the role of the artist in tribal society.

135. *Comparative Political Organizations*

Comparative political institutions and behavior in selected pre-industrial societies. Case

studies from Africa and the Americas will be examined in connection with theoretical developments in anthropology, political science, and other related fields.

141. *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.

142. *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.

146. *Peoples of Southeast Asia*

Mr. JAY.

Southeast Asia as a locale of concrete human experience. Geographical and historical factors in the growth of the area's major civilizations. The unity of the area as expressed through similarities and contrasts in society, religion, and politics. The character of U.S. involvement in the area.

147. *The American Indian: Ethnology*

An introduction to the cultures and contemporary status of Native Americans. Lectures, readings and discussions will focus both on the history of American Indian contact with Europeans and on problems and issues relevant to present day reservation life.

148. *Peoples of The Middle East*

Mr. BEEMAN.

A general introduction to the anthropology of the Middle East. The course will focus on the interrelationship between the geographical and ecological situation of Middle Eastern peoples and their social and cultural organization.

149. *Anthropological Perspectives on Contemporary America*

Mr. HICKS.

Selected aspects of American life are critically examined from the comparative perspective of ethnology.

153. *Selected Topics in American Material Culture*

Mr. BAKER.

An analysis of some of the behavioral aspects of the material culture of our own society, past and present.

154. *Experimental Archaeology*

Mr. SCHMIDT.

The testing and refinement of archaeological techniques, methods, and theory through the use of controlled data from historic and modern contexts.

157. *The American Indian: Archaeology*

Mr. ANDERSON.

An overview of the prehistory of North and Middle America. Emphasis on the diversity of prehistoric Indian cultures.

160. *Language and Culture*

Mr. BEEMAN.

Will explore the interaction between systems of human communication and systems of culture. Topics range from the study of animal language and chimpanzee communicative competence to the nature of aesthetic judgment in human verbal interaction, and the role of the structure of the human mind in determining the shape of communicative acts. This course is important for students interested in anthropology, sociology, psychology and linguistics.

186. *The Primates*

See Biomed 186.

190. *Special Topics: The Impact of Colonialism on African Society and Culture*

Ms. FRUZZETTI.

The relationship between the historical past and problems of the present. Questions of cultural change vis-a-vis political and economic development.

191B. *Special Topics: Interpretation of Myth and Ritual*

Mr. BUCHDAHL.

Approaches to myth and ritual: Myth and ritual are two fundamental aspects of human society — providing us with our sense of reality — our perceptions of space and time, and the sense we have of ourselves as creatures in the world.

191C. *Special Topics: Ethnomethodology*

Mr. JAY.

Understanding everyday life: Preliminary explorations in Ethnomethodology. Ethnomethodologists claim theirs is a radically new approach to the constitution of “the social order”. We examine here the philosophical issues they raise and some of the concrete work they have achieved.

193, 194. *Individual Research Project*

Intensive supervised reading, ordinarily involving a research project. 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.

III. PRIMARILY FOR GRADUATES

201. *Principles of Human Prehistory*

Mr. ANDERSON.

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.

202. *Principles of Cultural Anthropology*

Mr. LEIS.

A survey of the methodological principles of anthropology. Problems of classification and explanation will be examined.

210. *History of Ethnological Theory*

Mr. JAY.

The historical development of social and cultural theory during the 19th and early 20th century, placed in relation to significant intellectual events and currents of the period.

211. *Current Theoretical Issues in Cultural Anthropology*

Mr. LEIS.

Seminar discussion of selected theoretical issues, likely to be focused on debates among Marxists, structuralists, phenomenologists, and empiricists of various description.

212. *Applied Anthropology*

Mr. HEATH.

A critical evaluation of real and potential applications of anthropological theory, data, and methods to the solution of immediate problems. Special emphasis will be placed 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.

214. *Psychological Anthropology*

Ms. HOLLOS.

Intended as an advanced treatment of psychological anthropology; the subject matter varies from one semester to the next. Among the topics considered will be: the relationship of culture to cognition, various approaches to comparative socialization and child development, and symbolic interaction.

215. *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 fieldwork.

216. *Ethnohistory*

Mr. SCHMIDT.

A research seminar on anthropological interpretation of historical sources. Methods for collecting, evaluating, and analyzing historical evidence as it relates to problems in ethnography and archaeology. Original research is emphasized.

221. *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.

222. *The Anthropology of Urban Societies*

Mr. HICKS.

An examination of anthropological studies of urban situations with an emphasis on the relevance of anthropological hypotheses of culture change for understanding the evolution of modern societies and cultures.

232. *Kinship and Marriage*

Ms. FRUZZETTI.

An examination of the major problems in the anthropological study of kinship and marriage; selected case studies representing several major cultural areas will be used to illustrate different systems of kinship and marriage and various approaches to the study of them. The relationship between kinship and other aspects of society (such as ritual, economics, or politics) will be discussed.

235. *Political Anthropology*

Mr. LEIS.

A discussion of contemporary anthropological theory and research on political phenomena.

242. *Problems in the Ethnology of Latin America*

Mr. HEATH.

Intensive investigation of selected problems in the anthropology of Latin America. Individual research is combined with joint discussion of selected readings.

250. *Problems in Archaeology*

Mr. ANDERSON.

A seminar on methods and theory relevant to archaeological analysis and interpretation. Each participant is expected to develop and investigate an archaeological research problem of his own choosing, using methods discussed in class.

253. *Historic Archaeology*

Ms. RUBERTONE.

A seminar on the development of theory in historical archaeology. Topics considered include the relationship of historical archaeology to such fields as social anthropology, historical geography, and social history, and the problem of constructing interdisciplinary research designs.

255. *Museum Studies*

Ms. DWYER.

Problems in interpretation of material culture. Aspects of museum work including research, interpretation, administration.

256. *Circumpolar Archaeology*

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.

258. *Quantitative Methods in Archaeological Analysis*

Mr. THORBAHN.

Introduction to statistical methods as applied to research problems in archeology. Emphasis will be on intuitive understanding of mathematical models and examination of specific quantitative studies. Objective of the course is to allow students to formulate their own quantitative research design.

260. *Seminar 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.

261. *Linguistic Theory and Practice in Social Science*

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. *Medical Anthropology*

Ms. NEWMAN.

A graduate seminar stressing theoretical perspectives in medical anthropology and includ-

ing 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.

290. *Comparative Socialization*

Ms. HOLLOS.

The seminar will examine comparative socialization and child development from a variety of perspectives: culture and personality, interactionism; theories of cognitive development and language acquisition. Emphasis will vary depending on the interest of the participants.

290A. *Ethnography of South and Southeast Asia*

The focus of the course will be on religion and society through the available ethnographic data. The role and place of ideology in the social structure, the relationship and the discrepancy between the ideal and the actual model of the individual in the social system.

290B. *Environmental Archaeology*

Mr. SCHMIDT.

Exposure to the full spectrum of thinking and research in environmental archaeology.

291B. *Law and Conflict*

Ms. HOLLOS.

The seminar aims at a consideration of the variation in conflict resolving mechanisms and legal phenomena as they are found in diverse societies in the world today. Emphasis will be on the ideas, concepts, and theories which have been developed in the field and on the uses and functions of law and conflict in the more general study of social processes.

293, 294. *Reading and Research*

Work with individual students in connection with special reading, problems of research, or preparation of theses.

295, 296. *Teaching Practicum*

Applied Mathematics

Professors AHLBERG, BANKS, C. DAFERMOS, DALENIUS (Visiting), DAVIS, FALB, FLEMING, FREIBERGER (Chairman), GRENANDER, HALE, HIKATA (Research), HSIEH, INFANTE, KOLSKY, KUSHNER, LASALLE, PIPKIN, SIROVICH, and SU; Associate Professor BISSHOPP, S. DAFERMOS (Research), MALLET-PARET, and MCCLURE; Assistant Professor GEMAN.

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 and its activities are supported by a well-equipped University Computer Center providing easy interactive access through remote terminals.

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 background 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 SCIENCE DEGREE.

Applied Mathematics. Eighteen semester courses approved by the Division of Applied Mathematics in Mathematics, Applied Mathematics, the Physical or Life Sciences, Engineering, or Economics, including Mathematics 9, 10, 18, and 52, Applied Mathematics 3, 4, 33, 34, or 50 or 51 and 193 or 194. Of the unspecified courses six should be 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.

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

Applied Mathematics. Fourteen semester courses approved by the Division of Applied Mathematics including Mathematics 9, 10, 18, and 52, Applied Mathematics 3, 4, 33, 34, or 50 or 51. Of the unspecified courses four should be 100-level or higher level courses taught by the Division of Applied Mathematics. Substitution of alternate courses for the specific requirements is subject to approval by the Division.

RELATED COURSES OR PROGRAMS. In addition to the standard concentrations in Applied Mathematics there are also interdepartmental standard concentrations in Applied Mathematics-Economics, Applied Mathematics-Biomedicine and Economics-Operations Research.

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 a 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. A brief introduction to BASIC and text processing will be included.

3. *Introduction to Applied Mathematics I*

Mr. KOLSKY.

Introduction to mathematical modelling and the interpretation of mathematical results in deterministic and probabilistic contexts. Programming in APL. Estimation and approximation. Dynamic economic and biological problems described by difference equations. Probability theory. Random processes. Matrix algebra.

4. *Introduction to Applied Mathematics II*

Mr. KOLSKY.

Mathematical modelling of physical phenomena. Vector algebra and vector geometry. Equilibrium of structures. Applications of elementary differential equations to problems of force and motion. Applications of matrix algebra. Prerequisite: Mathematics 9.

15, 16. *Fundamentals of Physics and of Methods of Applied Mathematics* (Physics 15, 16)

MESSRS. BANKS AND MCCLURE.

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)

MESSRS. BANKS AND MCCLURE.

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.

23. *Introduction to Difference and Differential Equations*

Mr. HSIEH.

The formulation and solution of physical, biological and economic problems that involve ordinary difference and differential equations. This course is a shorter version of Applied Mathematics 33, 34. Credit may not be earned for both 23 and 33. Three hours lecture and two hours laboratory. Prerequisite: Mathematics 10.

33A, 34A. *Methods of Applied Mathematics I, II*

MESSRS. FLEMING AND FREIBERGER.

Mathematical techniques used in the analysis of physical, biological and economic phenomena. Emphasis is placed on the use of established methods, rather than rigorous foundations of methods. I: First and second order differential equations. Computation in APL. II: Application of linear algebra to higher order equations. Non-linear problems. Introduction to partial differential equations. Three hours lecture and two hours laboratory. Prerequisite: Mathematics 10.

33B, 34B. *Methods of Applied Mathematics I, II*

Mr. DAY.

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 that are used. Three hours lecture and two hours laboratory. Mathematics 18 is desirable as a corequisite. Prerequisite: Mathematics 10.

50. *Introduction to Scientific Computing* (Computer Science 50)51. *Computer Programming, Problem Solving, and Applications* (Computer Science 51)

II. FOR UNDERGRADUATES AND GRADUATES

115. *Introduction to Mathematical Statistics*

Mr. GEMAN.

Probabilistic background: random variables, distribution functions. Statistical inference: estimation theory, hypothesis testing, linear statistical models and their applications.

116. *Introduction to Computational Probability and Statistics*

Mr. GRENANDER.

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 115 or equivalent. Some experience in programming is desirable. Offered from time to time.

117, 118. *Introduction to Numerical Analysis*

Mr. BISSHOPP.

Numerical solution to linear systems and matrix inversion, iterative solutions of non-linear equations, computation of eigenvalues and eigenvectors, basic theory of polynomial approximation, differences, interpolation polynomials, and approximate differentiation, numerical integration, numerical solution of ordinary differential equations, difference methods for partial differential equations.

120. *Operations Analysis: Probabilistic Models*

Ms. S. DAFERMOS.

Basic probabilistic problems in operations research; methods of problem formulation and solution. Markov chains, birth-death processes, stochastic service and queueing systems, sequential decision theory, dynamic programming. Prerequisite: Applied Mathematics 115, Mathematics 161, or equivalent. Offered in alternate years.

121. *Introduction to Optimization*

Ms. S. DAFERMOS.

An introduction to the basic mathematical ideas and computational methods for optimizing a nonlinear system, or optimizing allocation of effort or resource utilization, with or without constraints. Linear programming, function minimization methods, constraints, integer programming. Prerequisite: Applied Mathematics 33, 34 or equivalent. Offered in alternate years.

125. *Analytical Mechanics* (Engineering 37)

An analytical approach to the study of the dynamics of particles and rigid bodies. Variational principles and Lagrangian formulation of mechanics, rigid body motion, introduction to Hamiltonian formulation of mechanics.

126. *Continuum Mechanics*

An introduction to the formulation of mathematical models for deformable media. Tensor fields and the kinematics and dynamics of continuous media; simple constitutive equations governing elastic solids and fluids. Wave propagation in continuous media. Basic notions of kinetic theory of gases.

133, 134. *Methods of Applied Mathematics III, IV*

Mr. SU.

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*

Mr. DAVIS.

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.

153, 154. *Analysis of Algorithms I, II* (Computer Science 153, 154).

Interested students should register for Computer Science 153, 154.

165, 166 *Statistical Inference*

Messrs. MARTIN AND GEMAN.

This course treats hypothesis testing, point and interval estimation, linear statistical models, non-parametric methods and time-series analysis. Calculus and some linear algebra will be assumed as well as some previous acquaintance with probability theory.

169. *Mathematical Population Models* (Mathematics 16)

Mr. FLEMING.

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*

Mr. KUCERA.

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*

Mr. GRENANDER.

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 115 or equivalent. Computing experience is useful but not required. Offered from time to time.

188. *Advanced Matrix Theory*

Mr. DAVIS.

Canonical forms for orthogonal, Hermitian, and normal matrices. Rayleigh quotients. Norms. Eigenvalues. Matrix equations. Generalized inverses. Banded, sparse, non-negative, and circulant matrices. Prerequisites: Applied Mathematics 34 or Mathematics 52 or permission of the instructor. Offered from time to time.

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*

Messrs. BISSHOPP AND SIROVICH.

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*

Mr. MALLET-PARET.

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*

Mr. MALLET-PARET.

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* Mr. PIPKIN.
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* Mr. PIPKIN.
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, Sturm-Liouville theory, special functions. May be taken concurrently with Applied Mathematics 214.

217. *Functional Analysis and Applications* Mr. KUSHNER.
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* Mr. JAKUBCIK.
Topics of current interest in applications of functional analysis.

219, 220. *Ordinary Differential Equations and Their Applications* Mr. LANGENHOP.
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* Mr. MARAUX.
Topics of interest in ordinary, partial and functional differential equations.

222. *Mathematical Models in Physiology (Biomed 212)* Messrs. BANKS AND PERELSON.
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)* Mr. DAFERMOS.

226. *Introduction to Stochastic Control Theory (Engineering 254)* Mr. KUSHNER.
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 visco-elastic 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 visco-elastic 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)

Mr. KOLSKY.

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*

Mr. HSIEH.

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*

Mr. HSIEH.

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*

Mr. SU.

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*

Mr. DAVIS.

Matrix computation and solution of elliptic partial differential equations.

256. *Numerical Analysis II*

Mr. LEWIS.

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)

Mr. FLEMING.

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*

The STAFF.

291, 292. *Research in Applied Mathematics*

The STAFF.

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, FELDMAN (Director, Studio Division), FISHMAN (Chairman), JORDY, SCHULZ, TOWNLEY; Associate Professors MAYER, WILKINSON-ZERNER (Director, Art History Division and Graduate Program), WINKES; Adjunct Associate Professors KOREN, SCHER; Assistant Professors BROWN, GILLERMAN, VOLK; Lecturer, Mrs. GLASS.

UNDERGRADUATE PROGRAM

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

Prerequisite: Art 1 or 3, 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, and the Concentration Seminar; 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, four other studio courses, two courses in the history of art distributed over two fields, and a Senior Thesis Exhibition. 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. Normally the two Honors courses will be taken during semesters 6 and 7.

CENTER FOR CLASSICAL ARCHEOLOGY 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 results. Typically, each student takes a balanced program of twelve courses through four semesters, culminating in a written Master's Thesis which usually occupies the fourth semester for completion. Each thesis is individually guided by a regular member of the faculty. The basic program of study provides experience in both art history and museum training. See below for a chart of this typical program arranged by semesters.

A central feature of the program is the requirement that all students prepare over a span of three 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 response.

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 three periods of the history of art. These periods are: Classical, Medieval, Renaissance, Baroque, or 19th century and 20th century art. Students who are, upon entry to 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 twelve courses for the Master's degree.

Full-time students are required by the Department to take four courses per semester over two years for a total of twelve courses; however, the required Art 236, 237 (exhibition course), and 280 (thesis) carry double credit and are each counted as two courses by the Graduate School and the Department. Students take the following program of required courses:

First Year:

- | | |
|---------------|--|
| <i>Fall</i> | Art 235
Art Department Seminar
Elective (seminar or lecture course)
*Undergraduate lecture or language course |
| <i>Spring</i> | Art 236
Art 236
Art Department Seminar
*Undergraduate lecture or language course |

Second Year:

- | | |
|---------------|---|
| <i>Fall</i> | Art 237
Art 237
Art Department Seminar
*Undergraduate lecture or language course |
| <i>Spring</i> | Art 280
Art 280
*Undergraduate lecture or language course |

*This course may be waived for students who have completed the distribution or language requirements, are serving as teaching assistants, proctors, etc., subject to the approval of their graduate advisor. The distribution requirement is fulfilled by the total program. Students are in addition required to take one seminar in the Department (course above 100 level) each semester. A term paper is required in these courses. An individual reading course may be substituted for a seminar with the consent of the instructor and the Director of Graduate Studies. A term paper is required in reading courses. No term paper is required of graduate students taking undergraduate courses. With approval of their advisor, students may take courses in their area of interest outside the Department. This program is in effect pending approval by the Graduate Council.

Art 235 (Methodology) and Art 236, 237 (Exhibition) are graded Satisfactory/No Credit. Students are encouraged to take other courses ABC/No Credit. At the end of the first year, overall performance is reviewed by the graduate Supervisor with the student.

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 passed 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 MA thesis will not be read until *both* language requirements have been completed.

M.A. 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 M.A. 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.

DOCTOR OF PHILOSOPHY. Admission to this program required 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 must fulfill both language requirements during the probationary year. At the end of the first year the student can be admitted to the Ph.D. program and the third year of residency for the Ph.D. will be waived. All 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 Master 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 graduate study. A minimum of three years of full-time study is required. If two years were spent for the study of the M.A. for example, one further year of resident study at Brown satisfies the Ph.D. requirement.

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 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 of 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.

I. PRIMARILY FOR UNDERGRADUATES

Introductory Courses

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.

3. *Foundations of Western Art in Antiquity* (Classics 3)
Messrs. WINKES (Art) AND HOLLOWAY (Classics).
This course deals with the art of Greece and Rome, both for its significance to the modern world and in the context of the diversity of its parent cultures. It is intended as a background to further work in art history or classical civilization but may be taken as a foundation for study in almost any branch of western humanism. This course will not cover material later than the Hagia Sophia (532-537 A.D.).

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.

Courses in the History of Art

Courses numbered below 100 are open to all undergraduates; 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.

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 annually. 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 and Gothic Periods.
46. *Northern Renaissance Painting* Ms. GILLERMAN.
Study of major painters and printmakers in Flanders and Germany with a concentration on the work of Van Eyck, van der Weyden, Bosch, Dürer, and Bruegel.
47. *Renaissance Architecture: Fourteenth, Fifteenth, and Sixteenth Centuries* Ms. WILKINSON-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. WILKINSON-ZERNER.
The course is divided into two parts given in alternate years: The figural arts in Italy from the time of Giotto to the close of the 14th century; 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. WILKINSON-ZERNER.
The sculpture and painting of the Italian Renaissance of the 16th Century.
50. *Studies in Seventeenth-Century Art* Ms. VOLK.
Baroque artistic expression in Europe. Annual topics will treat major personalities in terms of problems of style, content and attitude of the period in northern or southern centers.
51. *Baroque and Eighteenth-Century Architecture* Ms. WILKINSON-ZERNER.
Architecture and planning of the western tradition during the 17th and 18th centuries.
52. *Studies in Eighteenth-Century Art* Ms. VOLK.
French, English, and American art of the pre-modern period. Annual topics will treat problems in art and thought among major centers, emphasizing the onset of modern artistic expression.
56. *Nineteenth-Century Architecture* Mr. JORDY.
European and American developments in architecture contributing to the modern movement.
57. *Nineteenth-Century Art* Mr. CHAMPA.
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.
61. *American Art* The STAFF.
The evolution of American painting and sculpture from colonial times to the present; its distinctive characteristics with respect to contemporaneous European developments.
65. *History of Printmaking* The STAFF.
Printmaking from the Renaissance to the present, with emphasis on technical developments as well as on stylistic qualities.

II. FOR UNDERGRADUATES AND GRADUATES

Courses in the History of Art

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. <i>Topics in Etruscan and Italic Art</i>	Mr. WINKES.
143. <i>Topics in Classical Art and Architecture</i>	Mr. WINKES.
144. <i>Topics in the Art of the 1st Millennium</i>	Ms. GILLERMAN.
145. <i>Topics in Medieval Art</i>	Ms. GILLERMAN.
146. <i>Topics in 15th Century Northern Painting</i>	The STAFF.
147. <i>Topics in Architecture before 1800</i>	Ms. WILKINSON-ZERNER.
149. <i>Topics in Renaissance Art</i>	Mr. SCHULZ AND Ms. WILKINSON-ZERNER.
150. <i>Topics in Baroque Art</i>	Ms. VOLK.
152. <i>Topics in Eighteenth-Century Art</i>	Ms. VOLK.
157. <i>Topics in Nineteenth-Century Art</i>	Mr. CHAMPA.
158. <i>Topics in Twentieth-Century Art</i>	Mr. CHAMPA.
159. <i>Topics in Modern Architecture</i>	Mr. JORDY.
160. <i>Topics in Modern Sculptures</i>	Mr. JORDY.
165. <i>Topics in the History of Printmaking</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.

195B. *Senior Seminar in the History of Art* The STAFF.
Normally works of art of more than one historical period are studied comparatively. A broad theme will be explored in lectures, discussions and reports. Written permission required for non-majors.

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.

Studio Courses

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 Seminar* The STAFF.
An intensive basic seminar in the interaction of color as applied to the language of the visual arts in both two- and three-dimensional media.

121, 122. *Painting* Messrs. BROWN, FELDMAN, 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 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 prerequisite for 126. 126 may be repeated for credit. Written permission is required.

127, 128. *Drawing*

MESSRS. FELDMAN, FISHMAN, AND 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. Silver point, chalks, and various other media will be used. Texts and outside work will be assigned. Limited enrollment. Written permission of the instructor required.

191. *Individual Study in the Practice of Art*

The STAFF.

Work on an approved project, leading to the presentation of a portfolio or a 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.

Note: All Studio Art Concentrators are required to arrange and present an individual exhibition of their work in their final semester.

III. PRIMARILY FOR GRADUATES

201. *Research Seminar in Greek Archaeology*

Mr. HOLLOWAY.

(Students who wish to take this course should register for Classics 201.)

231. *Individual Reading Course* (single course credit)

232. *Individual Reading Course* (double course credit)

235, 236, 237. *Methods of Research and Art Historical Interpretation*

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, 236, single course credit; 237, double course credit.)

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| 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. WILKINSON-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 AND Ms. WILKINSON-ZERNER. |
| 250. <i>Research Seminar in Baroque Art</i> | Ms. VOLK. |
| 251. <i>Research Seminar in Eighteenth Century Art</i> | Ms. VOLK. |
| 257. <i>Research Seminar in Nineteenth Century Art</i> | Mr. CHAMPA. |
| 258. <i>Research Seminar in Twentieth Century Art</i> | Mr. CHAMPA. |
| 259. <i>Research Seminar in Nineteenth and Twentieth Century Architecture</i> | Mr. JORDY. |
| 265. <i>Research Seminar in the History of Printmaking</i> | The STAFF. |
| 270. <i>Critical Esthetic Theory</i> | The STAFF. |
| 280. <i>Thesis Research, Master's Degree</i> (double course credit)
Required of all M.A. candidates. | |
| 291. <i>Individual Reading Course for the Doctoral Candidate</i> | |
| 299. <i>Dissertation Research, Doctoral Degree</i> | |

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 to 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 SHERMAN; Lecturer, Mr. ADAMS.

101. *History of the Printed Book*

Mr. SHERMAN.

Traces the development of the book against the background of the social and intellectual history of man from the Renaissance to the present. Topics to be emphasized include Gutenberg's invention of movable type; the spread of printing throughout Europe and the Americas; changes in the artistic design, typography and technical production of books; the contributions of the master printers; restrictions on the press and its struggle for freedom; and the impact of the book on various social and intellectual movements. The course will be presented with an interdisciplinary approach and students will be encouraged to explore special aspects of the book which relate to their own field of interest. Liberal use will be made of illuminated manuscripts, incunabula and rare books in the libraries at Brown. For graduate students and undergraduates by permission.

102. *Introduction to Manuscript Theory and Practice*

Mr. SHERMAN.

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. With the conclusion of the course, students should be fully prepared to process a major manuscript collection during the following semester. If possible, this project will complement a student's field of concentration or research. Prior permission of instructor required.

103. *Advanced Manuscript Theory and Practice*

Mr. SHERMAN.

With the completion of the introductory course in manuscript theory and practice, students will have the opportunity to process a major manuscript collection under the direct supervision of the staff of the Manuscript Division of the John Hay Library. Students will begin and fully complete the organization, the descriptions, and the analysis of a collection, which will meet, as closely as possible, their own field of concentration or research. The course sequence can extend through two semesters of work, if desired. Grading will reflect an estimation of the student's processing and analytical abilities, as illustrated through the writing of a research guide to the manuscript collection. Prerequisite: Introduction to Manuscript Theory and Practice. Prior permission of instructor required.

193. *Seminar in Printed Sources on the Early History of the Americas* (American Civilization 193).

201. *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.

Biochemistry

BIOCHEMISTRY COMMITTEE

JOHN BIGGINS, PH.D., *Professor of Biology*

SUNGMAN CHA, M.D., PH.D., *Professor of Medical Science*

JOHN NICHOLAS FAIN, PH.D., *Professor of Medical Science*
 NELSON FAUSTO, M.D., *Professor of Medical Science*
 PAUL FREDRIC FENTON, PH.D., *Professor of Biology, Chairman of Committee*
 GLENN A. FISCHER, PH.D., *Professor of Biochemical Pharmacology (Research)*
 LEON GOLDSTEIN, PH.D., *Professor of Medical Science*
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 SEYMOUR LEDERBERG, PH.D., *Professor of Biology*
 HORACE F. MARTIN, PH.D., *Professor of Medical Science*
 ROBERT EMMETT PARKS, JR., M.D. PH.D., *Professor of Medical Science*
 EUGENE STEPHEN PYSH, PH.D., *Professor of Chemistry*
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 ALFRED W. SENFT, M.D., M.P.H., *Professor of Medical Science*
 JOSEPH M. STEIM, PH.D., *Professor of Chemistry*
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 RALPH PATRICK MIECH, M.D., PH.D., *Associate Professor of Medical Science*
 DAVID J. MORRIS, PH.D., *Associate Professor of Biochemical Pharmacology (Research)*
 ELLIOTT WILLIAM STRAUSS, M.D., *Associate Professor of Medical Science*
 JOEL KENNETH WELTMAN, M.D., PH.D., *Associate Professor of Medicine (Research)*
 JAMES D. SIMON, PH.D., *Assistant Professor of Medical Science (Research)*

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 and the Division of Biological and Medical Sciences, and the affiliated hospitals. See page 50 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 preliminary examination and the presentation of an acceptable thesis. Specific requirements and individual study will be tailored to meet the needs of the student. It is assumed that the student, in addition to a reasonable command of biochemistry, will obtain supporting information in general biology, organic chemistry, and physical chemistry. Besides appropriate courses in the Chemistry Department, a large number of courses in biochemical topics are available in the Division of Biological and Medical Sciences. Depending upon individual interests, students are also free to take courses in other departments as well, such as Applied Mathematics or Physics.

Biology and Medicine

Professors S. ARONSON, BALDINI, BARNES (E), BIGGINS, CALABRESI, CARLETON, S. CHA, CHASE (E), CHURCH (E), COBB, J. COLEMAN, CZECH, DAVIDS, DAVIS, DIAMOND, DYER (E), F. EBNER, ELLIS, EPSTEIN, ERIKSON, FAIN, FANGER, FAUSTO, FENTON, FISCHER, GALLETTI, GANN, GLICKSMAN, GOLD, L. GOLDSTEIN, GOSS, GRANGER, GREER, HAGY, HAMOLSKY, HERNDON, HOPKINS, KARLSON, J. KIDWELL, KNOPF, LANDY, LEDERBERG, LEDUC, LEONE, LICHTMAN, LIPSITT, LONGABAUGH, MARSHALL, H. MARTIN, McDONALD, McENANY, Mclwain, MORSE, OH, PARKS, POVAR, QUEVEDO, RANDALL, ROTHMAN, ROTMAN, SCHMIDT-NIELSEN (Adj.), R. SCHWARTZ, SENFT, SIMEONE (E), SINGER, SLABY, SNELL (E), STEINER, STERN, P. STEWART, STURNER, TEFFT, W. THAYER, TURNER, VARGAS, WEISZ, WESSEN, ZACKS, ZIMMERRING; Associate Professors

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GRADUATE PROGRAMS

The Division of Biology and Medicine presents three programs of graduate study leading to the degrees of Master of Science and Doctor of Philosophy. These programs are 1) Molecular and Cell Biology, 2) Experimental Pharmacology and Pathology, and 3) Physiology and Neural Sciences. 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 Containment 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 new Sciences Library, located at the corner of Thayer and Waterman Streets. This library provides access to more than 4,000 current periodicals and 250,000 volumes in the fields of bio-medicine, psychology, and all the physical sciences 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 Graduate School may be satisfied in any modern 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, and physiology. 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 EXPERIMENTAL PHARMACOLOGY AND PATHOLOGY. The Ph.D. Program in Experimental Pharmacology and Pathology is sub-divided into three interrelated sub-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 Experimental Pharmacology and Pathology. Joint research programs already exist between members of this group and the other two graduate training programs, Physiological and Neural Sciences, and Molecular and Cell Biology.

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 PHYSIOLOGICAL AND NEURAL SCIENCES. The graduate program in Physiological and Neural Sciences is designed to provide each student with a broad background of knowledge and laboratory experience in the general area of systems and integrative biology through course work, seminars, independent reading, and experimental

studies, while at the same time offering the opportunity to investigate a specific research problem in depth as preparation for a career in these fields. In the Physiology option, students are expected to become proficient in cellular, mammalian, and comparative physiology including quantitative aspects of these subjects. In the Neural Sciences option, courses must be taken in the areas of Neurophysiology, Neuroanatomy, and Neuropharmacology. Emphasis is placed on electrophysiological and ultrastructural aspects of the vertebrate central nervous system, as well as cellular mechanisms of synaptic transmission, sensory receptors, and smooth muscle function. Students may also participate in the interdisciplinary activities of the Center for Neural Sciences. Students who wish to study for the Ph.D. with emphasis in Bioengineering can do so by applying either to the graduate program in Physiology and Neural Sciences, or to the regular graduate program in the Division of Engineering, as may be appropriate to their backgrounds.

Students entering the Program are expected to have mastered the basic essentials of Mathematics, Physics, Chemistry, and Biology at the college level and to have acquired a particularly strong undergraduate background in these subjects. While there are no formal course requirements in the Program, students are expected to master the subject matter normally covered in courses in cell and organ systems (including nervous and endocrine) physiology to a degree that would allow them to teach these subjects at the college level. In addition, students are encouraged to become sufficiently proficient in higher mathematics, statistics, computer science, radiation biology, and instrumentation to be able to use these subjects to advantage in their own research programs.

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 191 (Engineering Graduate Programs).

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

Biology. Prerequisites: Mathematics 9, 10 or 9, 12, or 17 or Appl. Math 33 and Chemistry 3, 11 or Chemistry 7, 8. 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 much as two semesters of Independent Study (Biomed 195/196) may be counted for concentration credit.

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.

Program: A total of 20 courses including:

- a. Mathematics 9, 10 or 9, 12, or 17 or Applied Math 33; Chemistry 3, 11 and 12 or 63 or Chemistry 7, 8 and 9; Physics 3, 4 or equivalent. In addition, three more courses in the above subjects (or Applied Math, 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 52: Applied Math-Biology,

Aquatic Biology, Biochemistry, Biophysics, Health and Society, Human Biology, Biology-Geology and Neural Sciences, Biomedical Engineering, see page 191.

HONORS. All candidates for Honors in biology must elect Biomed 195 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 first week of their final semester, with the Honors Advisor (Ms. A. Coleman). Successful completion of the Honors program requires a 3.2 grade equivalent in the concentration, and a written and oral presentation of an Honors thesis representing research of superior quality.

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. The curricular requirements are given under Requirements for Degrees on page 63.

I. PRIMARILY FOR UNDERGRADUATES

Introductory Courses

1. *Introduction to Organismal Biology* Messrs. QUEVEDO, POOLE, AND STAFF.
An introduction to the principles of biology with emphasis on the human organism. 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. Laboratory sections consist of small groups of students led by faculty members of the Division of Biology and Medicine in the spirit of the Modes of Thought courses. The sections provide opportunities for discussion of important issues of life science and an introduction to biomedical research. Some instructors elect to evaluate major biological and medical concepts via discussion coupled with outside reading, while others use original experiments devised and pursued by students as a focal point for broad discussions. (Not for concentration credit.)
3. *Introduction to the Physiology of Human Nutrition* Mr. CUNNINGHAM.
Lectures presenting an overview of essential nutrients and their role in human physiology. Emphasis is placed on providing objective criteria for the evaluation of food sources by consumers. Small group recitations discuss current controversial topics in human nutrition such as weight control, heart disease, megavitamins, and cancer. No prerequisites, Biomed 6 recommended. (Not for concentration credit.)
6. *Introduction to Human Physiology* Messrs. J. CUNNINGHAM AND P. A. STEWART.
The aims of this course are twofold: A) to provide an introductory level course in Human Physiology, aimed primarily at freshmen who are not concentrating in biology and who want to learn more about his/her body functions, and why it does what it does; 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, SHEARER, ORTON, AND LEITH.
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 and industry, 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.)

11, 12. *Current Concepts in Biology*

Messrs. ELLIS, HOLOWINSKY, AND POOLE.

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. Principles pertinent to the organismal and population levels of organization are discussed in the spring. Three hours of lecture and three hours of laboratory. No prerequisites but a strong background in high school biology and chemistry is recommended.

27. *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.

A study of the developmental anatomy of vertebrate embryos. 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. Prerequisite: written permission.

42. *Principles of Ecology*

Mr. WAAGE.

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 12 or equivalent biology background, calculus recommended, written permission of the instructor required.

46. *Genetics*

Messrs. ZIMMERING AND LEDERBERG.

An introduction to genetic phenomena at the molecular, cellular and population level. Gene structure, transmission and function, and the impact of environmental agents on these parameters to produce gene mutations or chromosome aberrations are considered in microbial, laboratory animal, and human populations. One 2-hour discussion period 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*, mice, and human or mammalian cell cultures. Prerequisite: written permission. Recommended: Biomed 11, 12. Biomed 46 may not be taken in addition to Biomed 47.

51. *Plant Organism*

Ms. COLEMAN.

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 development and reproductive strategies and the integrative factors of individual tissue and organ systems. A lecture and laboratory/demonstration course. 5-6 hours of attendance. Prerequisite: Biomed 11 or 12 or AP biology.

61. *Invertebrate Biology*

The STAFF.

A comparative survey of the invertebrates, stressing ways in which functional morphology, physiology, reproduction and development, and behavior of the animals relate to their ecology. The laboratory exercises and field trips provide first-hand experience with the animals. Prerequisite: written permission.

82. *Histology*

Messrs. HEYWOOD AND RIPLEY AND Ms. LEDUC.

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.

91. *Nervous System: Introduction* (Neural Science 1)

Mr. EBNER AND STAFF.

Designed as a systematic introduction to the structure and function of the central nervous system. 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, and the diversity of nervous systems in vertebrate and invertebrate animals.

92. *The Nervous System: Specific Topics* (Neural Science 2)

Mr. EBNER AND STAFF.

Designed as a more specific treatment of selected topics related to the nervous system. Topics change from year to year, but have included vision, invertebrate neural science, regeneration and plasticity of the central nervous system, psychopharmacology, control of movement, models of neural function.

II. FOR UNDERGRADUATES AND GRADUATES

Cell Biology, Physiology, Biophysics

102. *History of Biology and Medicine* (Special Themes and Topics 102)

Messrs. BECK AND ERIKSON.

Interested students should register for Special Themes and Topics 102. Offered in alternate years.

103. *Plant Cell Biology*

Mr. HEYWOOD.

A detailed survey of cell structure, function, and organelle evolution in algae, fungi and higher plants. Topics that will be examined include: structure and function of organelles, nuclear behavior, cell and organelle motility, nutrition, symbiosis, morphogenesis, and the production of extracellular material. The potential of plant cells as experimental systems in biological research will be emphasized. Written permission required.

104. *Biology of the Eukaryotic Cell*

Ms. GERBI AND STAFF.

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 the validity of 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 (1978), 14, or 123 and written permission.

107. *Quantitative Models of Biological Systems* (Applied Mathematics 107)

Messrs. PERELSON AND BANKS.

An intermediate course between Biomed. 110 and Biomed 212/Applied Mathematics 222. The emphasis will be on the use of quantitative modelling techniques in solving real problems in biology at the sub-cellular, cellular and organ system levels. Topics presented may 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 cardio-vascular system), to the level of the whole organism (e.g. biological clocks, growth equations, chemostats, morphogenesis and pattern formation). 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.

110. *Cell Physiology and Biophysics*

Mr. CHAPMAN AND STAFF.

Integration of structure and function in living cells; biological membranes; electrophysiology; nerve and muscle physiology; cellular motility; computer modelling of cell function. Prerequisites: Chemistry 3, Physics 4, Mathematics 10, and Biomed 11 or written permission.

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 Spring 1979-80, and alternate years, thereafter.

112. *Topics in Marine Biology*

The STAFF.

A seminar-style course considering a wide variety of marine biological topics from bacteria to whales. Includes lectures, student presentations, guest speakers and field trips. Prerequisites: Biomed 61, 111 and/or 118 and written permission of instructor. Offered alternate years, next in 1980-81.

114. *Photobiology*

Mr. HOLOWINSKY.

This course focuses attention on primary photoprocesses in biology. Major consideration is given to photochemistry of biological macromolecules and pigments, molecular architecture of complex photoreceptors, and the nature of principal photoresponses. Offered in alternate years. Prerequisite: written permission. (Alternates with 234.)

116. *Plant Growth and Behavior*

Mr. BEALE.

The factors essential to growth; growth accelerators and inhibitors and their modes of action; correlation mechanisms; influence of environmental factors on survival and success of the individual; differentiation; developmental patterns and their modification. Six hours of attendance. (Alternates with Biomed 136.)

117. *Mammalian Physiology*

Messrs. GOLDSTEIN, JACKSON, AND STEWART AND Ms. CSERR.

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: Math 9, 10; Chem 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 Physiology*

Messrs. GOLDSTEIN AND JACKSON.

This course deals with the operation of physiological systems in a variety of vertebrates and invertebrates. Topics discussed are circulation, respiration, excretion, fluid balance and osmoregulation. Major emphasis is placed on the roles of the different physiological systems in the adaptation of organisms to different and changing environmental conditions. Prerequisites: Biomed 185 and Chemistry 11 or equivalents.

Biochemistry, Physiological Chemistry, Pharmacology

119. *Digital Signal Processing*

Mr. SHIPP.

Basic concepts in digital signal processing with emphasis on digital filters and spectral analysis. Mathematical techniques will be developed as needed and will require reasonable sophistication. The laboratory will stress practical applications in real-time signal processing and experiment control using microprocessors on a minicomputer system with graphics facilities. Prerequisites: Applied Mathematics 33, 34 or equivalent, modest programming experience, and written permission.

120. *Computers in Biology and Medicine*

Mr. SILVERBERG.

This course will introduce the fundamental principles and techniques of computer programming and will survey the potential applications of computer analysis to problems in biomedical practice and research. Examples will be drawn from both clinical and laboratory settings, and will be chosen so as to give the student some practical experience in using the computer as a routine tool in the investigation of biological and medical phenomena.

122. *Physiological Chemistry*

Mr. FENTON.

The course deals with the physiological aspects of general metabolism, functions of the gastrointestinal tract, regulation of food intake and obesity, acid-base balance, respiration and blood gas transport, kidney function, and a variety of topics selected by the students. Prerequisite: Chemistry 11. Seminars and individual conferences.

123. *Biochemistry*

The STAFF.

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. Prerequisite: Chemistry 3, 11, 12 (may be taken concurrently).

124. *Regulatory Biochemistry*

Mr. CZECH.

Designed for students who desire a second course in biochemistry which features: (1) an advanced treatment of the biochemical control mechanisms which operate to coordinate metabolic pathways in mammalian systems, and (2) extensive consideration of the biochemical consequences of disease states, such as cancer, diabetes, and obesity on these control mechanisms. Will also present areas of biochemistry which are not discussed in Biomed 123 such as glycosylation of protein, lipid, and collagen and the biochemical basis of muscle contraction. Interaction of disease processes and biochemical control mechanisms will be emphasized throughout. Important aims will be to underscore principles of rate control which are applicable to pathways and systems not specifically covered and to present the various modes of problem solving which are employed in the field. Prerequisite: Biomed 123.

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 abused drugs, psychotherapeutic drugs, antibiotics, anticancer drugs, and environmental pollutants. Prerequisites: Biomed 1 or Biomed 11, and Chemistry 11.

126. *Endocrinology*

The STAFF.

A survey of hormone action with emphasis on control mechanisms at cellular and molecular levels. Prerequisites: Biomed 1 or 11, 123 or written permission.

127. *Medical Biochemistry*

Mr. DAHLBERG.

An advanced course in regulatory biochemistry with a medical orientation designed for students with prior background in biochemistry. Two lectures and a discussion period each week. Prerequisite: Biomed 123 or its 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 123. Recommended for background information: Biomed 151.

129. *Basic Nutrition*

Mr. FENTON.

The course, in seminars and individual study, will deal with the organism's requirements for proteins, lipids, carbohydrates, vitamins and minerals and with the metabolic functions of these substances. Food additives, food fads and the distribution of foods, nationally and internationally, will be discussed, as will be evolution of food habits. Prerequisites: Chemistry 11, Biomed 1 or equivalent or special permission.

Development, Embryology, Evolution

131. *Analysis of Development*

Ms. FAUSTO-STERLING AND Mr. COLEMAN.

A critical analysis of the major developmental phenomena of animals. Emphasis is placed upon theoretical and historical background, and contemporary experimental design and interpretation. Cytodifferentiation, tissue interactions, morphogenetic movements, morphogenesis of complex patterns, and gene action in development are among the topics considered. Recommended: Biomed 11, 12 and 46 or 47.

132. *Evolution and Development*

Mr. WEISZ.

Topics include: evolution on molecular, intracellular, cellular, and organismic levels; origins of cellular components and processes, and of multicellularity; origins of animals and of main animal groups; comparative embryology, and related physiology and ecology; theories of ontogeny and phylogeny. Prerequisite: Biomed 1, 11, or written permission.

136. *Developmental Plant Anatomy*

Mr. BEALE.

This course is intended to provide opportunity for more intensive and detailed study of the vascular plants and their development, as well as current methods of study, beyond the level of Biomed 51. Topics included are: plant cell types and differentiation; the cell wall; meristems; histogenesis; primary and secondary tissues; organogenesis, organs, and organ systems; embryogenesis. Laboratory will include one in-depth investigation of developmental events and the preparation of a written, comprehensive report. Prerequisite: Biomed 51 and permission of the instructor. (Alternates with Biomed 116).

137, 138. *Experimental Morphogenesis*

Mr. GOSS.

Regeneration, compensatory growth, wound healing, and growth regulation. Three hours of attendance. Prerequisite: Biomed 1 or 11, 12; recommended: Biomed 82.

Genetics, Ecology, Population Biology

141. *Introduction to 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*

MESSRS. WAAGE AND MORSE.

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 deals with field work (informational and quantitative studies) on the plant and insect ecology 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 and Juniors only and limited enrollment. Prerequisites: Biomed 42, 51 and/or 61 and written permission.

144. *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) and Mathematics 9 and 10.

145. *Genetic Effects of Mutagenic Agents in Drosophila*

Mr. ZIMMERING.

Discussions on genetic effects of mutagenic agents, including X-rays and environmental chemical mutagens, and laboratory on techniques for their detection in *Drosophila*. Prerequisite: a course in genetics.

147. *Genetics and Human Disease*

The 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.

149. *Statistical Methods in the Biological and Medical Sciences*

Mr. KIDWELL.

Concepts and derived statistical methods particularly pertinent to biological problems; standard descriptive and testing techniques including chi-square, correlation, regression, analysis of variance, scale transformations, and various non parametric methods. Prerequisite: written permission.

150. *Plant Systematics*

The STAFF.

An evolutionary exploration of the vascular plants and their adaptations to different environments. Topics include plant taxonomy, variation and speciation, and adaptations for reproduction, dispersal, competition and defense. Life history strategies and coevolution of plants and animals are emphasized. In the laboratories students become familiar with plant classification and taxonomy. Field trips introduce students to the local flora. Prerequisites: Biomed 42 and 51 and written permission.

Molecular Biology, Microbiology, Immunology

151. *Molecular Biology and Microbiology*

MESSRS. ROTHMAN AND LEDERBERG.

The relation of cellular and subcellular functions to the molecular structure and properties of cellular components is explored, with emphasis on the specificity of biological synthesis and the mechanisms of its regulation and inheritance. Since bacteria and bacterial viruses have played a major role as experimental material for the elucidation of these problems, their molecular biology is stressed. Prerequisite: Biomed 123 or written permission; introductory genetics and physics are useful.

152. *Genetics and Society*

Mr. LEDERBERG.

The impact on society brought about by advances in research on molecular biology, genetics and reproductive biology. Topics include an examination of human genetic defects which impair the quality of life, the options available to change this quality, the many aspects of genetic technology as applied to human needs, and the ethical and moral ramifications of genetic technology. The course is designed for upper-classmen from life sciences and social studies interested in the interface between genetics and public policy. Readings will be from texts and reprints of articles on human genetics, population control and eugenics and from annotated court decisions and law reviews. Prerequisite: consent of instructor and a course in genetics or molecular biology for concentrators within the Division of Biology and Medicine or Biomed 1 for all others.

153. *Principles of Immunology*

Mr. ROTMAN.

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; effect or mechanisms; applications of immunology to research and to clinical problems. Standard immunology textbooks will be used to supplement lecture topics. Prerequisites: Chemistry 12; molecular and cellular biology recommended.

156. *Virology*

Mr. SHANK.

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.

158. *Medical Microbiology*

Messrs. KNOPF, MEDEIROS, AND SHANK.

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, or written permission.

Neurosciences

161. *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. Invertebrate nervous systems will be investigated with several techniques including dye injection, iontophoresis, signal averaging and statistical analyses. Informal lectures will be utilized to discuss methods, results and underlying concepts. Prerequisites: Neural Science 1 and 2, Bio 11, 12, Physics 3, 4, Chemistry 3, 11 and written permission of instructor.

164. *Experimental Neuroanatomy*

Mr. EBNER.

Neuroanatomy for Graduate students. This course builds on an introductory knowledge of neuronal anatomy and physiology to study the anatomical organization of the mammalian central nervous system in depth. Topics include ultrastructure of the central nervous system; anatomical techniques; neuronal response to injury, organization of somatic, visual and auditory sensory pathways to cortex; motor systems; comparative anatomy of the thalamus and cortex in mammals. Prerequisites: Neural Science 1 and 2 or equivalent Neural Science courses.

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. Prerequisites: One semester of biochemistry or written permission.

Radiation Biology

171. *Special Topics in Radiation Physics and Biology*

Messrs. GLICKSMAN, ORTON, PECK, AND STAFF.

Research projects in radiation oncology, radiology, diagnostic radiology, nuclear medicine, or radiation safety will be undertaken with faculty supervision either at one of the Brown Teaching Hospitals or on Campus. Students will be expected to actively participate in a series of weekly seminars and to write a term paper on their research. Prerequisites: written permission *plus* Biomed 7 or Biomed 241 *or* Physics 114 or Physics 140. The course is primarily for undergraduates and is limited to ten students. This course may be taken by physics concentrators as Physics 198.

Morphology, Histology, Pathology

176. *Biology of the Vertebrate Integument*

Messrs. QUEVEDO AND McDONALD.

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.

181. *Human Morphology* (double credit)

Messrs. CONROY AND ERIKSON AND Ms. PHILLIPS-CONROY.

The functional anatomy of man in the perspective of his evolutionary and embryological development 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.

183. *Experimental and Comparative Pathology*

Mr. FAUSTO.

The objectives of this course are to analyze the basic biological processes involved in cellular defense mechanisms and the metabolic alterations that lead to some major diseases. Pathology is considered here as a basic biological science and emphasis is placed on the mechanisms of production of disease at the molecular and cellular level, and in the transition from normal to abnormal cellular metabolism. The major topics considered are cellular death and necrosis, inflammation, immune response, and cancer. Open to graduate and undergraduate students not enrolled in the medical science program. Prerequisite: Biomed 104, 82, or written permission. Given in alternate years.

184. *General Pathology*

Mr. FAUSTO 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. Recommended background course, Biomed 82. Required for students in the Medical Education Program. All others by written permission.

185. *Comparative Biology of the Vertebrates*

Ms. BOSSY AND Mr. ERIKSON.

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 supervised individually by members of the staff. Required of candidates for Honors and for Sc.B. degrees, and open to others. For further information, see the Honors Advisor.

III. PRIMARILY FOR GRADUATES

Cell Biology, Physiology, Biophysics

210. *Advanced Cytology*

The STAFF.

Seminar based on research interest of the participants.

212. *Mathematics Models in Physiology* (Applied Mathematics 222)

MESSRS. BANKS AND PERELSON.

The development and use of mathematical models for describing phenomena of biology is illustrated by models taken from the literature, and from the experience of the class. In addition to general modeling concepts, mathematical techniques presented may include singular perturbation, numerical integration of ordinary and partial differential equations, optimization techniques, and techniques for the solution of nonlinear algebraic equations. These techniques will be discussed in the context of mathematical models taken from systems physiology, immunology, enzyme kinetics, membrane transport phenomena, etc. An independent research modeling project may be required of each student. Prerequisite: at least one 100-level biology course; Applied Mathematics 33, 34 or written permission.

213. *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 or 118. Prerequisite: written permission.

214. *Principles in Experimental Surgery*

Messrs. POVAR, HOPKINS, TRUDELL, AND VARGAS.

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. Prerequisite: Biomed 103 or 104 or the equivalent.

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. Prerequisite: 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 microorganisms. 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 123 or written permission.

221. *Basic Principles in Chemotherapy*

Messrs. CHA, CRABTREE, CUMMINGS, AND PARKS.

This course is designed for students interested in the biochemical basis of chemotherapy as well as some special aspects of the clinical usage of chemotherapeutic agents. Emphasis is on the reading of original research literature and active participation by students as well as faculty. In addition to formal lectures, opportunities are offered to observe the clinical management of patients with malignancies. Offered alternate years, two days per week. Prerequisite: Biomed 128 or written permission.

222. *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 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.

223. *Biochemistry*

Mr. FENTON.

Individual study in depth of some topics in physiological chemistry of special interest to the student.

224. *Nutrition*

Mr. FENTON.

The course will be conducted as individual study and seminars. It will deal with the basic nutritional aspects of proteins, carbohydrates, lipids, vitamins and minerals and their interrelationships. A part of the course will deal with the socio-economic aspects of the special nutritional problems of depressed areas of the world.

227. *Hormonal Regulation of Cellular Metabolism*

Mr. FAIN.

A study of the 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 and written permission.

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. Prerequisite: Biomed 103, 104 or equivalent and written permission. (Alternates with Biomed 114).

Genetics, Ecology, Population Biology

241. *Radiobiology*

Mr. LEITH.

Biophysical effects of ionizing radiation of living organisms. Topics include mechanisms of cellular lethality; cellular repair processes; modification by chemical agents; tumor biology and cell kinetic effects. Student project reports. Basic physics and some course beyond Biomed 1 are suggested. Written permission required.

Molecular Biology, Microbiology, Immunology

252. *Advanced Molecular Biology*

Mr. LEDERBERG AND STAFF.

A selection of topics on the molecular biology of cells and their viruses relating to the modification, damage, repair and regulation of their genetic elements. In past years, emphasis was given to environmental genetic toxicants which induce mutation, chromosomal changes and cancer. Prerequisite: Biomed 151 or equivalent, and written permission. Offered in alternate years.

254. *Advanced Immunology*

MESSRS. ROTMAN AND KNOFF.

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 instructors. Prerequisite: written permission and/or Biomed 153 (151 recommended).

256. *Biochemical Genetics*

Mr. ROTHMAN AND 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, tumor viruses, regulation of gene expression in eukaryotes. Three hours of discussion. Prerequisite: Biomed 151 or equivalent and written permission.

Neurosciences and Behavioral Science

264. *Physiology and Pharmacology of Excitable Cells*

Ms. MARSHALL AND Mr. CHAPMAN.

Biophysical and pharmacological properties of nerve and muscle cells, with particular emphasis on cellular mechanisms of mechanoreceptors, and the pharmacology of smooth muscle. Assigned seminar discussion of recent literature and modern research methods. Offered in alternate years. Prerequisite: Biomed 110.

266. *Physiology of the Visual System*

Mr. McILWAIN.

This seminar course examines in detail several major themes and topics in visual physiology. The emphasis is on current research concerning the anatomical and physiological basis of visual function with particular attention to the use of receptive field analysis as an investigative method. The course is complementary to the Seminar in Vision offered in the Department of Psychology and the two courses, offered in alternate years, may be taken in any order. Open to graduate students with neuroscience background and to selected undergraduates. Written permission required.

268. *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 an emphasis on primary care.

Morphology, Histology, Pathology

282. *Parasitology*

Mr. SENFT.

Introduction to the physiology and pathology of several classes of parasitic and tropical diseases. About ten separate human parasites will be considered, among them malaria, filarial diseases (elephantiasis) various trematodes including schistosomes and flukes, trypanosomiasis (Chagas' and sleeping sickness) and nematodes inhabiting the gastrointestinal tract. The effect of epidemic and eudemic diseases on the development of various regions of the world will be discussed. Biochemical and pharmacological aspects of treatment will be discussed. Preparation in biochemistry and in physiology is strongly urged. Written permission required.

284. *Vertebrate Paleontology: History and Biology of the Vertebrate Groups*

Ms. BOSSY AND Mr. QUEVEDO.

A detailed investigation of the evolutionary history of the vertebrates as revealed by the fossil record. The biology of the living vertebrates is stressed in interpreting the affinities, ecology, morphology, and physiology of vertebrates throughout geological time. Discussion and student presentations are encouraged. Three hours of attendance. Offered in alternate years. Prerequisite: Biomed 185.

288. *Vertebrate Paleontology: Evolutionary Principles and Problems*

Ms. BOSSY AND Mr. QUEVEDO.

A study of major evolutionary principles as illustrated in the phylogeny of the vertebrates. Discussions will explore such topics as rates, trends and opportunism in evolution, adaptation and adaptability, and principles of classification and taxonomy. Examples will be drawn primarily but not exclusively from vertebrate evolutionary history. Students will lead much of the discussion and will make short presentations. Offered in alternate years. Prerequisite: a genetics course and written permission; Biomed 185 strongly recommended.

General Offerings

291, 292. *Research*

The STAFF.

293, 294. *Special Topics*

The STAFF.

295, 296. *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/C132. *Health Data and Their Uses*

MESSRS. WESSEN, COBB AND FULTON.

This course surveys the various types of data collected concerning the health status of the population and the functioning of the medical care sector. It includes data on mortality and morbidity, sickness/absenteeism, hospital admissions and discharges, other forms of utilization, costs, and data on availability of manpower and facilities. Emphasis will be placed on problems of interpretation of data and on its application to problems of planning and management. Some background in statistics is desirable but not essential.

BI/B071, BI/B072. *Introduction to Human Behavior*

MR. ALEXANDER.

An integrated interdisciplinary study of fundamental topics in human psychology: development, psychoanalytic and learning theories of behavior, family theory, group and social psychology. Two lectures and one section per week. Recommended for upperclassmen. Preference will be given to students in the Medical Education Program. No prerequisites. Written permission required. Enrollment limited to 40.

IV. FOR PROGRAM IN MEDICINE ONLY

Core Clinical Clerkships

- 301 Medicine
- 316 Surgery
- 331 Reproductive and Developmental Medicine
- 346 Psychiatry
- 381 Community Health

Clinical Elective Offerings

Introductory Clinical Courses

- 369 Behavioral Medicine (Dr. FINK and STAFF)
- 370 Introduction to Clinical Medicine (Dr. GREER and STAFF)

Integrated Medical Sciences

- 363 Clinical Pharmacology and Therapeutics (Dr. CALABRESI and STAFF)
- 364 Integrated Medical Science, Nutrition (Dr. TURNER)
- 371 Integrated Medical Science, Cardiology (Dr. BOUGH and STAFF)
- 372 Integrated Medical Science, Endocrinology (Dr. TUCCI and STAFF)
- 373 Integrated Medical Science, Nephrology (Dr. GARELLA and STAFF)
- 374 Integrated Medical Science, Human Growth and Development (Drs. ARNOLD, EVRARD, SCHWARTZ, and STAFF)
- 375 Integrated Medical Science, Respiratory Disease (Dr. LEDERER and STAFF)
- 376 Integrated Medical Science, Gastroenterology (Dr. THAYER and STAFF)
- 377 Integrated Medical Science, Hematology (Dr. LICHTMAN and STAFF)
- 378 Integrated Medical Science, Infectious Disease, Parasitology, Supporting Structures (Drs. PETER, KAPLAN, SENFT and STAFF)
- 382 Integrated Medical Science, Laboratory Medicine (Dr. DIAMOND and STAFF)

Neurosciences

- 361 Neuroscience I (Drs. MCLWAIN, EBNER, MCENTEE, FINELLI, POGACAR and AMBLER)
- 362 Neuroscience II (Drs. ARONSON, SELVERSTONE, SHETTY, TRIEDMAN, ZACKS and AMBLER)

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, DAILY, 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)
- 305A Clinical Gastroenterology (Drs. THAYER, BEHAR, IANNUCCILLI, and STAFF)
- 305B Clinical Gastroenterology (Drs. IANNUCCILLI and THAYER)
- 306A Infectious Diseases (Drs. PETER, ZINNER, LOWE, and MEDEIROS)
- 307A Electrocardiography (Dr. KITZES)
- 307B Clinical Adult Cardiology (Drs. WILLIAMS, CAPONE, MOST, and STAFF)
- 307C/G 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)
- 307H Cardiology (Drs. SALZSIEDER, ARIF, and WHITED)
- 307I Electrocardiography (Drs. WILLIAMS, MOST, CAPONE, CARLETON, BOUGH, and SALZSIEDER)
- 307J Studies in Cardiac Rehabilitation (Drs. CARLETON and KHAN)
- 308A Introduction to Medical Oncology (Drs. CUMMINGS, DOOLITTLE, H. KAPLAN, TRIEDMAN, and CALABRESI)
- 308B Clinical Immunology and Oncology (Drs. ZAWADSKI and AIZAWA)
- 309A Rheumatology (Drs. KAPLAN, LOMBARDOZZI, HORWITZ, HO, HIMMEL, and STAFF)
- 310B Clinical Endocrinology (Dr. TUCCI and STAFF)
- 311A Clinical Hematology (Drs. LICHTMAN and FRIEDLAND)
- 311B Clinical Hematology (Drs. BARKER, FORMAN, and MEISSNER)
- 311C Clinical Hematology (Drs. BALDINI and STEINER)
- 311D Clinical Hematology and Medical Oncology (Drs. KNISLEY and D'AMICO)
- 311E Problems in Hematology (Drs. FARNES, STEINER, FORMAN, SMITH, and LEONE)
- 311F Clinical Hematology (Drs. CROWLEY, ALBALA, and STAFF)
- 312A Clinical Allergy (Drs. SETTIPANE, WELTMAN, and STAFF)
- 313A Rehabilitation Medicine (Dr. PALMER and STAFF)
- 314A Pulmonary Diseases (Drs. BRAMAN, CORRAO, ASHBA, 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. FRIEDLAND, KAPLAN, CROWLEY, STEINER, and STAFF)
- 315B Medical Intensive Care (Drs. BRAMAN, CORRAO, and STAFF)
- 315C Ambulatory Care Internal Medicine (Dr. FRIEDLAND and STAFF)
- 315D Pathophysiologic Concepts in Internal Medicine (Drs. CROWLEY, FRIEDLAND, KAPLAN, and STEINER)
- 315E Critical Care Medicine (Drs. KAYE, LEDERER, and LEVINSON)

Surgery

- 317B Introduction to the Private Practice of General Surgery (Dr. CARUOLO)
- 317C Surgery of the Alimentary Tract (Drs. CARNEY, CORVESE, FLEISIG, MIGLIACCIO, PAHIGIAN, PERRY, SODERBERG, BERNARDO, FRANCIS, LIFFMAN, MONCHIK, and MARSOCCI)
- 317D Surgery of the Alimentary Tract (Drs. BOWEN, COLEMAN, DORMAN, PAHIGIAN, CAPALBO, THOMPSON, and ROCCHIO)
- 317E The Hospital-Based Practice of General Surgery (Dr. STUART)
- 317F Principles of General Surgery (Dr. FELDER)
- 317G Surgical Intensive Care (Dr. THOMPSON)
- 317H Clinical Aspects of HMO Surgery (Drs. PERRY, LURIE, and STAFF)
- 318A Orthopedic Surgery (Drs. LITCHMAN, MOTAMED, SILVER, SIMON, and DEUTSCH)
- 318B Orthopedic Surgery (Drs. HERNDON, CORVESE, ZECCHINO, and QUIGLEY)
- 318C Psychosocial Care of Orthopedic Patients (Drs. SCALA, MARIORENTI, and DUBOIS)
- 319B Clinical Principles in Anesthesiology (Drs. McNAMEE, RAKATANSKY, BARCOHANA, EBNER, SABORIO, COUGHLIN, PATEL, 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, YASHAR, BURNARD, and WEYMAN)
- 323C Vascular Surgery (Dr. VAN DE WATER and STAFF)
- 323D Thoracic and Cardiovascular Surgery (Drs. McENANY and LEVINSON)
- 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 JOHNSON)
- 326B Plastic and Reconstructive Surgery (Dr. JOHNSON)
- 326C Advanced Clerkship in General Surgery (Drs. McENANY, HOPKINS, FELDER, and STAFF)
- 327A Introduction to Clinical Otolaryngology (Dr. WEXLER)
- 327B Otorhinolaryngology (Drs. McNELIS, LEKAS, HILL, BELLINO, and LANGENBRUNNER)

Reproductive and Developmental Medicine

- 332A Leukemia in Children (Drs. FORMAN, FARNES, BARKER, LEONE, and SMITH)
- 333A Clinical Pediatric Neurology (Dr. SHETTY and STAFF)
- 334A Human Sexuality (Rev. DANNENFELSER, Dr. EVRARD, Mses. GOLDMAN and HANSEN, Dr. MOUBAYED, and Mr. STEWART)
- 335B Child Development and Developmental Disabilities (Dr. PUESCHEL, SASSAMAN, and STAFF)
- 335C Developmental Disabilities in Childhood (Dr. PUESCHEL and STAFF)
- 336A Introduction to Pediatric Cardiology (Drs. CORWIN, SINGH, and ROMPF)

- 336B Pediatric Infectious Diseases (Dr. PETER and STAFF)
- 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, STERN, TOSELLI, and UTTER)
- 339A Perinatal Medicine (Drs. OH, CASHORE, COWETT, WIDNESS, and STONE-STREET)
- 340A Advanced Clerkship in Pediatrics (Dr. FORMAN and STAFF)
- 341A Clinical Gynecology (Drs. McDUFF, ANDERSON, and STAFF)
- 342A Maternal and Child Health and Family Planning Services (Drs. GOLD and EVRARD)
- 344A Introduction in Gynecologic Oncology (Drs. CALABRESI, GLICKSMAN, and STAFF)

Psychiatry

- 347A Outpatient Psychiatry (Dr. MAVISSAKALIAN and STAFF)
- 348A Management and Treatment of Patients with Alcohol and Drug Abuse (Dr. MAYFIELD and STAFF)
- 351A Environmental Aspects of Psychiatry and Psychosomatic Illnesses (Drs. COBB and WESSEN)
- 352B Community Psychiatry (Drs. INGALL, SILVER, FARBER, and STAFF)
- 353G Child Community Mental Health (Dr. NIRK and STAFF)
- 354A Psychology in Medicine (Drs. BROWN and FOWLER)
- 354B Psychiatry in Medical Practice (Drs. GOLDBERG and SLABY)
- 354C Psychological Aspects of Chronic Illness (Drs. FOX, BECKER, GOLDSTEIN, and HIMMEL)
- 355A Clinical Psychopharmacology (Dr. MAYFIELD and STAFF)
- 356A Clinical Psychiatric Research (Drs. BROWN, MAYFIELD, and STAFF)

Community Health

- 382B Chronic Diseases/Rehabilitation/Long-Term Care (Dr. GRANGER and STAFF)
- 383A Research in Medical Care and Administration (Drs. WESSEN, BURGESS, MONTEIRO, COONEY, and STAFF)
- 384A Decision-Making in a Public Health Agency (Dr. BURGESS and STAFF)
- 385A Medical Practice in a Small Community (Dr. HARTON and STAFF)
- 386 Alternate Modes of Health Care (Drs. ARONSON and GREER)
 - 386B, Faculty of Medical Sciences, Federal University of Sergipe, Brazil
 - 386C, The Frontier Nursing Service, Leslie County, Kentucky
 - 386D, CARE/Medico Center, Kabul, Afghanistan (Drs. FARNES and BARKER)
 - 386E, Mississippi Family Health Center, Jackson, Mississippi
 - 386F, Indian Health Service Unit, Hopi Reservation, Keams Canyon, Arizona
 - 386G, Blue Hill Memorial Hospital, Maine
 - 386H, Rural General Practice, Washburn, Maine
- 387A Emergency Room Care (Drs. CONSTANTINE, PORTER, and STAFF)
- 387B Emergency Medicine (Drs. HOCHHEISER, DEROLF, and STAFF)
- 387D Emergency Room Care (Dr. LEPORE and STAFF)
- 388A Primary Medical Care in an HMO Setting (Dr. ROSENBERG and STAFF)
- 389A Foundations of Preventive Medicine (Dr. COBB)

Family Medicine

- 387C Clerkship in Family Medicine (Drs. HOCHHEISER, CUNNINGHAM, and DEROLF)
- 389B Issues in Delivery of Primary Health Care (Dr. HOCHHEISER and STAFF)

Pathology

- 391A Clinical Pathology Conferences (Drs. FANGER, DAHLQUIST, ESPARZA, MEISSNER, REE, O'SHEA, TEPLITZ, NAYAK, and FIJMAN)
- 391B Forensic Medicine (Dr. STURNER)
- 391C Applied Pathology (Drs. DIAMOND, DYCKMAN, MEISSNER, and STAFF)
- 391D Selected Topics in Pathology (Drs. DIAMOND, DYCKMAN, MEISSNER, and STAFF)
- 391E Research in Perinatal Pathology (Dr. SINGER)
- 391F Developmental and Pediatric Pathology (Drs. SINGER, O'SHEA, and STAFF)
- 391G Gynecologic Pathology (Dr. LAUCLAN and STAFF)
- 391H Pathology of the Neuromuscular System (Dr. ZACKS)
- 391I Seminar in Developmental and Pediatric Pathology (Drs. SINGER, O'SHEA, AMBLER, and STAFF)

Radiation Medicine

- 392A Clinical Radiation Oncology (Drs. GLICKSMAN, TEFFT, and STAFF)
- 392B Nuclear Medicine (Drs. SPRARAGEN, GANDSMAN, and STAFF)
- 392C Diagnostic Radiology Preceptorship (Dr. UDIS and STAFF)
- 392D Diagnostic and Nuclear Radiology (Drs. HALLMAN, RYAN, HUDSON, TCHAKAROVA, and SCHWARTZ)
- 392E Preceptorship in Diagnostic Radiology (Drs. LAMBIASE, SCOLA, and STAFF)
- 392F Clinical Nuclear Medicine Preceptorship (Dr. FRATER and STAFF)
- 392G Diagnostic Radiology (Drs. COLAIACE and ENTEZARY)
- 392H Solid Tumors in Children (Drs. TEFFT, FORMAN, GLICKSMAN, STEINFELD, FARNES, LEONE, REGE, DELUCA, WESSELHOEFT, and SMITH)
- 392I Nuclear Medicine (Dr. CLAUNCH and STAFF)
- 392J Preceptorship in Clinical Radiology (Dr. ROCCO and STAFF)
- 392K Diagnostic Radiology (Drs. DEUTSCH, RYVICKER, COHEN, and SCHATZ)

Interdisciplinary

- 334A Human Sexuality (Rev. DANNENFELSER, Dr. EVRARD, Mses. GOLDMAN and HANSEN, Dr. MOUBAYED, and Mr. STEWART)
- 393B Living with Dying (Dr. SCALA)
- 393C Medical Jurisprudence (Dr. STURNER)
- 393D Drug and Alcohol Addiction (Drs. LEWIS, ZINBERG, and STAFF)
- 393E Medical School Administration (Drs. ARONSON and GREER)
- 393F Caring for Terminally Ill Persons (Dr. BORNSTEIN and Rev. PARKER)
- 395A Basic Portuguese (Professor VIERIA and Mr. BOTELHO)

Bio-Medical Ethics

The program in Bio-Medical Ethics is administered by the Committee on Bio-Medical Ethics composed of Associate Professor DAN W. BROCK (Chairman) (Philosophy), Professor SIDNEY COBB (Bio-Medical Sciences), Professor ROBERT P. DAVIS (Bio-Medical Sciences), Associate Professor EDWIN N. FORMAN (Bio-Medical Sciences), Professor JOHN LADD (Philosophy), Professor LEWIS P. LIPSITT (Psychology and Bio-Medical Sciences), Associate Professor JOHN P. REEDER, JR. (Religious Studies), and Associate Professor SUMNER B. TWISS, JR. (Religious Studies).

UNDERGRADUATE PROGRAMS

The concentration in Bio-Medical 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 bio-medical practice and research.

Each student in consultation with at least one member of the Committee on Bio-Medical 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 bio-medical sciences. Each concentration program must have a total of 10 courses including: 1) at least two courses in ethics selected from among Philosophy 143, 158, 164, and Religious Studies 22, 125, 128; at least one of these must be Philosophy 158, 164, or Religious Studies 125; 2) at least two courses in bio-medical science selected from among Bio-Medical Science 46, 47, 104, 110, 117, 123, 124, 126, 127, 128, 129, 140, 141, 142, 151, 152, 158, 181, 184; 3) at least two advanced courses in Bio-Medical 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. 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 Bio-Medical Ethics with Honors requires, in addition, an Honors thesis (Bio-Medical Ethics 192, during both semesters of the senior year) directed by a member of the Committee on Bio-Medical Ethics. Students interested in this concentration should contact Professor Twiss in the Department of Religious Studies.

FOR UNDERGRADUATES AND GRADUATES

Two courses from among Bio-Medical Ethics 150, 151, 152 and 154 will be offered in each year.

150. *Topics in Bio-Medical Ethics*

Messrs. DAVIS AND REEDER.

An interdisciplinary seminar devoted to an exploration in depth of some of the ethical problems arising out of medical care and human investigation and their impact on contemporary social and political life. A basic moral framework will be developed, utilizing the works of contemporary philosophers and religious thinkers such as John Rawls, Joel Feinberg and James Gustafson. Particular attention will be given to such concepts as respect for persons, obligation, justice, and rights. Key concepts in medical care will be analyzed, e.g. health, sickness, cure, treatment, care, support, life, death. The analysis will involve a critical examination of various definitions, criteria, limits and the ethical import of these and related medical concepts. An attempt will be made to work out those principles and rules which bear most directly on medical care and research. In addition, the role responsibilities of different parties involved in medical care, e.g. doctor, patient and family members will be discussed. Particular topics to be covered include: a) the allocation of medical resources; b) ethical problems related to the control of death: the right to life and the right to die; active and passive euthanasia; medical decision-making; c) a critical examination of the notion of "informed consent" and an exploration of alternatives in the context of treatment and experimentation; d) a discussion of the question whether or not a person has rights and responsibilities regarding his own body: does one have a duty to refrain from injuring oneself, to undergo treatment, to stay alive and, on the other hand, does one have a right to sell blood or organs, or terminate one's life? Readings will include articles in medical and philosophical journals and selections from contemporary and historical writers on ethics. 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. Limited enrollment. Written permission required. Prerequisite: one course in ethics; previous work in bio-medical science desirable.

151. *Ethical Problems in the Field of Mental Health*

MESSRS. BROCK AND COBB.

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*

MESSRS. TWISS AND DAVIS.

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*

MESSRS. COBB AND 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.

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.

Biophysical Sciences and Biomedical Engineering

CENTER FOR BIOMEDICAL ENGINEERING

EXECUTIVE COMMITTEE

RODNEY J. CLIFTON, PH.D., *Professor of Engineering*

JERRY D. DANIELS, PH.D., *Assistant Professor of Engineering*

PIERRE M. GALLETTI, M.D., PH.D., *Vice President for Medicine and Biology, Professor of Medical Science*

ROBERT W. HOPKINS, M.D., *Professor of Medical Science*

PETER D. RICHARDSON, PH.D., D.Sc. (ENG.) *Professor of Engineering*

PETER A. STEWART, PH.D., *Professor of Medical Science*

WILLIAM S. SHIPP, PH.D., *Associate Professor of Medical Science*

The Center for Biomedical Engineering is an association of faculty members from the Divisions of Biology and Medicine and of Engineering having interests in biophysics and biomedical engineering. The Center's functions are to promote interdisciplinary research and development in biomedical engineering, to develop and sustain degree programs related to the field, and to provide liaison with various health organizations. A combined Sc.B.—Sc.M. program is administered by the Center in cooperation with the faculty of the Divisions of Biology and Medicine and of Engineering. The Sc.B. with concentration in Biomedical Engineering is described under Engineering. Active research studies include the following fields: artificial organs, biomaterials, biomedical instrumentation, properties of membranes, mathematical studies in immunology, models of physiological systems, neurobiology, digital signal analysis, and vision.

Chemistry

Professors BAIRD, CARPENTER¹, L. B. CLAPP, COLE, EDWARDS, ESTRUP, GIBBS², GREENE, KING, LAWLER, MASON, NACE, RIEGER, RISEN (Chairman), STEIM, WARD³, WOLD; Associate Professors CANE, LUSK, PARKER; Assistant Professors C. H. CLAPP, DIEBOLD, MORTON, SWEIGART, WILLIARD.

¹On leave of absence, Semester II, 1979-80.

²Resigned, effective 6/30/79.

³On special assignment.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

Chemistry. Foreign Language: A reading knowledge of one or more modern languages: German, Russian, or French. 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, 11, 12, 15, 114, 151, plus three advanced electives. Note that differential and integral calculus and physics are prerequisites for Physical Chemistry (151 and 114).

See also descriptions of standard interdepartmental concentration programs in Biochemistry, Geology-Chemistry, and Chemistry-German, listed on page 54.

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF SCIENCE DEGREE.

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, 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 (above).

Courses: Twenty semester courses in Chemistry, Biochemistry, Mathematics, and Physics with a minimum of thirteen semester courses in Chemistry and Biochemistry (at least five in Chemistry), three 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, Biomedical Science 195, 196 or independent study approved by the Department.

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 Biomedical Science 195, 196.

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 Arts, 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 graduate enrollment is limited to about seventy students to ensure proper research facilities, opportunity for the individual, and close contact between the students and faculty. The Metcalf Chemical Laboratories 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 two expert electronics technicians. The laboratories are well equipped with modern instruments.

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) the physico-chemical behavior of macromolecules, particularly those characteristic of living organisms (proteins and nucleic acids); (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 transition metal complexes; (12) kinetics and mechanisms of inorganic reactions; and (13) laser induced fluorescence studies of vibration-to-electron energy transfer and chemical reaction dynamics.

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 theory of chemical reaction rates; 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) nitrogen heterocycles; (5) steroids; (6) organometallic reactions; (7) chemically induced dynamic nuclear polarization (CIDNP); (8) biochemical reaction mechanisms; (9) gas phase organic reactions; (10) environmental chemistry.

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 physiochemical 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

1. *Elements of Chemistry*

Mr. STEIM.

The fundamentals of chemistry, including the nature of elements and compounds and the characteristics of chemical change. Attention to the methods of physical science including some discussion of chemical case histories. Lectures, and three hours of laboratory attendance. Students intending to take a continuing course in chemistry should register for Chemistry 3 and not for Chemistry 1.

3. *Equilibrium, Rate, and Structure* MESSRS. CARPENTER, KING, MASON, AND SWEIGART. 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. This course is prerequisite to all chemistry courses except 1. Three hours of lecture and four hours of conference and laboratory attendance. Prerequisite or corequisite: Mathematics 9.

7. *Chemistry: Thermochemistry and Chemical Equilibrium. Stoichiometry* Mr. EDWARDS. Chemical aspects of thermodynamics. Chemical equilibrium, pH buffers and oxidation-reduction. Introduction to descriptive chemistry. Laboratory experiments designed to exemplify lecture subjects. Prerequisites: high school chemistry and mathematics including calculus (or placement for corequisite enrollment in Physics 15, Vector 1 course), plus written permission. Three hours lecture, four hours laboratory.

8. *Chemistry: Chemical Bonding, Reactions, and Inorganic Chemistry* Mr. RISEN. Sequel to Chemistry 7, with treatment of thermodynamics at a deeper level. Electronic and molecular structure. Kinetics and mechanisms of chemical reactions. The periodic table and relevant inorganic chemistry. Three hours lecture, four hours laboratory. Prerequisite: Chemistry 7. Corequisite: enrollment in Applied Mathematics 16 (Vector 1 course).

9. *Chemistry of Organic Compounds* Mr. L. CLAPP. Sequel to Chemistry 8, an introduction to functional group chemistry, stereochemistry, and synthesis of organic compounds with emphasis on their bonding and reactions. Laboratory: synthesis and properties of representative compounds. Three hours lecture, five hours laboratory. Prerequisite: Chemistry 8.

10. *Chemistry of Organic Compounds* Mr. L. CLAPP. Sequel to Chemistry 9, the chemistry and identification of organic compounds with emphasis on amino acids, proteins, carbohydrates, and fats. Laboratory: identification of organic compounds. Three hours lecture, five hours laboratory. Prerequisite: Chemistry 9.

11. *Organic Chemistry* MESSRS. CANE, C. H. CLAPP, NACE, AND MS. PARKER. 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: 3 or equivalent.

12. *Organic Chemistry* MESSRS. C. H. CLAPP, LAWLER, MORTON, AND NACE. 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: 11.

15. *Inorganic Chemistry* MESSRS. EDWARDS AND WOLD. Introduction to the chemistry of main group and transition metal elements with an emphasis on covalent bonding and molecular structure. Three hours of lectures and five hours of laboratory attendance. Prerequisite: Chemistry 12 and written permission.

63. *Physical Chemistry* MESSRS. DIEBOLD AND GREENE. Chemical thermodynamics with applications to phase and solution equilibria, electrochemistry, transport phenomena, surface effects, and kinetics. Intended as a fourth semester course for premedical, biology, and, medical science students. Not recommended for students intending to take Chemistry 114 and 151. Three hours of lecture and four hours of conference and laboratory attendance. Prerequisite: 12; Mathematics 10. Prerequisite or corequisite: Physics 2, 4, or 6.

97, 98. *Research* The STAFF. Special projects in the various fields of chemistry supervised individually by members of the Staff. Prerequisite: written permission.

II. FOR UNDERGRADUATES AND GRADUATES

106. *Advanced Inorganic Chemistry*

Mr. WOLD.

Discussion of a number of topics in solid state chemistry, coordination chemistry, and reaction mechanisms. Laboratory work will consist of independent projects. Three hours of lecture plus five hours of laboratory attendance. Prerequisite: Chemistry 15.

114. *Physical Chemistry: Quantum Chemistry*

Messrs. ESTRUP AND GREENE.

The quantum and statistical mechanical theories of chemical systems. Topics include chemical bonding, molecular structure and the microscopic basis of the laws of thermodynamics. Fifth semester course for all candidates for the degree of Bachelor of Science or Bachelor of Arts with concentration in Chemistry. Lectures plus eight hours of laboratory attendance per week. Prerequisites: 3; Physics 2, 4, or 6; Mathematics 10 or equivalent.

124. *Biochemistry*

Ms. LUSK.

Metabolism and control mechanisms with emphasis on microbial nitrogen metabolism. Membrane structure; synthesis of membrane components; transport systems. Prerequisite: Biomed 123.

125. *Biophysical Chemistry*

Mr. STEIM.

Physical chemistry of biomacromolecules, phospholipids, and cells, with emphasis upon experimental techniques. Topics include sedimentation, diffusion, electrostatics and electrokinetics, circular dichroism and other spectroscopic techniques, X-ray diffraction, colorimetry, and n.m.r. Prerequisites: 63 or 151; Biomed 123 or permission.

137. *Chemical Instrumentation*

Mr. COLE.

An introduction to instrumental methods used in chemical research. Topics in electronics, electrochemistry, spectroscopy, and the use of small computers. Lecture plus 6-8 hours of laboratory attendance. Written permission required.

145. *Advanced Organic Chemistry*

Mr. LAWLER.

Instrumentation and laboratory techniques applied to the determination of the structure of organic and biological molecules. Techniques will include nuclear magnetic resonance, infrared and mass spectroscopy, and the isolation of natural products. Prerequisite: 12. Ten hours of laboratory attendance.

151. *Physical Chemistry: Thermodynamics and Statistical Mechanics*

Messrs. BAIRD AND MASON.

The equilibrium and non-equilibrium behavior of chemical systems from the macroscopic and the microscopic points of view. Sixth semester course for all candidates for the degree of Bachelor of Science or Bachelor of Arts with concentration in Chemistry. Three hours of lecture plus eight hours of laboratory attendance. Prerequisite: 114 or written permission.

156. *Topics in Advanced Physical Chemistry*

The STAFF.

Lecture units on topics of current interests in physical chemistry, such as electrochemistry, surface chemistry, molecular spectroscopy, solid state chemistry, polymer chemistry, radiochemistry, 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*

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 273).

202. *Statistical Mechanics*

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 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. COLE.

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.

212. *Theory of Dielectrics and Electrolytes*

Mr. COLE.

A discussion of modern theories of dielectrics as they pertain to molecular structure and intermolecular forces, followed by derivation of limiting laws in dilute solution of electrolytes and discussion of deviations at higher concentrations. 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. RIEGER.

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. C. CLAPP.

Principles of chemical bonding, of electron displacements within molecules, of steric effects on 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*

Ms. PARKER.

Topic for 1979-80: Problems and solutions in synthetic chemistry.

277, 278. *Quantum Mechanics*

Messrs. BAIRD AND KING.

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

The Child Study Center — Founded in 1967, its initial responsibility was that of administering Brown University's involvement 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 from birth through eight years of age. Numerous studies were done, some in collaboration with the other ten institutions across the country which collected data of the same type. The Carriage House followup unit, at 157A Waterman Street, founded in 1959, still exists for the furtherance of such studies and for undertaking new research programs. Currently supported research within the Child Study Center includes studies of (1) sensory and learning development of infants and young children, (2) crib death and its causes, (3) the precursors in adolescents of depression, suicide, and antisocial behavior, and (4) 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 journal, *Infant Behavior and Development*, the only English language journal devoted exclusively to infancy, is published in the Child Study Center.

The Director of the Child Study Center is Dr. Lewis P. Lipsitt, Professor of Psychology and Medical Science.

Center for Classical Archaeology and Art

The Center for Classical 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. It occupies its own facilities including a professional dark room on two 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 placed further important resources within reach of the members of the Center.

Since 1966 Brown University has conducted field excavations at Satriano, Buccino, and Trentinara in southern Italy while students have also participated, with university support, in excavations at Polla (Salerno), Pompeii, Ortona and Cavallino (Lecce). 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. The current research interests of the faculty members of the Center lie in prehistoric and early historic Italy, Greek epigraphy, Greek numismatics, Greek sculpture, Roman sculpture and Roman painting. Encouragement of student research is a primary object of the Center.

Classics

Professors BOEGEHOLD, DONOVAN, FORNARA, HOLLOWAY, PINGREE, PUTNAM, SEGAL (Chairman), TOOMER, WORKMAN, WYATT; Assistant Professors ELLIOTT, RAAFLAUB.

The Department provides both specialized training for those who wish to enter graduate school in preparation for a career of 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, and classical art and archaeology 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.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS 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. 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.

Students with no previous preparation in Latin or Greek should register for Latin 1 and Greek 1.

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.

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 areas 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.

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, 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 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. Sight Translation in Latin—Examinations given twice yearly.
5. Sight Translation in Greek—Candidates should write these as soon as possible.

The preliminary Examination will consist of three 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), 3) Greek or Roman History (successful completion of a year course in Greek or Roman History can be substituted), 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 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.

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 402). 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 CLASSICAL ARCHAEOLOGY AND ART (page 156).

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 achievement of the Roman Republic and Empire.
3. *Foundations of Western Art in Antiquity* (Art 3) Messrs. 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.
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, Heliodorus, Petronius and Apuleius.
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.

61. *Ancient Greek Literature in Translation*

Mr. DONOVAN.

A survey of ancient Greek literature from Homer through Plato, with an emphasis on non-dramatic literature. Students wishing to do reading in the original should receive the permission of the instructor and register for Greek 161.

62. *The Greek Drama in English*

Mr. DONOVAN.

A survey of the works and different conceptions of tragedy of Aeschylus, Sophocles, and Euripides. Some attention will be paid to ancient comedy. Lecture and discussion. Students wishing to do some reading in the original should receive the permission of the instructor and register for Greek 162.

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.

92. *The Youthful Hero in Greek and Roman Mythology*

Greek and Roman works of literature and art will be examined for mythic paradigms of adolescence and the transition to youthful heroism. Psychosocial issues such as the nature of heroic action, ways of "growing up" in a heroic context, relationship to parents and country, female vs. male heroes, and the importance of athletics will be explored. At the same time the various types of stories will serve as an introduction to classical literary genres including the epic, tragedy, erotic verse, comedy, and the romance, and from these basic techniques of literary criticism will be developed. Readings will include selections from Homer, Sappho, Aeschylus, Sophocles, Euripides, Aristophanes, Plato, Virgil, and Ovid. The course will be conducted as informal class discussion of readings, and the instructor will supplement the readings with historical, cultic, and literary background. Final requirements will consist of an oral presentation in class which will then be reworked and handed in in written form.

GREEK

1, 2. *Essentials of the Greek Language*

Ms. ELLIOTT.

A two-semester approach to Greek with special emphasis on developing facility in rapid reading of Greek literature. Selections from Attic Greek authors. No previous knowledge of Greek is required.

A. *Introduction to Greek*

Mr. DONOVAN.

Intensive one-semester introduction to Greek. No previous knowledge of Greek required.

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; topic for 12: Homer.

LATIN

1. *Essentials of the Latin Language*

The 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 or who wish a rapid introduction to Latin reading.

11, 12. *Introduction to Latin Literature* Ms. ELLIOTT (I); Mr. BOEGEHOLD (II).
An introduction to Latin literature through intensive reading of major authors in prose and poetry. Prerequisite: Latin 1 or its equivalent. Topic for 11: Ovid, *Metamorphoses*; topic for 12: Tacitus, *minor historical works*.

II. FOR UNDERGRADUATES AND GRADUATES

CLASSICS

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.
For a fuller description see Religious Studies 115.

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.

121, 122. *The History of Greece from Archaic Times to the Death of Alexander*
(History 104, 105) 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*
MESSRS. WYATT AND ERIKSON (Biological and Medical Sciences).
A chapter in the history of medical thought. Study of ancient doctrines and beliefs from Homer to Galen, both in Greece and in Rome. Special attention to the relation of medical 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.

143. *Topics in Classical Art and Architecture* (Art 143) Mr. WINKES.
The sculpture of the Hellenistic Age.

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.

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* Mr. WYATT.
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 liturgics 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. (Formerly 215) *Greek Prose Composition* Mr. BOEGEHOLD.

125. *Aeschylus and Sophocles* Mr. DONOVAN.
Study in Greek tragedy, with emphasis on the different approaches to tragedy of Aeschylus and Sophocles.

126. *Plato and Aristotle* Mr. BOEGEHOLD.

129. See Classics 129.

161. See Classics 61.

162. See Classics 62.

181. (Formerly 201) *Early Greek Literature* 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. (Formerly 204) *Greek Literature of the Fifth Century* Mr. 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.

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* Mr. PUTNAM.

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* Mr. RAAFLAUB.

A study of the development and themes of Roman historical writing through a close examination of its major authors. Sallust, *Catiline*; Livy, Books 1 and XXI (parts of each); Tacitus, *Annales* (major portions of several books).

111A. *Selections from Latin Authors*

1978: Epic, Romance and Fabliau: Readings in
Medieval Latin Narrative Poetry

Ms. ELLIOTT.

1979: 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, Lucan) and genres (historiography, biography, oratory, political philosophy, historical epic) will be read which all deal with the fundamental experience of civil war or with the lives and

careers of the leading personalities. Other authors (Plutarch, Appian, Cassius Dio) will be read in translation.

111B. *Selections from Latin Authors*

1978: Virgil: The *Eclogues* and *Georgics* Mr. PUTNAM.
A close reading of Virgil's early work, with more general discussion of ancient pastoral and georgic poetry.

1979: Medieval Latin Literature: The Comic Mirror Ms. ELLIOTT.
Consideration of a number of medieval institutions — e.g. courtly love, the epic warfare, the philosophical schools — as they are seen through the optic of comic and satiric texts. Provision will be made to accommodate students with differing degrees of preparation in Latin.

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. (Formerly Latin 215) *Latin Prose Composition* Mr. WYATT.

181. (Formerly Latin 201) *Survey of Republican Literature* Mr. PUTNAM.

182. (Formerly Latin 202) *Survey of Latin Authors from Horace to Suetonius*
Mr. PUTNAM.

III. PRIMARILY FOR GRADUATES

CLASSICS

201. *Seminar: Readings in the Criticism of Ancient Art* Mr. HOLLOWAY.
Emphasis will be placed on twentieth century critics, particularly R. Bianchi-Bandinelli and Guido von Kaschnitz-Weinberg.

208. *Seminar: Textual Criticism* (1977) Mr. PINGREE.
Augustus and the Emergence of the Principate (1978) Mr. RAAFLAUB.
Social Conflicts in the Roman Republic: The Struggle of Orders (1979) Mr. RAAFLAUB.

231. *Seminar in Archaeology* Mr. HOLLOWAY.
Topics in recent years have include Topography and Monuments of Ancient Rome, Ancient Pottery, the Parthenon, Numismatics. Topic for 1979: Archaic Greek Sculpture and Related Arts.

243. *Seminar: Research Seminar on Roman Art* Mr. WINKES.
Students interested in this course should register for Art 243.

GREEK

202. *Seminar: Aristophanes* Mr. BOEGEHOLD.
Close reading of *Wasps* and perhaps one other play. All aspects of ancient comedy will be considered proper matter for study and seminar reports.

203. *Seminar: Euripides* (1977, 1979) Mr. SEGAL.
Byzantine Scholarship (1978) Mr. PINGREE.
An investigation of the efforts of Byzantine scholars to preserve, to edit, and to explain Classical Greek texts. Good reading knowledge of Greek and French required.

211. *Seminar: Greek Epigraphy* (1977) Mr. BOEGEHOLD.
The Presocratic Philosophers (1978) Mr. WORKMAN.
Examination of Ionian and Italian Philosophers of the sixth and the fifth

centuries B.C. in their search for a theory of causation. Their influence on Plato and Aristotle. Problems of authenticity of text and attestation of doctrine.

Sophocles (1979)

Mr. SEGAL.

Close literary study of the extant plays.

212. *Seminar: Thucydides*

Mr. BOEGEHOLD.

213. *Seminar: Plato's Phaedrus and Symposium* (1978)

Mr. SEGAL.

A close literary study of these two dialogues.

217. *Seminar: Greek Astrological Poetry* (1978)

Mr. PINGREE.

235. *Seminar: Greek Linguistics*

Mr. WYATT.

291, 292. *Reading and Research*

The STAFF.

Written permission required.

LATIN

203. *Seminar: Catullus* (1977); *Propertius* (1979)

Mr. PUTNAM.

204. *Seminar: Ovid: The Metamorphoses*

Ms. ELLIOTT.

211. *Seminar: Livy* (1977); *Translation in Latin*

Mr. TOOMER.

Poetry (1978); *Ammianus Marcellinus* (1979)

Mr. FORNARA.

212. *Seminar: Apuleius* (1977, 1979)

Mr. WORKMAN.

Reading Latin Manuscripts (1978)

Mr. TOOMER.

An introduction to Latin paleography for those wishing to learn how to read medieval manuscripts and documents. A wide variety of hands will be studied in facsimile.

213. *Seminar: Lucretius Book V*

Mr. TOOMER.

235. *Seminar: Latin Linguistics*

Mr. WYATT.

251. *Seminar: Tacitus*

291, 292. *Reading and Research*

The STAFF.

Written permission required.

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 has at least one member from each of the following departments: Anthropology, Applied Mathematics, Computer Science, Engineering, Linguistics, Music, and Psychology. The core of the discipline revolves around cognitive psychology, psycholinguistics and neurolinguistics, and artificial intelligence. In general, members of the Center are concerned with the ways intelligent systems, both human and artificial, use knowledge to understand experience, and how they process, store, and transform symbolic information.

The purposes of the Center are to encourage interdisciplinary research in cognitive processes by obtaining support for students and faculty, maintaining a computer-based facility, arranging for courses, concentrations, and degrees in cognitive science, and bringing cognitive science scholars to Brown.

The Center's laboratory consists of a Digital Equipment Corporation VAX-11/780 computer with 256K bytes of memory, an REM03 disk with 67 megabytes of storage, and a 75ips magnetic tape unit. Connected to the VAX is an LPA11-KK microprocessor for A/D

and D/A processing. This system will be used for speech analysis and synthesis. Also, a Grinnell color raster-scan graphics system with 256x256 matrix of pixels each coding 12 bits of information is connected to the VAX. This system will be used for research in pattern recognition and to generate stimuli for psychological experiments. A number of special-purpose laboratory computers will be connected to the VAX as satellites. The VAX will also be connected to other larger computers on campus.

The Center for Cognitive Science and the Center for Neuroscience have a two-year contract with the Alfred P. Sloan Foundation for the support of a series of seminars on current issues in cognitive science. These will culminate in a series of workshops.

The Center plans to introduce both an undergraduate concentration program in Cognitive Science and a Master's degree program. For the Ph.D. degree, students in Cognitive Science will enter into a standard departmental program.

For further information about the Center contact Richard Millward, Center for Cognitive Science, Box 1853, Brown University.

Comparative Literature

Professors COOK, HONIG, KUHN,¹ SCHOLLES, SEGAL, SPILKA, TERRAS, TRUEBLOOD,² WEINSTEIN (Chairman), WINNER,³ Associate Professors AHEARN, BOSSY; Assistant Professor 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

¹On leave of absence, 1979-80.

²On leave of absence, 1979-80.

³On leave of absence, Semester I, 1979-80.

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: one course from among English 3, 4, 18; one course from among English 9 (Sec. 01), 11, 12, 13, 101, 102; one course from among English 103, Linguistics 22, Linguistics 119; Comparative Literature 171 (in addition, students are urged to take Comparative Literature 272); (2) at least five advanced literature courses (generally 100-level courses), including Comparative Literature 121, selected from 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, the Romantic period, 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 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 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*

61. *The Functions of Literature*

Topics for 1979-80: Sec. 1, Shakespearean Transformations Ms. NEWMAN.

Sec. 2, Rhetorics of Selfhood and Literary History Mr. BOSSY.

71. *Literature and Its History*

81. *Ideas, Myths and Themes*

Topic for 1979-80: Love, Society and the Forms of Literature Mr. AHEARN.

Topic for 1980-81: Order and Chaos in Literature Mr. WEINSTEIN.

II. FOR UNDERGRADUATES AND GRADUATES

121. *Introduction to the Theory of Literature* Mr. AHEARN.

141. *Studies in Drama*

Ms. NEWMAN.

Topic for 1979-80: Dramatic Comedy

142. *Studies in Narrative*

Topics for 1979-80: Sec. 1, Self and Society in Early Narrative Mr. WEINSTEIN.

Sec. 2, Romantic Fiction Mr. TERRAS.

Sec. 3, Reading from a Feminist Perspective Ms. NEWMAN AND Ms. SCHOR.

Sec. 4, Proust, Joyce and Faulkner Mr. WEINSTEIN.

Sec. 5, Dostoevsky and the European Novel. Mr. WINNER.

143. *Studies in Poetry*

Topics for 1979-80: Sec. 1, Medieval Lyric Mr. BOSSY.

Sec. 2, Theory of Poetry Mr. COOK.

161. *Studies in Criticism*

171. *Introduction to Literary Translation*

Mr. HONIG.

Translation as a literary phenomenon in relation to the creative process, the critical process, literary tradition, literary history, and other topics.

181. *Studies in the Literature of Ideas*

Topics for 1979-80: Sec. 1, Myth and Identity Mr. SEGAL.

Sec. 2, Film and Fiction in the German Democratic Republic and the Soviet Union Mr. SMITH.

Sec. 3, Renaissance Versions of the Self Ms. NEWMAN.

Sec. 4, History and Theories of Semiotics Mr. WINNER.

198. *Senior Conference*

The STAFF.

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*

Topics for 1979-80: Sec. 1, Dramatic Comedy Ms. NEWMAN.

Sec. 2, Proust, Joyce and Faulkner Mr. WEINSTEIN.

253. *Seminar in Themes and Modes*

254. *Seminar in Schools and Movements*

Topics for 1979-80: Sec. 1, Medieval Lyric

Mr. BOSSY.

Sec. 2, The Childhood Theme in Nineteenth Century Fiction

Mr. SPILKA.

265. *Theory of Literature*

Topics for 1979-80: Sec. 1, Critical Theory and Modern Criticism

Mr. AHEARN.

Sec. 2, Theory of Discourse and the Teaching of Writing

Mr. SCHOLES.

272. *Theory and Practice of Literary Translation*

281. *Special Studies in Comparative Literature*

Mr. WINNER.

Topic for 1979-80: History and Theory of Semiotics

282. *Special Topics in Comparative Literature*

283. *Special Problems in Comparative Literature*

Mr. COOK.

Topic for 1979-80: Image and Metaphor in literary works and visual arts

291, 292 *Reading and Research*

The STAFF.

Work with individual students in connection with special reading, problems of research, or preparation of theses.

Computer Science

Professors VAN DAM (Chairman), SAVAGE, WEGNER; Assistant Professors CHARNIAK, DOEPPNER, REISS, SEDGEWICK.

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. At this time Computer Science moved into a new building and acquired a new research computer that provides modern and powerful computing facilities for both faculty and students.

The Department of Computer Science offers standard Sc.B. and A.B. concentrations, 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 hardware, firmware and software systems design, distributed computing, computer graphics, programming languages and systems, complexity of computing, operating systems, analysis of algorithms, combinatorial computing, artificial intelligence, systems performance, and pattern recognition, in addition to a variety of applications 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.

The standard Sc.B. concentration in Computer Science requires nineteen approved semester courses in Computer Science, Applied Mathematics, Engineering, or Mathematics, including Applied Mathematics 3, 4 or Engineering 3, 4 or Physics 3, 4; Mathematics 17 or 9, 10; Applied Mathematics 33, 34 or Mathematics 25-26 or 29, 52; Applied Mathematics 151; Computer Science 51, 100, 101, 106, 152, 153; and Engineering 163. Computer Science 101 and Engineering 163 are design courses which satisfy the general requirement for independent study, research, or design for the Sc.B. degree.

The standard A.B. concentration allows a broader, less professionally oriented course selection than the Sc.B. The prerequisites for the A.B. concentration in Computer Science are Applied Mathematics 3, 4 or Engineering 3, 4 or Physics 3, 4; and Mathematics 17 or 9, 10. The A.B. requires seven approved semester courses in Computer Science, Applied Mathematics, Engineering, or Mathematics, including Computer Science 51, 100, 101 and two of the four courses: Computer Science 152, 153; Applied Mathematics 151, and Engineering 163.

Students concentrating in Computer Science are encouraged to take courses in areas of application such as Applied Mathematics, Biology, Chemistry, Economics, Engineering, Linguistics, Philosophy, Physics, Psychology, or Sociology.

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 satisfactory Master's thesis must normally be completed under the supervision of a member of the faculty.

PROFESSIONAL MASTER OF SCIENCE IN COMPUTER 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:

1. two of the eight courses must be advanced courses on programming, programming systems or computer architecture;
2. two must be advanced courses on the analysis of algorithms, theory of computation or mathematics relevant to computation;
3. at least three of the eight courses must be at the 200 level; and
4. two course credits may be used for work on the design or research project.

The student must complete satisfactorily a substantial design or research project under the supervision of a member of the faculty.

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 a 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 either through an in-depth oral examination or, subject to the approval of the 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 Department's 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 formally admitted 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 Department's 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 will be awarded.

I. PRIMARILY FOR UNDERGRADUATES

50. *Introduction to Scientific Computing*

Mr. WEGNER.

An introduction to computer programming for scientific applications in a high-level language. This course will emphasize problem-solving and numerical applications of computer programming to several scientific disciplines.

51. *Computer Programming, Problem-solving, and Applications*

Mr. VAN DAM.

Introduction to computer programming in a high-level language, analysis of problems for computer solution, applications of computers to various disciplines. This course is directed towards those students who want a broad introduction to the field, including those intending to be Computer Science majors.

II. FOR UNDERGRADUATES AND GRADUATES

100. *Introduction to Computer Science*

Mr. SEDGEWICK.

Assembly language programming, elementary logical design, data structure programming. Fundamental concepts and methods in computer science theory and applications. Prerequisite: 51 or equivalent.

101. *Systems Programming*

Mr. REISS.

Advanced programming techniques and software methodology. Introduction to system software such as loaders, linkers, assemblers, interpreters and compilers. Prerequisite: 100 or consent of instructor.

102. *Introductory Compiler Construction*

Lexical analysis, syntactic analysis, code generation, code optimization, translator writing systems. Prerequisite: 101 or consent of instructor.

104. *Operating Systems Principles*

Mr. DOEPPNER.

Basic concepts in the design and implementation of operating systems. Parallel processes, memory and name management, resource allocation, protection, system performance. Examples of the application of the principles in actual systems. Prerequisite: 101 or consent of instructor.

106. *Computing Systems*

Mr. SAVAGE.

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. Advanced machine concepts. Microprocessors.

141. *Introduction to Artificial Intelligence*

Mr. CHARNIAK.

How Computers can be made to behave "intelligently". Particular topics include: the programming language LISP, natural language processing, computer vision, search techniques, A.I. data bases, story comprehension, medical diagnosis, and problem solving. The emphasis will be on the writing of small versions of classic A.I. programs. Prerequisite: 100 or consent of instructor.

151. *Applied Modern Algebra* (Applied Mathematics 151)

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.

152. *Introduction to the Theory of Computation*

Mr. DOEPPNER.

Finite state machines and regular expressions. Turing machines. Pushdown automata and context free languages. Operations on automata and languages. Computational complexity. Program verification.

153, 154. *Analysis of Algorithms I, II*

Mr. SEDGEWICK.

This two-semester sequence is intended for those who wish to pursue an intensive study of the techniques involved in the efficient implementation and precise analysis of computing algorithms. Mathematical topics include finite difference calculus; properties of binomial coefficients, Stirling numbers, Harmonic numbers, Fibonacci numbers, and asymptotic methods. Computer programming topics include basic concepts of data representation; program optimization techniques; and a variety of methods for sorting and searching. An emphasis is placed on obtaining exact closed form expressions describing the time and space requirements for particular computer programs when it is possible to do so. Prerequisite: 100.

193, 194. *Senior Seminar*

Independent study in various branches of Computer Science.

195, 196. *Special Topics in Computer Science.*

III. PRIMARILY FOR GRADUATES

254. *Topics in Analysis of Algorithms*

The STAFF.

Advanced concepts and techniques in the analysis of algorithms. Contents may vary from year to year.

273. *Programming Languages*

Mr. WEGNER.

Design, analysis, and implementation issues, including: run-time storage management, garbage collection, block structure, data types and operations, parameter passing, macro processing, co-routines and multi-tasking. Introduction to programming language semantics, language definition, and program verification. Languages covered include FORTRAN, ALGOL, SNOBOL 4, LISP, PL/I, PASCAL, SIMULA, ADA, modular languages, artificial intelligence languages, and concurrent processing languages. Prerequisite: 100.

274. *Programming Language Theory*

MESSRS. DOEPPNER and 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 flow chart models, mathematical semantics, fixed points and recursive programs, lambda calculus models, and language definition techniques.

276. *Computer Graphics*

Mr. VAN DAM.

Computer handling of such graphic information as line drawings, block diagrams, logic maps, handwriting, and three-dimensional surfaces. Emphasis on the use of a computer-driven cathode ray tube color display.

277. *Complexity of Computing*

Mr. SAVAGE.

The objective of this course is to develop useful theoretical limits on the performance of computers. To reach this objective a number of topics are brought together including the circuit complexity of Boolean functions, sequential machines, Turing machines and the organization of general-purpose computers. The limits on performance are stated in terms of limits on storage-time tradeoffs. If time permits, additional topics will be discussed, including sorting, matrix and multiplication, and NP-complete problems.

278. *Software Engineering*

The STAFF.

Structured programming, design and analysis, data abstraction, exception handling and reporting, implementation and testing strategies, development handling and reporting, implementation and testing strategies, development libraries, approaches to project management and documentation. Prerequisites: 101.

279. *Trends in Artificial Intelligence*

Mr. CHARNIAK.

Current topics in artificial intelligence will be discussed in detail. Emphasis on understanding the problems involved, surveying current research efforts, and investigating new directions. Topics might include automatic programming, natural language processing, problem solving, computer vision, medical diagnosis, and knowledge representation.

291. *Theory of Algorithms*

Advanced topics in computational complexity. Upper and lower bounds. Complexity classes. Selected topics of current research interest.

295, 296. *Special Topics in Computer Science*

297, 298. *Research in Computer Science*

The STAFF.

RELATED COURSES

The following courses in other departments are also of direct relevance to the study of computer science. For more complete descriptions of these courses, see the listings under the various departments.

Applied Mathematics

- 1. *Interactive Computing in APL*
- 115. *Introduction to Computational Probability and Statistics*
- 116. *Computational Probability and Statistics*
- 117, 118 *Numerical Analysis*
- 229, 230 *Mathematical Models in Operations Research*
- 255, 256 *Numerical Analysis*
- 267, 268 *Topics in Probability and Statistics*

Engineering

- 56. *Fundamentals of Electronic Circuits*
- 163. *Digital Electronic Systems Design*
- 252. *Pattern Recognition and Adaptive Decision Making*

Linguistics

- 170. *Introduction to Automatic Language Analysis*
- 172. *Mathematics and Computational Linguistics*

Philosophy

- 55. *Logic*
- 163. *Symbolic Logic*
- 192. *Topics in Mathematical Logic*

Psychology

- 107. *Programming the Laboratory Computer*
- 180. *Human Information Processing*
- 181. *An Introduction to Artificial Intelligence*
- 182. *Natural Language Processing*

Sociology

- 242. *Computer Applications in Sociology*

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 of differential equations and dynamical systems with special emphasis on applications to the control and stability of systems. 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 the Franklin Institute, Quarterly of Applied Mathematics, The Royal Society of Edinburgh (Proceedings), Applicable Analysis, Applied Mathematics and Optimization, 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, for only individual departments have that authority. 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,¹ BORTS, GROSSMAN,² POOLE,³ RYDER³ (Chairman), SATO, SCHUPACK, STEIN;⁴ Associate Professors FELDMAN, HANSON,⁵ HENDERSON, ROHR;³ Assistant Professors HARAF, IOANNIDES, KENNAN, SPULBER; Visiting Associate Professors KAWASHIMA,⁶ ONO;⁶ Visiting Assistant Professors KANNIAINEN,⁷ SUZAWA⁷.

Both graduate and undergraduate programs are built around a sequence of core theory courses. The theoretical tools are used to analyze public policy questions in a variety of areas. The emphasis in the undergraduate program is on policy issues and methods of devising efficient policy instruments. The graduate program emphasizes the development of tools of analysis which can be used for suggesting and evaluating policy instruments.

¹On leave of absence, Semester I, 1980-81.

²On leave of absence, Semester II, 1979-80.

³On leave of absence, 1980-81.

⁴On leave of absence, 1979-80.

⁵On leave of absence, 1979-80, and Semester II, 1980-81.

⁶1979-80.

⁷Semester I, 1979-80.

Mathematics background is not required for the undergraduate program, although it is useful in organizing the economic theory used. Mathematics is necessary for the graduate program. It is recommended that undergraduates obtain some mathematical facility if they intend to undertake graduate work in economics. These students might consider one of the concentrations offered jointly with the Mathematics Department or the Division of Applied Mathematics.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

Economics. Courses: Economics 111, 121, and 122 as a core, and at least five other one-hundred level economics courses as electives.

Economics Honors. Courses: Economics 111, 121, 122, 195 or 193, 194 and at least four other one-hundred level courses as electives.

RELATED COURSES OR PROGRAMS. Two groups of standard interdepartmental concentrations involving work in economics are available. Details of each program are given on the pages indicated.

Programs emphasizing analytical and theoretical economics:

Applied Mathematics-Economics: see page 53

Engineering and Economics: See page 56

Mathematical Economics: See page 58

Operations Research-Economics: See page 59

Programs covering particular social policy problems:

International Relations: See page 57

Modernization: See page 59

Organizational Behavior: See page 59

Urban Studies: See page 61

Any of the first group of programs is especially recommended for those who intend to do graduate work in economics. Each of the programs in the second group is intended to give a broad background in a policy area utilizing courses from all of the social science departments.

GRADUATE PROGRAMS

The graduate program in economics is designed to broaden and deepen the student's knowledge of economic theory and of the tools of economic research, and to help him or her develop skill and judgment in the analysis of economic problems. It reflects our belief that useful work in economics demands a thorough knowledge of economic theory and relevant mathematical and statistical techniques.

Brown offers a number of advanced courses in economic theory, mathematical economics, and econometrics, as well as courses that focus on specific problems or applied fields of interest. Every applied field, however, has as its core the application of economic theory, and where possible the confrontation of theory with quantitative evidence.

The primary emphasis of the program at Brown is preparation for the Ph.D. degree. However, a Master's degree is available for those who need less extensive training. Most of those who receive the Ph.D. degree enter college teaching, although many enter research positions in government agencies and industrial consulting and banking institutions. Ph.D. graduates from Brown have an outstanding record of publication.

MASTER OF ARTS. The M.A. program is not highly structured. The program of study includes: (1) eight semester courses in economics, constituting a coordinated program of study (two semester courses in a related field in another department may be substituted for two of these courses); (2) a passing grade on the Core Exam given at the end of the first year of graduate study (see description of the Core Exam below under the Doctor of Philosophy

Program). Courses 205, 206, 207, and 208 form the basis for the Core Exam and these would normally constitute four of the eight courses required.

DOCTOR OF PHILOSOPHY. The standard Ph.D. program includes two courses in microeconomic theory (205, 206), two courses in macroeconomic theory (207, 208), four courses in quantitative methods (Applied Math 115 and Economics 260, 279 and 280), and six courses in advanced fields of specialization. Among the fields presently available are aggregate economic growth, econometric theory, economic development, industrial organization, international trade and finance, labor economics, location theory, mathematical economics, monetary economics, public finance, and urban economics. Other fields may be developed in conjunction with faculty in economics or other departments.

The Core Examination will be a six-hour written examination in two three-hour sittings. The material covered in the Core Examination normally reflects the work in courses 205, 206, 207, and 208. Except in special situations this examination will be taken at the end of the first year of study. Preliminary examinations in elective fields will be written and will be three hours in duration. It is expected that in most instances a student will take these examinations at the end of the second year after completing the sequences of courses offered in the fields.

When Econometric Theory is not presented as a field of specialization, the candidate must demonstrate proficiency in the area. This requirement may be satisfied by passing two courses in Statistics and Econometric Theory at the graduate or advanced undergraduate level, usually Applied Mathematics 115 and Economics 260.

Students preparing for the Ph.D. should achieve sufficient proficiency in mathematical techniques to master the material in Economics 279 and 280, Mathematics for Economists. Those who have not covered this material prior to entrance must take the courses.

With the permission of the Department of Economics, the candidate may substitute a related field of specialization in another department for one of the elective fields. There is no foreign language requirement.

When all preliminary requirements have been met, the student will be admitted to doctoral candidacy for a period of five years. During this period, the candidate must present a dissertation which embodies the results of original research and gives evidence of high scholarship. After the completion of the dissertation, a Final Examination will be given orally on the subject of the dissertation.

I. PRIMARILY FOR UNDERGRADUATES

Although Economics 1 is taught at an elementary level and is not required as a prerequisite for advanced economics courses, it is recommended as a worthwhile course for all students interested in gaining an understanding of how economists analyze current problems. Experience suggests that such knowledge is valuable for a general liberal arts education and, in addition, for those students who expect to take advanced courses in economics and concentrators.

1. *Elements of Economics* Messrs. BECKMANN, BORTS, KENNAN, AND STAFF.
Economic theory, policy, and institutions examined on elementary level, with emphasis on their application to current social problems.

5. *Current Economic Problems* Mr. POOLE.
Application of elementary methods of economic analysis to a range of current economic problems — unemployment, inflation, government regulation, etc. — and examination of a wide range of opinions on appropriate governmental policies to deal with the problems. Primarily for students not intending to concentrate in economics. Prerequisite: 1 or 111.

45. *The Economics of Regulation* Mr. ROHR AND STAFF.
The theory and practice of regulation. Attention to the regulation of natural monopolies like electrical utilities. Offered in conjunction with 145. Prerequisite: 1.

71. *Financial Accounting*

Mr. RYDER AND STAFF.

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. BECKMANN, IOANNIDES, KENNAN, FELDMAN, SPULBER, 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.

112. *Microeconomic Analysis*

Mr. KENNAN.

Topics in price theory, including expected utility maximization, portfolio selection, saving, capital and interest, intertemporal profit maximization, investment, nature of the firm, team theory, theories of profit, market failure. Prerequisite: 111.

117. *Welfare Economics*

Mr. FELDMAN.

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, compensation criteria, and related ideas. Prerequisite: Economics 111.

121. *Money, National Income, and the Price Level*

Messrs. GROSSMAN, HANSON, HARAF, AND STAFF.

Macro-economic concepts and problems. Theory of national income and the price level. The dynamics of inflation. Prerequisite: Economics 111.

122. *Monetary and Fiscal Policy*

Messrs. HARAF AND POOLE.

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 stabilization policy. Prerequisite: Economics 121.

128. *Classical and Marxist Economic Theories*

Mr. IOANNIDES.

Comparative analysis of Classical and Marxist economic doctrines. History, development and interpretation. Political aspects of economic theories. Prerequisites: 111 and 121.

132. *Labor Economics*

Mr. KENNAN.

The supply of labor; economic determinants of fertility, labor force participation rates, labor/leisure choices; human capital theory, rates of return on investments in education and training; the allocation of time. Demand for labor; competitive and monopsony firms, demand for overtime, output and employment decisions over time. Unemployment; job search, information in labor markets. Effects of unions on wages and employment, economic influences on collective bargaining. The distribution of income. The economics of discrimination. Prerequisite: 111.

134. *Economics of Energy*

Messrs. SCHUPACK AND SPULBER.

Economic theory of exhaustible resources. Supply, demand and technological conditions underlying the production and use of energy. Models to estimate the future energy situation. Policies to ameliorate and control energy problems. Critique of Project Independence. Prerequisite: 111.

135. *Environmental Economics*

Mr. SPULBER.

Man, scarcity, the environment, and economic theory. Economic causes and consequences of environmental pollution. Efficiency and equity of alternative pollution control institutions. Energy. Economic growth and the environment. Prerequisite: 111.

141. *Urban Economics*

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 prob-

lems and their associated policy issues are developed in detail: congestion, pollution, poverty, housing, governmental structure, and the fiscal crisis of local government. Prerequisite: Economics 111.

142. *Topics in Urban Economic Policy* (Urban Studies 142) Mr. HENDERSON.
Designed for either Economics or Urban Studies concentrators. 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 governmental policies and examining the data. Policy areas include housing, poverty, environment, revenue sharing, and the property tax.

145. *The Economics of Regulation* Mr. ROHR.
The theory and practice of regulation. Attention to the regulation of natural monopolies like electrical utilities. Offered in conjunction with 45. Prerequisite: 111 and one other 100-level applied microeconomics course.

146. *Industrial Organization* Messrs. SCHUPACK AND SPULBER.
The structure and performance of industries, standards for economic efficiency, and government policies to improve economic efficiency. Particular attention to antitrust activity, public utility regulation, the patent system, and technological change. Prerequisite: Economics 111.

147. *Financial Markets: Economic Theories and Evidence* Mr. HARAF.
An overview of the economic analysis of financial markets. Certainty models of financial markets and decisions; determinants of the market value of the firm; portfolio composition under uncertainty and the equilibrium price of risk; and rate of return dynamics in an efficient asset market. The empirical evidence on these issues will be examined. Prerequisites: Economics 111, 121, 122. Some familiarity with basic statistical concepts on the level of Applied Mathematics 115 and knowledge of calculus on the level of Mathematics 9, 10 is also recommended.

148. *Public Finance* Mr. IOANNIDES.
An analysis of the appropriate 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: Economics 111.

151. *Economic Development* Mr. HANSON.
A study of economic growth with 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, including inflation, will also be treated. Prerequisite: Economics 121.

152. *The International Economy and the Developing Economies* Mr. HANSON.
Trade, economic development and international markets, political economy of import restrictions, import substituting industrialization versus export-oriented growth, political economy of customs unions, international capital flows and multinational corporations in developing economies. Prerequisites: Economics 151, 154, or 155.

154. *International Trade* Messrs. FELDMAN AND HANSON.
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: Economics 111.

155. *International Finance* Messrs. BORTS AND HANSON.
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. 154 is *not* a prerequisite. Prerequisite: Economics 121.

156. *Monetary History of the U.S.* Mr. STEIN.
Use of aggregative economic theory to explain the major monetary disturbances that have occurred during the past century. Prerequisite: Economics 121.
158. *Comparative Economic Systems* Mr. IOANNIDES.
Evolution of economic thought and the emergence of economic systems. Application of economic analysis to comparative economic systems. Centralized vs. decentralized decision making. Questions of ownership. The performance of socialist economies. Prerequisite: 111 and one other 100-level economics course.
161. *Quantitative Economics* Mr. SCHUPACK.
Managerial economics: 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 and Mathematics 7, 9, or equivalent.
162. *Econometrics* Mr. ROHR.
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. Prerequisites: Economics 121, and Mathematics 162 or Applied Mathematics 115 or Applied Mathematics 166.
- 163, 164. *Econometric Theory* Mr. ROHR.
An examination of the mathematical and statistical procedures required for the testing of economic hypotheses. Prerequisite: Applied Mathematics 166.
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: Economics 111 and Mathematics 7, 9 or equivalent.
186. *Mathematical Economics* Messrs. SATO AND BECKMANN.
A study of the principal mathematical techniques in economic analysis. Theory of cost and production, consumer demand, introduction to linear programming. Prerequisites: Economics 121 and Mathematics 29 and 52 or Applied Mathematics 33, 34.
- 193, 194. *Honors Course* The STAFF.
Independent study or seminar required of seniors in the Honors program. Preparation of a thesis. Economics 195 may serve as the first semester of this sequence.
195. *Senior Seminar* Messrs. BORTS, SATO, AND STAFF.
An opportunity for seniors in economics to pursue a research project within the context of a seminar discussion group. The projects should reflect the student's training in economics and related disciplines. Open only to seniors concentrating in economics. Written permission required.

III. PRIMARILY FOR GRADUATES

205. *The 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. General equilibrium theory, efficiency, cost-benefit analysis, collective choice rules, and Arrow's Impossibility Theorem.
206. *The Theory of Price II* Mr. FELDMAN.
Intertemporal pricing, speculative markets, the behavior of the firm under a regulatory constraint, optimal taxation and externalities.

207. *Theory of Employment and Inflation I*

Mr. GROSSMAN.

Output and employment under non-market clearing conditions. Capital and financial assets. Inflation and rates of return. Inflation and unemployment. Macroeconomic models incorporating incomplete information, rational expectations, and risk-shifting arrangements.

208. *Theory of Employment and Inflation II*

Mr. POOLE.

Macroeconomic models. Theory of consumption, investment, and monetary behavior. Dynamics of inflation, rates of return. Interactions of real and monetary factors over the business cycle. Stabilization policy.

210. *Aggregative Economic Growth*

Mr. STEIN.

Three major topics are discussed: a) Economic growth in a non-monetary economy, b) Economic growth in a monetary economy, c) The relation between market generated growth and optimal growth.

212, 213. *Monetary Economics*

Messrs. GROSSMAN AND POOLE.

Current research topics in monetary theory and empirical applications, including the following: portfolio theory; pricing in securities markets, including the term structure of interest rates; demand and supply of money; the evidence on the relation of money to business fluctuations and inflation; optimal stabilization policy; advanced analysis of employment and inflation; exchange theory, including theories of exchange in non-market-clearing situations and theories of the evolution and structure of monetary exchange.

216. *Topics in Risk and Information*

Mr. GROSSMAN.

Risk shifting in labor markets, theory of signaling, problem of adverse selection, rational expectations with particular attention to macroeconomic implications.

219. *Public Finance*

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*

The theory of local public finance; multiple jurisdictions and fiscal disparities; federal-state-local relations. An analysis of alternative proposals for fiscal and structural reforms. The impact of public policy on metropolitan growth patterns.

232. *Labor Economics*

Mr. KENNAN.

Theory and empirical analysis of labor markets; job search theories; dynamics of labor demand; job matching, equilibrium theories of unemployment. Prerequisite: 162, 186 or their equivalents, and 132.

241. *Urban Economics*

Mr. HENDERSON.

The location of population and economic activity in metropolitan areas; the urban land market; transportation; techniques of analysis and projection of metropolitan and intrametropolitan patterns.

247. *Industrial Organization and Market Structure*

Messrs. SCHUPACK AND SPULBER.

Theoretical and empirical descriptions of markets; applications to welfare analysis; innovations, research and development, and the patent system; implications for government regulation of business.

251. *Economic Development*

Mr. HANSON.

Growth within the framework of the developing economies; the role of the agricultural, industrial, and international trade sectors; inflation; government policy planning and investment criteria.

257. *Theory of International Trade* Mr. BORTS.
The balance of payments and its adjustment under different currency standards; international specialization under free trade; welfare aspects of free trade.
258. *Dynamic Aspects of International Trade* Mr. BORTS.
Capital movements; growth differentials; the balance of payments in growing economies.
260. *Econometric Methods* Mr. ROHR.
Application of statistical techniques to the estimation and testing of economic models. Prerequisite: Applied Mathematics 115.
- 263, 264. *Econometric Theory* Mr. ROHR.
An examination of the mathematical and statistical procedures required for the testing of the economic hypothesis. Prerequisite: Applied Mathematics 166.
275. *Location of Economic Activity* Mr. BECKMANN.
Residential density and rent distributions. Theories of migration. The location of plants. Locational structure of a homogeneous region. Theory of central places. Models of general equilibrium for a spatially extended economy.
- 279, 280. *Mathematics for Economists* MESSRS. BECKMANN AND RYDER.
Techniques of mathematical analysis useful in economic theory, mathematical economics, statistics, and econometrics. Topics covered include linear algebra, constrained maximization, difference and differential equations.
281. *Mathematical Economics I* Mr. SATO.
The theory of positive matrices and its application. Linear programming and the study of linear models of production and exchange. General equilibrium analysis.
282. *Mathematical Economics II* Mr. BECKMANN.
Decision making under uncertainty. Game theory. Dynamic programming.
283. *Mathematical Economics III* Mr. RYDER.
Analysis of dynamic stability. Optimal control and mathematical models of economic growth. Turnpike theory.
- 291, 292. *Reading and Research* The STAFF.
Seminar The STAFF and guest lecturers.
Reports on current research. Required, without credit, of graduate students in economics. Offered periodically throughout the year.

Education

Professors ARCHAMBAULT (Chairman), ESCHENBACHER; Assistant Professors SCHNEIDER, SHAW.

The Education Department offers progs, for both undergraduates and graduate students, in preparation for teaching in secondary schools. These include a program of preparation for teaching offered in most fields at the undergraduate level; a specially designed undergraduate program to prepare science teachers for positions in inner-city schools; a Master of Arts in Teaching Program to prepare liberal arts college graduates to teach at the secondary level; a Master of Arts in Teaching Program to provide advanced study for experienced teachers; and a program leading to the Master of Arts in Education which offers advanced study of one or more areas in the field of education. In addition, the department offers a variety of courses in the foundations of education to meet the general needs of students at the University.

UNDERGRADUATE PROGRAM

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 Department of Education at Brown, preferably prior to registration for the sophomore year. Minimum undergraduate preparation in the field of education includes: Education 105; 106; 107; and appropriate electives chosen in consultation with Education Department staff.

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 studies 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.

The Psychology of Teaching (Education 105) will not be accepted as credit toward the concentration, except where the concentrator is enrolled in the Undergraduate Teacher Education Program.

STATE CERTIFICATES. 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 through 1981-82.

GRADUATE PROGRAMS

The courses offered for graduate students are intended to serve as (1) a basic professional preparation for prospective teachers and (2) advanced study of teaching or aspects of educational theory. Opportunity is offered for original investigation and research. 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 269), and the Master of Arts in Education.

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, final examination, and occasional short papers are required.

105. *The Psychology of Teaching* (Psychology 105)

Mr. SHAW.

Develops theoretical analysis through small group classroom activities, cooperative field work with students, teachers, and observational activities in the 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*

The STAFF.

Offered in five sections: Sec. 1, English; Sec. 2, foreign languages and classics; Sec. 3, mathematics; Sec. 4, science; Sec. 5, social studies. Restricted to students seeking a secondary school teaching certificate through the Undergraduate Teacher Education Program. Prerequisites: Education 105 and one or more of the following: Education 102, 103, 109, 121, 122, 156, 157, 161, 162, 173. Ordinarily elected in Semester I of the senior year. Prerequisite to practice teaching (Education 107) in Semester II. Written permission required.

107. *Practice Teaching*

The STAFF.

A course in practice teaching given with the assistance of supervising teachers in neighboring schools to whom individual students are assigned. The work of the course consists of practice teaching in the schools, study of teaching methods, observations, reports, and conferences. The course provides not less than 180 clockhours 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 requirements for secondary certification in most states. Prerequisite: Education 106. Ordinarily open to seniors only.

108. *Analysis of Teaching*

The STAFF.

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.

109. *Education and Psychology* (Psychology 109)

Mr. SHAW.

Designed to introduce the psychological principles of instruction and learning to students interested in the fields of education and psychology. Students are required to participate in tutorial activity in association with a community school. The tutorial activity is designed to balance the foci of the course by examining theory through practical application. The course of study is organized into six general sections; the examination of instructional models, performance assessment and research, pupil behavior, instructional procedures, motivation, and educational innovation.

111. *The Social Psychology of the Classroom* (Psychology 111) Mr. SHAW.
Through readings and observations of schools, students will examine the psychological components of the hidden curriculum of schools, focusing on three areas: physical environment, expectations, and values.
121. *The Sociology of Teaching* (Sociology 121) Mr. SCHNEIDER.
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.
122. *Analysis of Urban Education in a Social Context* (Sociology 122) Mr. SCHNEIDER.
Emphasis will include an historic perspective as well as a close study of the relationship between urban education and industrial society, minorities, normative patterns within the schools, teacher behavior and the decision-making process. Students will also conduct various types of educational and social research.
156. *Philosophy of Education* (Philosophy 156) 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.
160. *Psychological Models of Education* (Psychology 160) Mr. SHAW.
The course will examine in detail up to four coherent approaches to education, such as Mastery Learning, behavioristic approaches, humanistic approaches, and the Montessori method. The psychological and philosophical assumptions underlying each approach will be examined and contrasted with each other. Students will investigate one approach in depth; the class as a whole will contrast the various methods.
161. *The Sociology of Education* (Sociology 161) Mr. SCHNEIDER.
A sociological analysis of the relationship between educational institutions and the social stratification of American society. Of major interest is the study of social and educational mechanisms employed by schools which change or perpetuate the socioeconomic status of individuals and social groups. To be examined also is the conflict between goals concerning equality of educational opportunity and the differentiation of educational programs.
162. *Educational Policy and Social Change* (Sociology 162) Mr. SCHNEIDER.
A sociological analysis of the relationship between the institutions of education and the process of change. The process by which elementary and secondary schools undertake or reject innovation and the impact of educational policies upon societal change will be examined as well as the latent outcomes of these policies.
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.
187. *Seminar on Normative Academic Environment* (Sociology 194) Mr. SCHNEIDER.
An analysis of sociological and social-psychological research concerning school normative environment and the relationship of this concept to socio-economic status of students and school achievement. Three major research studies concentrating upon student values and/or school climates in elementary and secondary schools will be investigated in depth.

II. PRIMARILY FOR GRADUATES

207. *Practice Teaching Apprenticeship*

The STAFF.

A course in practice teaching designed for students who are assigned as apprentices in neighboring schools. 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.

210. *Practice Teaching Internship*

The STAFF.

A course in practice teaching designed for students who are assigned as intern teachers in neighboring schools. 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 CAMINOS (Chairman); Technical Assistant, Mrs. PASIPOULARIDES.

The Department is concerned with the study of ancient Egypt from the earliest manifestations of human activity in the Nile valley before the dawn of history down to the extinction of the Pharoanic civilization under Roman rule. Early Sudan (including the so-called Meroitic culture) also lies within the scope of the Department.

UNDERGRADUATE PROGRAM

There is no undergraduate program. Concentration in the field of Egyptology for the Bachelor of Arts degree is not possible.

GRADUATE PROGRAMS

A competent reading knowledge of both French and German is a *sine qua non* prerequisite for admission as a graduate student. Preference will be given to applicants with a solid classical background. Graduate programs leading to the M.A. or 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 Grammar*

Written permission required.

131A. *Selections from Middle-Egyptian Hieroglyphic Texts*

Written permission required. Prerequisite: 131, 132.

132A. *Selections from Middle-Egyptian Hieratic Texts*

Written permission required. Prerequisite: 131, 132.

143, 144. *History of the Ancient Orient: Egypt*

Written permission required.

143A. *Egyptian History: A Study of Sources*

Written permission required. Prerequisite: 241, 281.

143B. *Egyptian Historical and Religious Records.*

Written permission required. Prerequisite: 241, 281.

II. PRIMARILY FOR GRADUATES

201. *Reading of Middle-Egyptian Texts*

Written permission required. Prerequisite: 131, 132.

201A. *Studies in Hieroglyphic Palaeography*

Written permission required. Prerequisite: 132, 241.

241. *Late-Egyptian Grammar*

Written permission required. Prerequisite: 132, 281.

281. *Old-Egyptian Grammar*

Written permission required. Prerequisite: 131, 132.

Energy Studies

EXECUTIVE COMMITTEE

F. BISSHOPP, *Professor of Applied Mathematics*

J. FRIEDMAN, *Preceptor*

M. GLICKSMAN, *Provost, ex officio*

J. F. HERMANCE, *Associate Professor of Geological Sciences*

J. KESTIN, *Professor of Engineering and Center Director*

J. LOFERSKI, *Professor of Engineering*

P. F. MAEDER, *Professor of Engineering*

T. F. MORSE, *Professor of Engineering*

W. RISEN, *Professor of Chemistry*

R. ROHR, *Associate Professor of Economics*

G. SEIDEL, *Professor of Physics*

A. WOLD, *Professor of Chemistry and Engineering*

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 or its own degree programs, but it promotes specialized and interdisciplinary research in the broad field of "energy." The Center promotes the creation of departmental and interdepartmental energy concentrations; the first such 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 Center represents the University on the University Coal Research Consortium of the Northeast. The largest research programs operated by members of the Center include solar energy and geothermal energy conversion.

Engineering

Professors AVERY, BOLLE,¹ CASWELL, CLARKE, CLIFTON,^{1/2} COOPER,¹ DOBBINS,¹⁴ DUFFY,^{5/13} FINDLEY,³ FREUND⁴ (Chairman), GLICKSMAN, GURLAND,⁴ HAZELTINE, HELLER,^{8/11} KARLSSON, KESTIN,¹² KOLSKY, KORNHAUSER, KUSHNER, LIU,^{1/2} LOFERSKI,⁹ MAEDER, MASON, MORSE,⁴ MYLONAS, PEARSON, RICE, RICHARDSON, RICHMAN,⁶ ROESLER, SIBULKIN, SYMONDS,² TAUC,^{4/7} WEINER,⁴ WOLD,¹⁰ WOLOVICH; Visiting Professors SHEWCHUN (Research), STUART; Adjunct Professor WHITE; Associate Professors DAFERMOS (Research), NEEDLEMAN, NURMIKKO; Visiting Associate Professors GOTOH (Research), TVERGAARD (Research); Adjunct Associate Professor HEMINGRAY; Assistant Professors ASARO, DANIELS, LEHNER, LO, SCHENKER; Visiting Assistant Professors ELLIOTT (Research), JOU (Research), WAKEHAM (Research); Lecturer PATTERSON; Senior Research Engineers: Messrs. CHOSAK, COMETTA⁴ (Executive Officer), CRISMAN, HAWLEY, HERMANN; Assistant to the Chairman: Mr. ABBOTT.

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 five-semester common core required of all Sc.B. candidates in Engineering, followed by a coherent group of six upper level courses in one of the area of specialization. The core includes courses in Physics, Chemistry, Mathematics and the following areas of engineering science: analytical mechanics, electric and magnetic fields, electric circuits, mechanics of solids and structures, fluid mechanics, thermodynamics, and materials science. Degree programs accredited by the Engineers Council for Professional Development are offered in Biomedical, Civil, Electrical, Materials, and Mechanical Engineering. The emphasis on fundamentals prepares candidates who are particularly well equipped for dealing with the rapid pace of technological change and the interdisciplinary demands of modern engineering practice. In addition, a broad exposure to the engineering sciences enables a student to make a well informed selection of the branch of engineering in which he or she wishes to specialize.

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 and thermodynamics, materials science, and mechanics of solids and structures. In addition there are joint programs with the Division of Applied Mathematics and the Division of Biomedical Sciences. Interdepartmental programs are easily arranged with the departments of Chemistry, Geology, and Physics.

As part of his/her graduate study program a student participates in the experimental and theoretical research activities of the Division. 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

¹On leave of absence, Semester I, 1979-80.

²On leave of absence, Semester II, 1979-80.

³Special leave.

⁴Engineering Executive Committee.

⁵Director, Mechanical Testing Facility.

⁶Director, Electron Microscopy Facility.

⁷Director, Optical Facility.

⁸Director, Far and Infrared Facility.

⁹Director, Microelectronics Facility.

¹⁰Director, Materials Preparation Facility.

¹¹Director, Materials Research Laboratory.

¹²Chairman, Center for Energy Studies.

¹³Graduate Program Coordinator.

¹⁴Undergraduate Program Coordinator.

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, and part of the laboratories of applied mechanics. The latter include facilities for studies of stress wave propagation and impact phenomena, photoelasticity and 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 infra-red spectroscopy, and electron microprobe analysis. There is also a microelectronics facility, and laboratories for quantum electronics, microwave and millimeter wave propagation, and anti-ferromagnetic resonance.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF SCIENCE DEGREE.

Candidates for the degree of Bachelor of Science are expected to complete successfully eight semester courses, Engineering 3, 4, 17, 19, 32, 52, 73, and 81, plus two one-half course credit Laboratory and Design courses, Engineering 11 and Engineering 12. In addition, they must complete successfully the six courses: Chemistry 3, Physics 60, Mathematics 9, 10, and Applied Mathematics 33, 34. For students entering with one year of high school calculus, Mathematics 17, 18 is recommended instead of Mathematics 9, 10. Mathematics 18 is a recommended elective for students who take Mathematics 9, 10. For the remainder of the concentration program, the candidate is required to complete successfully six more courses which constitute a preparation for one of the specialized areas of Engineering. One of these courses must be a design course. 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.

Students pursuing this program should complete at least eight Engineering courses, including Engineering 3 and 4 and two 100 level Engineering 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 he or she selects. The program should be prepared under the guidance of an Engineering faculty counselor and will be reviewed by the Engineering Concentration Committee. The program should also include mathematical preparation equivalent to Mathematics 9 and 10 and Applied Mathematics 33 and 34.

PROGRAM FOR COMBINED DEGREES OF BACHELOR OF SCIENCE, CONCENTRATION IN ENGINEERING, AND BACHELOR OF ARTS. Students who wish to combine the intensive study in mathematics, physical sciences, and engineering, demanded of a candidate for the Bachelor of Science degree, concentration in Engineering, with an equally intensive study in the humanities, arts, or social sciences, required of a candidate for a Bachelor of Arts in one of these areas, can arrange a five-year program leading to both degrees.

INTERDEPARTMENTAL CONCENTRATION PROGRAM IN ENGINEERING AND ECONOMICS LEADING TO THE BACHELOR OF ARTS DEGREE. This program has been planned for students who want to prepare for positions in management and administration. The first year may be identical to the first year of the Sc.B. in Engineering program. Toward the end of the freshman year, the student electing to concentrate in Engineering and Economics should design the Engineering part of his or her program to include at least eight Engineering courses. Two of these would be Engineering 3 and 4 and two should be 100 level Engineering courses, one of them a design course. The program should be prepared with the help of an Engineering faculty advisor and reviewed by the Engineering Concentration Committee. The Economics part of the program should include at least six economics

courses. Economics 111, 121, and 122 are required and a minimum of three additional courses should be chosen from other 100 level Economics courses. The Economics part of the program should be prepared with the help of an Economics faculty advisor.

Honors. Students desiring to be candidates for Honors in Engineering should consult with the honors supervisor of the Division during their junior year. They should complete the normal requirements for the Bachelor of Science degree. In addition they will have the opportunity to work under the direction of a faculty member on an experimental or analytical project. An Honors thesis and an oral examination on the results of this work are required at the end of the senior year.

BIOMEDICAL ENGINEERING. A student interested in Biomedical Engineering should prepare a program in consultation with an adviser and a member of the Program for Biomedical Engineering. The degree requirements in Engineering must be fulfilled, but appropriate substitutions of courses may be recommended for individual programs.

INTEGRATED PROGRAM FOR THE DEGREES OF BACHELOR OF SCIENCE, 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 may 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 eight 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 should 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.

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 minor area. 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 student'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 15th of the third semester in residence.

The Preliminary Examination follows the completion of a major portion of the course work, and will normally 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.

Students entering from abroad with advanced degrees should establish Sc.M. equivalency at the end of their first year in residence. The maximum number of courses that may be transferred is eight and the maximum residence equivalence granted is one year. 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 such 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, 4. *Introduction to Mechanics and Electricity and Dynamics*

First half: the use of vectors in the formulation and solution of physical problems; introduction to APL, an interactive computer language. The subject matter is drawn from the areas of statics and electric circuits. In statics the basic principles are ultimately applied to the analysis of structures, with emphasis placed on the utilization of the principle of virtual work. After an introduction to the fundamental laws of linear electric circuits, diode circuits are treated, leading to their application in the design of digital logic circuits using Boolean algebra. Second half: a thorough treatment is given of mechanics, including the kinematics and dynamics of particles and rigid bodies, the concepts of work, energy, linear and angular

momentum, and motion in moving frames of reference. Application is made to such practical problems as satellite orbits and the mechanics of gyroscopes. Laboratory hours arranged.

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. Available under the Technology and Society course series.

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.

11. *Introductory Engineering Laboratory*

A laboratory program designed to introduce the student to measurement and experimentation in mechanics, electricity and magnetism, thermodynamics, materials and other topics. One-half credit course.

12. *Projects in Engineering Laboratory and Design*

Engineering laboratory projects and engineering design projects based on mechanics, electricity and magnetism, thermodynamics, materials and other topics. One-half credit course.

13. *Advanced Engineering Laboratory*

Advanced experiments in the areas of electric circuits, electronics, thermodynamics, fluid mechanics, mechanics of solids and structures and materials science. Prerequisite: Engineering 11 or permission of instructor.

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: Engineering 12 or permission of the instructor.

17. *Electrical and Mechanical Systems*

The methods of formulating complex problems in both electrical and mechanical linear systems are covered and advantage taken of the similarity of their mathematical solution and aspects of their natural and forced response, such as resonance, normal modes, etc. Special emphasis is given to the case of sinusoidal excitation, the use of complex exponentials, impedance functions, and the significance of their poles and zeros. Prerequisite: Engineering 4 or equivalent.

19. *Materials Science*

This course provides students with an understanding of the relationship between the structure of matter and its physical properties. Topics include atomic structure, the Schrödinger equation, chemical bonding in molecules, crystals, and networks; the electrical and magnetic properties of materials; crystallography and the determination of crystal structure by diffraction; non-crystalline materials such as glasses and plastics; defects in crystals — their nature and effect; mechanical behavior of crystalline matter from an atomistic viewpoint; the deformation of materials into useful shapes; the cold worked structure and annealing; thermodynamics and phase diagrams of one- and two-component systems, and phase transformation; the relation of microstructure to properties; diffusion and mass transport processes; corrosion, electrochemistry, and oxidation. Prerequisite: Mathematics 10, Chemistry 3, Physics 60 or equivalent.

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.

32. *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 behavior 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; wave propagation in bars, vibrations; mechanical behavior of materials in shear and more general stress states; torsion of shafts; three-dimensional stress and strain states; tensors and principal values, Mohr's circle; field theory formulation for continuous media; two-dimensional elastic stress distributions, stress concentrations. Prerequisite: Applied Mathematics 33, 34 or Mathematics 29, 52 (may be taken concurrently) and Engineering 3 or written permission.

37. *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: Engineering 17, Applied Mathematics 34, or equivalent.

52. *Electricity and Magnetism*

This course introduces the basic concepts of electricity and magnetism and presents the fundamental laws for electric and magnetic fields. The topics include electrostatic and magnetostatic fields, scalar and vector potentials, electrical conduction, dielectric and magnetic materials, capacitance and inductance, electromagnetic energy and waves. Prerequisite: Engineering 4, Applied Mathematics 33 or equivalent.

56. *Fundamentals 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 analyses 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 amplifier; direct coupled amplifiers; computer aided circuit analyses; linear IC design techniques; operational amplifiers; simple active filters; rectification and regulation. Prerequisite: Engineering 17, 52 or equivalent.

73. *Thermodynamics*

An introduction to thermodynamics and to its engineering applications. The course begins

with basic thermodynamic concepts: systems, equilibrium, state, continuous systems, processes and properties. The Zeroth Law is introduced, and thermal equations of state are described for pure substances and extended to elastic, electric, magnetic and chemical systems. The accounting of energy transfer begins with a discussion of work, following which the First Law is introduced and heat is defined. The First Law is applied in closed, open and in continuous systems, and in particular to simple processes of broad significance. The concept of enthalpy is developed to include its treatment for chemical reactions. The Second Law is introduced with clear distinction of its first and second parts, alternative statements and statistical interpretation. The existence of the thermodynamic temperature scale is demonstrated and its relation to the perfect gas scale shown. Consequences of the Second Law for engine efficiencies, mixing, diffusion; entropy production. Application of thermodynamics are given for compressors, gas turbines, jet and rocket engines, steam plant, refrigerators, and internal combustion engines. Prerequisite: Applied Mathematics 33 or Mathematics 29.

74. *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 73 is expanded to cover in greater depth applications to: compressors, gas turbines, jet engines, rocket engines, steam plant, 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: Engineering 73.

81. *Fluid Mechanics*

Properties of fluids — density, pressure, normal and shear stresses, viscosity, thermal conductivity, surface tension. Dimensional analysis applied to correlation of data on drag, laminar and turbulent pipe flows with wall roughness, scale modeling of fluid flows and model testing. Fluid statics: equations of fluid statics and hydrostatics, forces on submerged surfaces, static stability of a stratified atmosphere. Kinematics of fluid flow in a Eulerian description. Particle derivatives of scalar and vector quantities. Equation of continuity. Dynamics of frictionless incompressible flows. Euler's equations and Bernoulli's equation. Euler's momentum theorem and applications to the measurement of thrust, lift, and drag. Rotation of fluid elements. Velocity potential for irrotational flows. Elementary solutions to the Laplace equation. The stream function. Vorticity and circulation and their role in lift and drag. The Navier-Stokes equations with applications to simple viscous flows such as Couette and Poiseuille flows. Laminar boundary layers, momentum and displacement thickness, flow separation. Turbulent flows. Open channel flow and gravity waves. Steady one-dimensional flow of a compressible fluid: flow with area change, normal shock waves. Prerequisites: Applied Mathematics 34 or Mathematics 29.

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: Engineering 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.

93A. *The Automobile and Our Environment*

It has become increasingly apparent in recent years that some type of alternative propulsion system to replace the internal combustion engine in the automobile must become available in the near future, especially in large urban areas with a high population density. A large number of alternative systems have been proposed, but at this time none are available to the general public. This course will therefore be devoted to a study of these possible alternate systems and to the detailed scientific and economic problems which must be overcome in order for an alternative system to meet the performance and cost constraints of the present automobile. The first part of the course will be devoted to a study of the performance constraints of the automobile and the manner in which they have changed since the inception of motorized transportation. The development and advances of several propulsion sources will be studied, including a study of their efficiencies and the pollution they produce either directly or indirectly. Several unusual types of energy storage devices will also be discussed. Laboratory experiments will also be designed to compare theory and experimental results.

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, buoyancy 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, loudspeaker, 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 Sc. B. degree, concentration in Engineering.

93G. *Intermediate 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 tricycle carriages, or fish ponds and each of these will be discussed. These 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.

94A. *An Introduction to Systems Science*

Intended to provide non-engineering majors with a basic understanding of what is currently and commonly referred to, in many diverse fields, as systems science or systems engineering. Intended to familiarize non-engineering majors with many of the fundamental notions pertaining to systems. Discussions on a number of diverse but related topics; e.g., routine theory, management flow charting procedures, queuing theory, linear programming, game theory, and dynamical system modeling. Practical examples, drawn from diverse disciplines, will illustrate various mathematical techniques, and specially developed computer programs will be introduced to facilitate a number of the design algorithms. Prerequisite: a working knowledge of high school algebra.

94B. *The Impact of Western Science and Technology on Non-Western Societies*

The enormous power western societies have gained through their scientific and technological progress has been recognized and acted upon by Asian and African societies at various dates during the past hundred years. One of the first nations to do so was Japan, and the effect of this on Japanese society has been and continues to be profound. The pursuit of change for a time led to colonial expansion; since 1945 it has propelled Japan into one of the leading economic positions in the world, and suggests dominance within three decades. In this course the students and professor will try (1) to analyze the effects of technology on society, including its value system; (2) to understand the influence of historical patterns (religion, philosophy, culture) on the technological progress of non-Western societies studied; (3) to evaluate the role technology plays in changes in the societies under study.

Major attention will be given to the current situation and observable trends in the societies of Japan and China. The course will use textual material and articles to be analyzed and criticized.

94C. *Materials in a Modern Society*

From prehistoric times to the present day civilization has been characterized by the tools employed by man and especially by the materials from which these have been made. The limitations of each age of man including today and tomorrow are limitations of materials, that is the ability of man to design and synthesize new materials for specific applications. Provides an ideal opportunity for non-science majors to gain an acquaintance with those methods by which materials are designed and synthesized for many applications (including environmental control, biological materials for artificial organs, energy conversion, as well as materials for the artistic expression of man's thought and feeling). This course will allow students to participate actively in a laboratory and lecture program where materials of modern times will be made and examined using the most sophisticated of present day equipment and techniques. There are no prerequisites for the course.

94E. *Product Liability: the Engineer, the Lawyer, and the Consumer*

The true nature of strict products liability in tort, negligence of 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 on 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

121. *Biomechanics*

Foundations. Circulation, compliance, pulsatile flows. Blood rheology and hemostasis. Respiratory aerodynamics. Exchange and transport in lungs and kidneys. Muscle,

skeleto-muscular dynamics. Thermal response. Prerequisite: Applied Mathematics 34 or equivalent. Lectures and laboratory.

122. *Neuroengineering*

Analysis of sensory transduction, pattern recognition, CNS integration and neuromuscular control. Relationship of these activities to the actions of individual neurons in the visual pathways of the brain. Developmental neurobiology. Neural Plasticity. Machine intelligence. Bio-instrumentation. Term project involving perceptual-motor skills. Prerequisites: Applied Mathematics 33, Engineering 17, 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: Engineering 32.

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.

132. *Urban Technology*

The main purpose of the course is to enable engineering students to become acquainted with some of the problems of modern urban systems. Lectures on some methods of systems analysis are included (elementary linear and dynamic programming, networks, and queuing theory), but the main work of the course is to study by reading and discussion some of the major issues in transportation, housing, and city modelling and simulation, where engineering training and viewpoints may be useful. Several visiting lectures represent areas of professional practice especially in the local area. Each student writes a paper on a topic which is chosen, as far as possible relating general background approaches to the special features and problems of the Providence metropolitan region.

134. *Water Supply and Wastewater Treatment*

An introduction to the unit operations and unit processes of water supply and wastewater 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: Engineering 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: Engineering 32.

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: Engineering 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: Engineering 19, 73.

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: Engineering 19.

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: Engineering 19.

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 stresses 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: Engineering 19, 32, 73, or equivalent.

156. *Electrical Transmission and Microwave Networks*

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: Engineering 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: Engineering 17.

158. *Digital Communication Systems*

Sampling theorem. 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:

site: Engineering 157. Applied Mathematics 115 or Mathematics 161 is helpful but not required.

159. *Physical Electronics*

Band theory of solids, electric and magnetic properties. Semiconductors and their application to p-n junctions, transistors and many high frequency active electronic devices. Quantum electronics, lasers and parametric devices. Prerequisite: Engineering 19 and 52.

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. *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. Advanced machine concepts. Some knowledge of APL is desirable. Interested students should register for Computer Science 106.

166. *Automatic Control Systems*

Analysis and design of linear feedback control systems involving both frequency and time domain methods. 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. Prerequisite: Engineering 157.

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. *Semiconductor Devices and Microelectronics*

Contemporary semiconductor device practice, materials, design principles and application of semiconductor microelectronic and opto-electronic devices. Topics include materials and processes for device fabrication; integrated circuit components and functional blocks; bipolar, field-effect, Schottky-barrier, MOS and charge coupled devices; computer microelectronics; photodiodes, solar cells, light-emitting diodes, and semiconductor lasers. Lectures and laboratory. Prerequisite: Engineering 159.

169. *Laser Applications and Modern Optics*

Principles and application of contemporary coherent optics, optical measurement techniques, and devices. Topics include lasers, diffraction and Fourier transforms in optics, interferometric measurements, modern spectroscopy, holography, detection and modulation of light, solid state light sources, integrated optics, optics and energy. The course is appropriate also for students outside Engineering with some background in electromagnetic

theory and materials science. Lectures and laboratory. Prerequisites: Engineering 52 or Physics 47, Engineering 19 or equivalent, or permission of the instructor.

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 laboratory. Prerequisite: Engineering 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, assignments, design task, laboratory. Prerequisites: Engineering 73 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: Engineering 32.

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: Engineering 175, plus Engineering 37 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. A short period is devoted to an introductory study of multiphase flow, with a

comprehensive discussion of existing large-scale installations and their controls. Prerequisites: Engineering 74 and 186 or permission of the instructor.

186. *Advanced Fluid Mechanics*

Designed primarily 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. Prerequisites: Engineering 73 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 and empirical prediction formulae, influence of atmospheric stability. Air pollutants: chemical and physical properties, irritation and toxicity levels, common sources. Diffusion of air pollutants; the diffusion equation, turbulent diffusion in the atmospheric boundary layer, approximate solutions for the diffusion problem. Prerequisites: Engineering 73, 81, or equivalents. Lectures plus 4th hour arr.

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: Engineering 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. Eigen-value 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 material 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 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.

251. Complexity of Computing

Interested students should register for Computer Science 277.

Boolean Functions, combinational complexity, formula size, and delay complexity. Sequential machines, their realization and reduction. Regular events. Turing machines and computability. General purpose computers computational work, and computational inequalities involving space, time, and complexity measures.

252. Pattern Recognition and Adaptive Decision Making

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 apriori 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 nonsupervised 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.

254. Introduction to Stochastic Control Theory

The 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. Equivalence 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. 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 LP 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, AlIII B V , AlII B VI , AlIBIV C V , AlBIII V VI 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.

268. *Information Theory*

Information measures. Noiseless coding of discrete sources. Channel capacity for discrete, memoryless channels. The coding theorem and the random-code bound in probability of error. Converses to the coding theorems. A decoding theorem. Parity check codes. Theory of groups, polynomial algebra and finite fields. Cyclic codes. BCH codes and a decoding algorithm. Convolutional codes. Threshold and Sequential Decoding.

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 the 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. *Essentials of 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 fluid continua, vorticity theorems, aspects of potential flow and Bernoullian theorems. 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 like Stokes-Oseen flow, lubrication theory, and boundary-layer theory.

282. *Essentials of Fluid Mechanics II*

Constant-density potential flow theory all in three dimensions: formulation, gravity waves, long waves; point source and point dipole with method of images and inverse method; connectivity, boundary data and uniqueness illustrated; general solution to Laplace's equation for internal flow and external flow past bodies; dipoles vs. vortex rings; thin lifting-surface theory and slender-body theory. Sound waves and sound fields: unsteady solutions of wave equation — plane, spherical, and cylindrical waves; physical considerations and problems. Nonlinear, unsteady, rectilinear, compressible flow with waves: wave properties deduced physically for one wave family flow in piston-cylinder problems; generalization to formal method of characteristics for numerical solutions. Nonlinear, steady, two-dimensional, compressible, supersonic flow with waves: also treated first physically and then generalized formally.

283, 284. *Viscous Flow*

Fundamentals of the mechanics of real fluids with emphasis on basic concepts. Navier-Stokes equations and boundary conditions; the dynamical significance of vorticity diffusion; exact solutions; Stokes and Oseen approximations for low Reynolds number flow; motion at high Reynolds number and boundary layer concepts. Flow of chemically reacting mixtures. Integral techniques. Physical aspects of hydrodynamic stability including nonlinear effects. Transition in boundary layers and free shear flows. Turbulent shear flows; law of the wall and law of the wake. Large-scale coherent structures in turbulent shear flows and their interactions with fine-grained turbulence. Offered in alternate years.

286. *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. Offered in alternate years.

287. *Advanced Experimental Methods in Fluid Dynamics*

Low-speed wind tunnel operation and instrumentation. Hot wire anemometry to measure turbulent fluctuations of velocity and temperature. Shock-tube operation and instrumentation. High vacuum techniques. Optical techniques in supersonic flow. Laser Doppler techniques. Use of research equipment of general interest. Offered in alternate years.

289. *Advanced Lecture or Reading Courses*

The following courses are offered whenever a sufficient number of students express interest.

289A. *Aerodynamic Sound Generation*

Introductory discussion of vibratory motion, linear oscillators, the flexible string; acoustic wave motion, energy and momentum, energy losses; radiation from various sources, reflection from a surface; scattering and diffraction. Lighthill's theory on sound generated by fluid flow; sound and pseudo-sound, flow induced sound; surface effects and diffraction in flow noise; scattering and propagation in random fields.

289B. *Combustion Theory*

Survey of combustion phenomena. Combustion chemistry; heat of reaction, adiabatic flame temperature, reaction rate. Laminar flame propagation in pre-mixed gases. Aerodynamics of combustion; deflagrations and detonations. Analyses of combustion problems: Shvab-Zel'dovich formulation; droplet combustion, laminar free convective burning.

289C. *Dynamics of Rotating and Stratified Flow*

General discussion of the inertial effects of rotation and the gravitational effects of density (or entropy) variation in the flow. Vorticity production by nonhomogeneity and rotation. Dimensionless parameters and scales of motion. Motion in a thin layer on a solid rotating sphere, the B-plane approximation, geostrophic flow and the thermal wind, Rossby waves, Ekman layers at a free surface and at a rigid boundary. Baroclinic instability, the basic motion, wave motion, energy considerations. Wave motions of small amplitude, lee waves; internal gravity waves, wave energy, radiation stress and the mean motion. Hydrodynamic stability of two contiguous homogeneous fluids, the Bénard problem, salt fingers, Kelvin-Helmholtz instability.

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 levels 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 nonequilibrium flow of water vapor and liquid with condensation kinetics as found in nuclear power plants. Combusting flows occurring in internal combustion engines. Prerequisite: Engineering 281 and 282 or approximate equivalent.

289E. *Rarefied Gas Dynamics*

Qualitative theory. The Boltzmann equation. The H-theorem, rarefied gas parameters. Initial and boundary conditions. Free molecule flows. Equilibrium and near-equilibrium flows. Chapman-Enskog-Hilbert theory. Transport phenomena. Linearized Boltzmann equation. Eigentheory. Theory of kinetic models. Methods of solution: integral iteration,

moments method, half-range methods, etc. Initial value problem. Boundary value problems: Couette flow, heat flow, sound propagation.

289F. *Turbulent Flows and Turbulence*

Equations of motion; Reynolds stresses, turbulence energy. Analysis of shear flows: algebraic models; entrainment, mixing length. Methods of solution. Differential equation models: one equation (k) and two equation (k, ϵ) models. Basic turbulence concepts; averages, probability density, correlation functions, energy spectra. Isotropic turbulence: double and triple velocity correlations, closure problems. Three dimensional energy spectrum, energy cascade, Kolmogoroff theory. Diffusion in a homogeneous turbulent field.

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 offered in the Division of Applied Mathematics, the Physics Department, the Geological Sciences Department, and the Chemistry Department.

English

Professors BLISTEIN, BLOOM,¹ BOULGER, CASSILL, HARPER, HAWKES, HIRSCH (Chairman), HONIG,² JAYNE, KRAUSE, LANDOW,³ LEWALSKI, MONTEIRO,⁴ NICHOLS, ROSENBERG,⁵ SABOL,⁴ SCHEVILL,¹ SCHOLES, SHROEDER, SPILKA, ST. ARMAND, VAN NOSTRAND,⁴ WAGGONER,¹ WILMETH; Associate Professors BECKHAM, EMIGH, HENKLE, KIRK,⁵ ROSENFELD, RUSSOM, SILVERMAN, WALDROP, WOODS;⁵ Assistant Professors BLASING, CALDWELL, DOANE, HIGGINS, ROMER, VANECH; Visiting Professors BLOOMFIELD and COOKE; Visiting Lecturer FISHER.

Prerequisite. Demonstrated proficiency in English composition is prerequisite to concentration in English and to all courses in composition except English 1.

UNDERGRADUATE PROGRAMS

The English Department offers the following four concentration options for undergraduates. More detailed information about them is available from the Department.

1. *English and American Literature*. This program provides the student with a standard pattern of distribution, requiring eight semester courses in English and American literature plus two from a wide variety of related fields. Of the eight literature courses, two must be in English literature before 1670 and two in literature before 1900.
2. *Special Concentration in English*. For students interested in a special topic, period, or genre, the Department offers two varieties of special concentration. A student selecting either (a) or (b) below must submit an appropriate proposal for Department approval.
 - (a) Eight courses in British and American literature.
 - (b) Ten courses: seven in English, three related.

¹Not in residence semester I, 1979-80.

²Not in residence semester II, 1979-80.

³On Leave of Absence or Sabbatical Leave in semester I, 1979-80.

⁴On Leave of Absence or Sabbatical Leave in semester II, 1979-80.

⁵On Leave of Absence or Sabbatical Leave in semesters I and II, 1979-80.

3. *Honors in English and American Literature.* This program requires ten courses and a thesis. Six of the courses must be Honors Conferences or approved equivalents, others should be approved by the Honors Advisor.
4. *Interdepartmental Honors Programs:* Students may combine Honors work in English and another language by selecting a coherent pattern of courses in both languages, combining, for instance, courses in English and German romanticism, etc. At least four semesters' work in English Honors Conferences must be included.

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 Requirement for the A.M. degree 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. One semester course emphasizing philological or linguistics training, chosen from among the following:

231	<i>The 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 *Introduction to the Techniques, Terminology and Theory of Linguistic Analysis* (especially recommended for A.M. candidates in the ten-course program).
(others as appropriate)

Language requirement, either program.

A candidate for the A.M. should show competence in one modern foreign language. Normally this is demonstrated by passing the ETS examination with a score of 525 or above (NB—A score of 575 is required if the language is to be offered at the Ph.D. level).

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.

A typical course schedule includes:

1. Four courses in writing — either concentrated in fiction, poetry, drama, or film writing, or made up of some combination of these genres. Ordinarily in the first year the candidate takes English 101, 102.
2. One or two courses in a studio or performing art.
3. One or two courses in literary translation.
4. Other courses involving work relevant to the candidate's thesis in such areas as English and American literature, comparative literature, philosophy, anthropology, history, religious studies and the like.

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 specializations.

Course Requirements and Recommendations.

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)

Philology. All students are required to take 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.

All students are required to take one semester course in English Literature before 1700, in addition to the one semester philology requirement.

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 an ETS examination in those languages with a score of 575 or above (or, where necessary, a departmental examination). Alternatively, he or she may pass an ETS or departmental 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 for 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 four 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 A.M. degree.

DOCTOR OF ARTS. The Doctor of Arts degree is offered in creative writing to a few highly motivated and gifted candidates who have demonstrated outstanding ability as writers. Admission is unusually selective, and interested persons ought, before making formal application, to correspond with the Director of the Writing Program.

The normal residence requirement for the degree of Doctor of Arts is the equivalent of three years of full-time study beyond the bachelor's degree. At least two consecutive semesters must be devoted exclusively to full-time study.

The student must normally complete a minimum of two years of academic course-work acceptable for graduate credit by the Department.

The student must complete at least one year's professional experience, directed by his or her supervisor. This may be a special exhibition, course of training, or program devised and taught by the student in a private or governmental institution.

The student must complete a Doctoral Project, in written and, if necessary, other recorded modes. This will ordinarily take the form of a substantial manuscript and will be prepared and submitted to the Graduate School according to the forms governing the preparation and submission of Ph.D. dissertations.

The student must pass a Final Examination, written or oral or both, proving an historical knowledge of the genre or area of specialization and also a detailed knowledge of the major works or accomplishments in that genre or area.

I. PRIMARILY FOR UNDERGRADUATES¹

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|---|-------------------------------------|
| 1. <i>The Fundamentals of Writing</i> | The STAFF. |
| College writing. Open to all students, all levels. Analysis, organization, and style. | |
| 2. <i>Scholarly and Critical Writing</i> | The STAFF. |
| An introduction to the technique of critical writing and research. | |
| 3. <i>Personal and Reflective Writing</i> | Mr. BECKHAM AND STAFF. |
| Explorations in self-discovery and self-revelation. | |
| 4. <i>Intermediate Fiction Writing</i> | Messrs. HAWKES, BECKHAM, AND STAFF. |
| 5. <i>Intermediate Poetry Writing</i> | Mr. HONIG AND STAFF. |
| 8. <i>Intermediate Journalistic Writing</i> | The STAFF. |
| 9. <i>Special Topics in Writing</i> | |
| <i>Section 1.</i> Topic to be announced. | |
| <i>Section 2.</i> Explorations in journalism, essays, and other non-fictional or fictional expressions. | |
| <i>Section 3.</i> Writing and knowing. | Mr. BECKHAM. |
| | Mr. HIGGINS. |
| 10. <i>Advanced Fiction Writing</i> | Messrs. CASSILL AND HAWKES. |
| Writing and discussion of stories, supplemented by some reading in contemporary fiction. | |
| 11. <i>Advanced Poetry Writing</i> | Messrs. HONIG AND HARPER. |
| 12. <i>Advanced Play Writing (Theatre Arts 12)</i> | Mr. SCHEVILL. |
| The writing of plays and the discussion of new directions in contemporary play-writing. | |
| 13. <i>Advanced Journalistic Writing (Semiotics 13)</i> | Mr. HENKLE. |

¹Here and in the following sections, those courses which are listed together with an indication of the identity of the Instructor or Instructors are scheduled in 1979-80. Where there is no such indication, the course is not scheduled for that academic-year.

15. *Critical Analysis of English and American Fiction* The STAFF.
 16. *Critical Analysis of English and American Poetry* The STAFF.
 17. *Critical Analysis of English and American Drama* The STAFF.
 19. *Selected Major English Writers* The STAFF.
 An introduction to the English literary tradition before 1800.
 20. *Selected Major English Writers* The STAFF.
 An introduction to the English literary tradition beginning with 1800.
 27. *English Poetry to 1600*
 From the Anglo-Saxon era through the Renaissance.
 34. *Selected Modern Writers, English and American* Ms. ROSENFELD.
 Survey of English and American fiction and poetry from the end of World War II to the present day.
 35. *Seventeenth-Century Poetry Exclusive of Milton*
 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* Mr. BECKHAM.
 Afro-American literature since the Harlem Renaissance.
 44. *Black Literature*
 47. *The Augustan Age*
 48. *The Age of Johnson*
 49. *Romantic Literature* Mr. BOULGER.
 The poetry of Blake, Scott, Coleridge, Wordsworth, Byron, Shelley and Keats.
 50. *Romantic Literature, Special Topic* Mr. BOULGER.
 The Gothic Novel, Romantic prose, criticism and the minor Romantic poets.
 54. *Comedy and Laughter*
 56. *The Nature of Tragedy* Mr. JAYNE.
 An effort to define the genre by induction. Readings include Aeschylus, Sophocles, Euripides, Shakespeare, Racine, Shaw, Lorca, Brecht, Williams, and Miller.
 61. *Victorian Poetry*
 S71. *Undergraduate Seminar* Mr. BLISTEIN.
 An introduction to Shakespeare studies.
 S72. *Undergraduate Seminar* Mr. SCHEVILL.
 Theory of the Grotesque.
 S73. *Undergraduate Seminar* Mr. HENKLE.
 Literature in a cultural context (England, 1900-1930).
 S74. *Undergraduate Seminar* Mr. HARPER.
 Chant of Saints. Contemporary Afro-American writing.
 S91. *Senior Seminar* Mr. ST. ARMAND.
 American Gothic: Dark Romanticism in America from Charles Brockden Brown to H. P. Lovecraft.
 S92. *Senior Seminar* Mr. HAWKES.
 The First-Person narrator in fiction.
 S93. *Senior Seminar*
 Topic to be announced.

S94. *Senior Seminar*
Science and poetry.

Mr. WAGGONER.

II. FOR UNDERGRADUATES AND GRADUATES

101, 102. *English Composition, Advanced Course*

Messrs. HARPER, HAWKES, WALDROP, CASSILL, SCHEVILL.

Students will be expected to develop and bring to completion an original work or series of works in prose, verse, or drama.

103. *The Structure and History of the English Language*

Mr. RUSSOM.

A survey of major historical developments affecting English from its Indo-European origin to the present.

104. *Structure and History of the English Language*

105, 106. *Chaucer*

115. *Principles of Literary Criticism*

Mr. VAN NOSTRAND.

The conventions of meaning in a literary work of art, as expressed in critical writings from the Renaissance to the present.

116. *Principles of Literary Criticism*

118. *Survey of English Poetry, 1660-1940*

Mr. HIRSCH.

122. *Development of the American Theatre* (Theatre Arts 122)

Mr. WILMETH.

123, 124. *A History of the European Theatre* (Theatre Arts 123, 124)

Mr. WILMETH.

125. *Shakespeare, Selected Plays*

Mr. SABOL.

In 1979-80, the plays studied will be *A Midsummer-Night's Dream*, *Henry V*, and *Hamlet*.

126. *Shakespeare, Selected Plays*

130. *Milton, Poetry and Prose*

134. *19th-Century British Fiction*

Mr. HENKLE.

The major novelists studied in their social and literary contexts.

136. *17th-Century Prose*

137. *19th-Century Prose, Exclusive of Fiction.*

140. *American Literature to 1830*

Ms. CALDWELL.

The development of American modes and themes from the beginnings to early Romanticism.

141. *American Prose Fiction*

Mr. NICHOLS.

To the Civil War. Brown, Irving, Cooper, Poe, Hawthorne, Melville, Simms.

142. *American Prose Fiction*

Mr. SHROEDER.

Since the Civil War.

143. *American Poetry*

Ms. BLASING.

From the time of the Puritans to the Civil War.

144. *American Poetry*

Ms. BLASING.

From the Civil War to the Present.

146. *Special Topics in Literature*

Mr. HENKLE.

British comic writers.

147. *Special Topics in Literature*

Mr. WALDROP.

The tale of terror and the horror story.

148. *Special Topics in Literature*

Mr. NICHOLS.

The idea of Progress in America.

149. *Special Topics in Literature* (Linguistics 158)

Studies in language change.

150. *Special Topics in Literature* Mr. BLOOM.
Modes of satire.
171. *20th-Century Poetry, English and American, to World War II* Mr. WALDROP.
A history of Modernism.
172. *20th-Century Novel, English and American, to World War II* Mr. SPILKA.
173. *Shakespeare, the Complete Works* Mr. SCHROEDER.
Histories and comedies.
174. *Shakespeare, the Complete Works* Mr. SHROEDER.
Tragedies and romances.
182. *English Drama, 1580-1642*
186. *English and American Drama, 17th and 18th Centuries* Mr. KRAUS.
187. *20th-Century English and European Drama, to World War II* Mr. KRAUSE.
191. *Senior Honors Conference* The STAFF.
193. *American and British Fiction since World War II* Mr. CASSILL.
194. *American and Continental Drama and Theatre since World War II* Mr. EMIGH.
198. *Reading and research* The STAFF.

HONORS COURSES

- H1, H2. *Shakespeare, the Complete Works* Mr. BLISTEIN.
Semester I: Comedies, histories, and poems. Semester II: Tragedies, problem plays, and dramatic romances.
- H3. *The 17th Century* Ms. LEWALSKI.
- H4. *Milton* Ms. LEWALSKI.
- H5, H6. *The 18th Century*
- H7. *The Romantic Movement, Earlier Years* Mr. BOULGER.
- H8. *The Romantic Movement, Later Years*
- H9. *Victorian Literature*
- H10. *Victorian Literature, Special Topic* Mr. LANDOW.
Victorian poetry.
- H11. *American Literature* Ms. BLASING.
- H12. *American Literature*
- H13. *Modern Literature* Ms. ROSENFELD.
Modern British literature.
- H14. *Modern Literature* Ms. ROSENFELD.
Modern American literature.
- H15. *Special Topic* Mr. KRAUSE.
Topic in drama to be announced.
- H16. *Special Topic*
- H29. *The Middle Ages*
- H30. *The Renaissance* Mr. JAYNE.

III. PRIMARILY FOR GRADUATES

221. *Methodology of Literary Scholarship* Mr. JAYNE.
224. *Methods of Literary Criticism* Mr. SPILKA.

225, 226. <i>The History of Literary Criticism</i>	
225A, 226A. <i>Studies in Literary Theory</i>	
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: Beowulf</i>	Mr. RUSSOM.
235A. <i>Language and Symbolic Structures</i>	
241. <i>Middle English Language and Literature</i>	Mr. RUSSOM.
242. <i>Middle English Language and Literature</i>	
243. <i>The Canterbury Tales</i>	
244. <i>The Early Chaucer</i>	
245. <i>16th-Century Literature Exclusive of the Drama</i>	
246. <i>16th-Century Literature Exclusive of the Drama</i>	Mr. JAYNE.
245A, 246A. <i>Studies in the Literature of the Renaissance</i>	
249. <i>Shakespeare, Comedies, Histories, and Poems</i>	Mr. BLISTEIN.
249A. <i>Studies in Elizabethan Drama</i>	Mr. SABOL.
250. <i>Shakespeare, Tragedies and Romances</i>	
251. <i>17th-Century Literature, Poetry</i>	Ms. LEWALSKI.
251A. <i>Studies in 17th-Century Literature</i>	
252. <i>17th-Century Literature, Milton</i>	Ms. LEWLASKI.
252A. <i>Studies in 17th-Century Literature</i>	
255. <i>18th-Century Literature, Fiction</i>	Mr. VANECH.
256. <i>18th-Century Literature, Jane Austen</i>	Mr. BLOOM.
259, 260. <i>18th-Century Fiction</i>	
261. <i>English Literature of the Romantic Age</i> The late 18th-century poets.	Mr. BOULGER.
262. <i>English Literature of the Romantic Age</i> The younger Romantic Poets.	Mr. BOULGER.
263. <i>English Literature of the Victorian Age</i>	
264. <i>English Literature of the Victorian Age, Poetry</i>	Mr. LANDOW.
265, 266. <i>19th-Century Fiction</i>	
267. <i>Modern Fiction, Henry James</i>	Ms. ROSENFELD.
267A. <i>Studies in Modern British Literature</i>	
268. <i>Modern Fiction</i>	
268A. <i>Studies in Modern British Literature</i>	
273. <i>Major American Literary Figures, 19th Century</i> Idealism.	Mr. NICHOLS.
273A. <i>Studies in American Literature</i> Colonial American Literature.	Ms. CALDWELL.
274. <i>Major American Literary Figures, 19th Century</i>	Mr. HIRSCH.
274A. <i>Studies in American Literature</i> Realism and Naturalism.	Mr. NICHOLS.
275. <i>Major American Literary Figures, 20th Century</i>	

275A. <i>Problems in American Literature</i> Emily Dickinson.	Mr. ST. ARMAND.
276A. <i>Problems in American Literature</i> American visionary poetry.	Mr. WAGGONER.
286. <i>Special Topics</i> The theatre of Yeats.	Mr. KRAUSE.
286A. <i>Special Topics</i> (Comparative Literature 254) The childhood theme in 19th-century fiction.	Mr. SPILKA.
287. <i>Special Topics</i> Theories of discourse and the teaching of writing.	Mr. SCHOLLES.
287A. <i>Special Topics</i> Stephen Crane.	Mr. MONTEIRO.
288. <i>Special Topics</i> The taboo on tenderness in modern British fiction.	Mr. SPILKA.
288A. <i>Special Topics</i>	
289. <i>Special Topics</i>	
289A. <i>Special Topics</i> Topic in American poetry to be announced.	Ms. BLASING.
293A. <i>Laboratory in Teaching Writing</i>	Mr. HIGGINS.
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 has encouraged many students to design independent environmental studies concentrations in the past few years. The Center for Environmental Studies was established in May 1978 in response to the needs of students and faculty involved in this interdisciplinary field. The Center for Environmental Studies acts as a resource and communications center for environmental study both for students and faculty and for those outside the Brown academic community who are interested in environmental issues. The Center assists with the planning of academic internships and volunteer positions with Rhode Island governmental agencies and public interest groups. It also sponsors lectureship series dealing with current environmental questions.

In April 1979 a standard environmental studies concentration was approved. This concentration provides guidance in the design of 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 standard Environmental Studies concentration does not attempt to provide for all possible environmental interests but will guide those students concerned with integrating social and scientific inquiries into environmental issues in the development of a strong and diverse concentration program. The student planning an Environmental Studies concentration should consult with an appropriate member of the Executive Committee of the Center for Environmental Studies for assistance in developing a coherent course selection, culminating in an integrative thesis project. Listings of the recommended and approved courses for Environmental Studies concentrators are available in the Center.

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 Assistant Professor M. BRINTNALL (Political Science), Professor G. SEIDEL (Physics), Associate Professor J. WAAGE (Biology), Assistant Professor W. PRELL (Geology), Instructor Ms. J. PERROLLE (Sociology) and Professor H. WARD (Chemistry). the 78-79 student members are: HILLARY HORN, MARTY LITTLEJOHN, ALICE THURSTON, and KATHERINE WAGNER.

For information concerning Environmental Studies contact HAROLD WARD, Director, Center for Environmental Studies, Box H, Metcalf 324.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

The program requires a minimum of fourteen courses for a concentration, including Environmental Studies 11 and 190, Biomedical Science 12, Economics 111 and one course in values or ethics (Philosophy 5 or 6, Religious Studies 22, University Courses 109, 110, or 111 or a comparable course). An independent research course(s) leading to thesis preparation is also required. The remaining eight courses are selected from the sciences or policy related courses.

Science Focus: Six science courses in addition to Biomedical Science 12 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 and thesis research; two science courses, one of which should be in the physical sciences.

Thesis Requirement: Each student must submit a thesis proposal to the CES concentration committee no later than two weeks prior to the beginning 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 190 and will be counselled that a particularly effective sequence for thesis preparation is to begin the thesis research in the sixth semester, continue it on a related internship through the summer, and complete the thesis writing in the seventh semester. However, no more than one semester's thesis work will be required.

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.

LOVENBERG-RODRIQUEZ PRIZE:

Each year the Center awards the Lovenberg-Rodriquez prize to the graduating senior who through scholarship and extra-curricular activities has made the most outstanding contribution to environmental studies at Brown.

I. PRIMARILY FOR UNDERGRADUATES

11. *Environmental Issues*

Mr. WARD.

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 will be discussed, and the manner in which the methods of the various disciplines are used to reach these decisions will be explored.

II. FOR UNDERGRADUATES AND GRADUATES

190. *Environmental Problem-Solving*

Mr. WARD.

A case study method will be used in the analysis of selected environmental problems. Particular emphasis will be given to the use of scientific and technical data by the legal system in the resolution of environmental disputes. In the latter 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 region. 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, Biology 11, Economics 111). Intended for juniors and seniors. Written permission is required.

French Studies

Professors RIDGELY, KUHN,¹ BAUER, MAJEWSKI (Chairman), WEINSTEIN; Associate Professors AHEARN, BÉLANCE, HUGOT, DURAND, CROSMAN,¹ BOSSY, SCHOR; Assistant Professors BLAKELY, DORNBUSH; Lecturer, WIART.; Visiting Instructor, Mr. LAPEYRE.

Placement - see page 39. General Prerequisite for 100-courses except 151: French 14, 15, 16, 17 or 18 taken at Brown or by Advanced Standing credit, or French 35, or an appropriate Modes of Thought course.

UNDERGRADUATE PROGRAMS

STANDARD AND HONORS CONCENTRATION PROGRAMS

FOR THE BACHELOR OF ARTS DEGREE.

The Department of French Studies offers regular and Honors concentration programs, focussed on language, literature, and civilization. Prerequisite: for literature and civilization programs: one of the following: French 14, 15, 17, 18 or 35, or an appropriate Modes of Thought course. Program: at least eight courses (nine for Honors candidates and thesis), including two of the following: French 19, 51, 151. The remaining courses may be selected from the following: French 101, 102, 103, 104, 105, 106, 107, 108, 111, 112, 113, 114, 115, 121, 131, 132, 141, 142, 151. Required of concentrators: 190 or 198.

For additional programs involving French Studies, see the Honors Program in Comparative Literature, the Interdepartmental Honors Program in English, and concentration programs in Linguistics and in two Literatures. Detailed information about all these programs is available from the departmental office and from the Concentration Advisor.

French Civilization: a minimum of eight courses as follows: Required: two of 19, 51, 151; 141, 142, 190 or 198; Elective: 100-level courses offered by the French Studies Department and/or appropriate 100-level courses offered by other departments (Art, History, Anthropology, etc.). 200-level courses may be taken in addition to or in place of

¹On leave 1979-80.

100-level courses with the approval of the instructor concerned and of the Concentration Advisor.

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. The courses selected should be approved by the Concentration Advisor.

Honors. The concentration program in French language, literature or in French civilization of a candidate for Honors in French will be the same as the standard concentration program with these differences: a minimum of ten courses will be taken, and, along with the previously mentioned requirements (two of 19, 51, 151 and, in French civilization 141, 142), 198 (the Senior Thesis) is also required.

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

The Department of French Studies accepts properly qualified candidates for the degrees of Master of Arts and of Doctor of Philosophy. The Rockefeller Library offers ample material for study and research in French literature, being liberally supplied with new and standard books, reference works, and literary and professional journals. The John Carter Brown Library is rich in printed source-material on early French-American relations.

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 (such as Spanish, Italian, German, or Russian), 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

1-2. *Basic French*

Ms. WIART AND STAFF.

Elective for students who have not presented French for admission. A year course; no credit is given for the first semester alone.

3. *Intermediate French*

Mr. BLAKELY AND STAFF.

Oral practice, language laboratory, composition, readings in literature and civilization, group projects. Prerequisite: French 1-2, or placement.¹

4. *Intermediate French II*

Mr. BLAKELY AND STAFF.

Training in oral and written expression and in aural and reading comprehension of literature and civilization, participation in group projects. Prerequisites: French 3 (2 with special written permission) or placement.¹

French 14 and French 15 are designed to offer a focused introduction to French theater and French prose. Unlike survey courses, they will deal with a precise topic, encouraging the students to develop and deepen their grasp of specific dramatic and literary problems.

14. *Introductory Course in the French Theatre*

Mr. RIDGELY.

Topic for 1979-80: Le théâtre français et le mythe, de Molière et Racine à Ionesco et Beckett. Offered every year.

15. *Introductory Course in French Prose Fiction*

The STAFF.

Topic for 1979-80: Introduction au roman français. Offered every year.

17, 18. *Development of French Literature and Culture*

Mr. RIDGELY.

French 17, 18 will examine through an historical approach to literature some of the most significant changes that have been occurring in French culture during the last four hundred years. Literature as one special form of human behavior is meaningful not only in itself, but also in its relationship to the remainder of the total culture of which it is a part, and thus for what it may reveal about this total culture. Works will be selected from the various genres. (17 may be taken alone, and with written permission a student can elect 18 without 17). Offered every year.

19. *Writing and Speaking French I*

The STAFF.

Prerequisite: French 4 or placement. A four-skill language course (listening, speaking, reading, writing). Diversity of content and of skill emphasis will be made possible by student involvement in the choice of material and of learning activities. Three hours per week, with additional laboratory work. Offered every semester.

35. *Intensive Introduction to Literature and Literary Methods*

Mr. MAJEWSKI AND Ms. SCHOR.

This course is intended for freshmen having attained the highest placement in French upon entrance and for highly qualified upperclassmen.¹ A one-semester course, it will be taught in small sections and will involve a high degree of participation by students. Using carefully selected works of major French authors, it will give an intensive introduction to the central concepts and modes of literature and literary criticism. May not be taken in addition to French 14, 15, 16, 17, 18.

45. *Introduction to French Film I*

Mr. BLAKELY.

This course, in English translation, is designed to introduce a topic of particular interest to freshmen and sophomores who are not prepared for courses where French is read and spoken. The goal of the course will be to give students an awareness and critical understand-

¹See announcement for Placement Tests, page 39.

ing of some of the most important films ever made by any director in the history of cinema. At least one film will be viewed and analyzed each week. Students will be required to see each film at least twice. Required work will also include shot-by-shot analyses and individual oral presentations of sequences studied in class. There are no prerequisites for the course, which may serve as a general introduction to film esthetics as well as a study for the 1930s' films of Jean Renoir. Conducted in English. Topic for '78-'79: The Films of Jean Renoir, 1930-1939.

51. *Writing and Speaking French II*

The STAFF.

Prerequisite: Placement or French 19; open also, with written permission of instructor, to students who have completed French 14, 15, 17, 18, or 35. A four-skill language course (listening, speaking, reading, writing). Diversity of content and of skill emphasis will be made possible by student involvement in the choice of material and of learning activities. Three hours per week, with additional laboratory work. This course may be repeated for credit with permission of the instructor. Offered every semester.

II. FOR UNDERGRADUATES AND GRADUATES

101. *Early and Middle French Language and Literature*

Mr. BOSSY AND Ms. DORNBUSH.

Readings of texts dating from the eleventh to the sixteenth century illustrating the development of the French language and literature. Offered every year.

Note: the following courses, with the exception of 151 will present a specific topic which will vary from year to year. Any course may be repeated for credit provided the topic is different. Detailed descriptions of these courses can be obtained at the office of the Department of French Studies.

102. *Studies in Early French Literature*

103. *Studies in French Literature of the Renaissance*

Ms. DURAND.

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. Topic for 1979-80: Poésie de la Renaissance.

104. *Studies in French Literature of the Seventeenth Century*

Mr. RIDGELY.

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. Topic for 1979-80: Illusions et réalités de la condition humaine dans le théâtre, la prose, et la poésie des époques baroque et classique.

105. *Studies in French Literature of the Eighteenth Century*

Mr. MAJEWSKI.

History of ideas and the development of form and content in the literary genres of the Enlightenment. Topic for 1979-80: L'Age des Lumières: Philosophes, anti-philosophes et préromantiques.

106. *Studies in French Literature of the Nineteenth Century*

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. Topic for 1978-79: Balzac, Stendhal and Flaubert.

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). Topic for 1979-80: L'Autobiographie dans la littérature française du XXe siècle.

108. *Black Literature in the French Language*

Mr. BELANCE.

The rise and development of black literature in French: novel, poetry, short story, theater, periodicals such as *Présence Africaine* and *Tropiques*. Reading and discussion of such representative authors as J.S. Alexis, Bédié, Césaire, Damas, Diop, Roumain, Saint-Aude and Senghor. Topic for 1979-80: Surréalisme et Négritude dans les Caraïbes.

111. *Studies in the French Novel*

The STAFF.

A series of inquiries into the nature of the novel in all periods. Offered in alternate years.

112. *Studies in the French Theatre*

The STAFF.

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 aims, forms, themes, stagecraft, and concepts of the dramatic art. Offered in alternate years.

113. *Studies in French Poetry*

Mr. AHEARN.

Exploration of the poetic sensibility from the Troubadours to René Char. Topic for 1979-80: Baudelaire, Rimbaud, Mallarmé.

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*

Mr. BLAKELY.

A study and analysis of the great works of French Cinema. Topic for 1979-80: L'Oeuvre de Jean Renoir, 1930-39.

121. *Studies in Major French Writers*

Ms. SCHOR.

An intensive analysis of the works of a single important literary figure. Topic for 1979-80: Flaubert.

131. *Special Topics in French Literature I*

Ms. DORNBUSH.

Topic for 1979-80: Le Labyrinthe littéraire au XXe siècle.

132. *Special Topics in French Literature II*

Mr. HUGOT.

Topic for 1979-80: A Systematic approach to French grammar.

Note: the following two courses in English translation are designed to examine topics of particular interest to upperclassmen who are not prepared for courses where French is read and spoken.

133. *Studies in French Literature in English Translation (I)*

The STAFF.

134. *Studies in French Literature in English Translation (II)*

The STAFF.

Note: the following two courses 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.

Offered in alternate years.

142. *French Society Today*

Mr. BAUER.

Offered in alternate years.

151. *Advanced Written and Oral French*

The STAFF.

Continues French 51 in the sequence of language courses. Prerequisite: French 51 or placement by interview. Emphasis is on language skills for those students wanting advanced proficiency in specific areas of language performance. Oral and/or written skills are

stressed. Near-native fluency is not a goal. Students are strongly recommended to define specific target objectives reachable within the span of a semester. Offered every semester.

190. *Senior Seminar*

Mr. MAJEWSKI.

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. Topic for 1979-80: L'Artiste et la société.

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

204. *Studies in Medieval French Literature*

Mr. BOSSY.

Topic: La lyrique occitane du moyen âge.

211. *Studies in French Literature of the Renaissance*

Ms. DURAND.

Topic: Poésie de la Renaissance. See French 103.

213. *Studies in French Literature of the Seventeenth Century*

Mr. RIDGELY.

Topic: Illusions et réalités de la condition humaine dans le théâtre, la prose, et la poésie des époques baroque et classique. See French 104.

217. *Studies in French Literature of the Nineteenth Century*

Ms. SCHOR.

Topic: Flaubert.

221. *French Stylistics*

Mr. HUGOT.

Topic: A systematic approach to French grammar. See French 132.

290. *Teaching Methods*

Mr. HUGOT.

Theoretical discussions and analyses of the learning process and of the teacher's role in the process-focusing on foreign-language acquisition. Practice in micro-teaching situations and, in the second half of the semester, in the on-going program. The aim of the course is to integrate the theory and practice of the craft. Offered every year.

291, 292. *Reading and Research*

The STAFF.

GENERAL ROMANCE

201. *Introduction to Romance Linguistics*

Mr. SCHNERR.

Elements of the historical and comparative grammar of the Romance languages with special attention to the late Latin period. Offered every year.

Geological Sciences

Professors CHAPPLE, GILETTI³ (Chairman), IMBRIE², MATTHEWS, MUTCH¹, YUND; Associate Professors Head, HERMAN, HESS, RUTHERFORD, J. TULLIS, T. TULLIS, WEBB; Assistant Professors FORSYTH, GROMET; Assistant Professors (Research) PARMENTIER, PRELL; Adjunct Professor BERGGREN; Adjunct Associate Professor HUEGENIN.

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

¹On leave, Semester I and II 1979-81.

²On Sabbatical, Semester I and II, 1979-80.

³On Sabbatical, Semester I and II, 1980-81.

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 Lincoln Field Building, Rhode Island Hall, and Wilson Hall. 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 published topographic and geologic maps for the United States is available. A complete set of photos of the Moon, Mars, and Mercury is housed in the Sciences Library.

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.

Independent Concentration Programs, described more fully elsewhere in this catalogue, provide unique opportunities for certain students to plan their own course of study. For example, topics such as energy or environmental problems provide numerous possibilities for an Independent Concentration program which would involve courses in the Geological Sciences.

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 3, 4, 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 PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

Geological Sciences. Courses: Geological Sciences 2, 3, 11, 24, 41, 45, 102, 109 and two of the following: Chemistry 3, Math 9, Physics 3 or 5, Biomed 11 or 12.

Geology-Biology. Courses: Geological Sciences 2, 3, 11, 24, 41, 102; Biomed 11, 12, plus four additional courses to be approved by the concentration advisor; Chemistry 3; Mathematics 9.

Geology-Chemistry. Courses: Geological Sciences 2, 3, 24, 41, 45, 102; Chemistry 3, 114, plus two of the following: 11, 15, 106, 151; Mathematics 9, 10; Physics 3, 4 or 5, 6.

Geology-Physics-Mathematics. Courses: Geological Sciences 2, 3, 41, 45, 161; Physics 3, 4 or 5, 6 and 47, 50 or Engineering 52, 37; Mathematics 9, 10 and 25, 26 or 29, 52.

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF SCIENCE DEGREE.

Geological Sciences. Courses: Geological Sciences 2, 3, 11, 24, 41, 45, 102, 109; Mathematics 9, 10; Physics 3, 4 or 5, 6; Chemistry 3; 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, 41, 102; Biomed 11, 12 and three additional courses having the approval of the concentration advisor; Mathematics 9, 10; Chemistry 3; 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, 15, 114, 151; Mathematics 9, 10; Physics 3, 4 or 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 2, 3, 41, 45, 109 or field equivalent, 161; Physics 3, 4 or 5, 6 and 47, 50 or Engineering 52, 37; Mathematics 9, 10 and 25, 26 or 29, 52; Chemistry 3; 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.

Honors. Honors work in the geological sciences involves completion of a senior thesis directed and evaluated by the staff.

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 forty 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 their 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 using the K-Ar and Rb-Sr systems; 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 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 (1½ 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, and Mars. Recent work emphasizes interpretation of Viking data from Mars. Comprehensive collections of Lunar Orbiter, Apollo, Mariner 9, Mariner 10, and Viking pictures are available. Computer techniques have been developed to store, retrieve, and analyze much of the photographic information. Opportunities exist for a wide range of research programs including photographic mapping, statistical analysis of landforms, integration of data from multiple remote sensing instruments, 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 small discussion groups and practical sessions during the semester, plus a field trip. Cannot be taken in addition to Geological Sciences 2.

2. *Physical Processes in Geology*

MESSRS. CHAPPLE AND TULLIS.

An introduction to the configuration and the origin of the interior and the surface of the earth. The physical processes which occur at the surface of the earth such as erosion, deposition, flow of streams and glaciers, mass movements and those that occur in the interior such as mountain building, earthquakes, and volcanic activity will be discussed. 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.

Chemical composition of the earth, meteorites, and other planets. Atomic structure and composition of the rock-forming minerals. Mineralogy, texture, occurrence, and mode of formation of the common igneous, sedimentary, and metamorphic rocks. Chemical weathering and chemical aspects of sedimentation, diagenesis, and ore formation will be treated. Isotopes in naturally occurring phases and absolute dating of rocks using radioactive techniques. Three lectures per week plus six laboratory meetings and several field trips. Prerequisite: Chemistry 1 and Geological Sciences 1 or 2, or written permission. Primarily for science majors.

4. *Evolution of the Earth*

THE STAFF.

An integrated history for the Earth is presented utilizing recently developed ideas of planetary accretion, early differentiation, continental drift, sea floor spreading, and plate tectonics. Within this context, biological evolution is reviewed. Several field trips will be taken in lieu of conventional laboratory sessions. For non-science and science students. Prerequisite: an introductory course in the geological sciences.

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 FORSYTH.

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. No prerequisites.

41. *Elementary Mineralogy*

Mr. YUND.

A study of the fundamental principles of mineralogy including crystallography and crystal chemistry. Special emphasis on atomic structure and chemical variability of minerals. Laboratory work includes determinative mineralogy of the major mineral groups. Prerequisite: Chemistry 3; Geological Sciences 2 and 3 also recommended.

45. *Structural Geology*

Mr. TULLIS AND Ms. TULLIS.

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. Occasional field trips. Prerequisite: Geological Sciences 2 and 3 or written permission.

61. *Introduction to Geophysics*

Mr. HERMANCE.

Sea-floor spreading, plate tectonics, and mantle convection currents are concepts that have evolved through geophysical investigations of the earth. This course reviews the principles of various geophysical techniques (seismology, gravity, electromagnetism, and heat flow), which lead to constraints on conceptual models of dynamic processes in the earth. Should not be taken by undergraduate geophysics majors. Prerequisites: Physics 3, 4 or Engineering 3, 4; Mathematics 9, 10; or written permission.

63. *Geophysical Exploration for Earth Resources*

Messrs. HERMANCE AND FORSYTH.

An examination of the methods used in the search for petroleum, geothermal energy, minerals and water with emphasis on the relation between the various exploration techniques and concepts from physics, engineering and applied mathematics. A background in geology is not expected. Frequent and independent use of geophysical equipment in the field will help the student understand methods for developing exploration strategies and will provide a data base that he or she will use for interpreting seismic, gravity, magnetic and electrical measurements in the laboratory. Prerequisites: Physics 3, 4 or Engineering 3, 4; Mathematics 9, 10; or written permission.

81. *Planetary Geology*

Mr. HEAD.

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. 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.

Microscopic study of the main types of rocks and discussion of the classification and the origin of igneous and metamorphic rocks. Prerequisite: Geological Sciences 41.

109. *Field Geology*

Mr. RUTHERFORD.

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.

112. *Historical Oceanography*

Messrs. IMBRIE AND PRELL.

History of the world ocean, with emphasis on processes which have acted during the Cenozoic to change its circulation, climate, geometry, and biology. Individual study projects using geological, geophysical, and micropaleontological data give experience in analysing and interpreting deep-sea sediments in terms of oceanic processes. Prerequisite: Geological Sciences 24 and 121, Biomed 1.

116. *Stratigraphic and Tectonic Patterns*

Mr. CHAPPLE.

An integrated study of patterns of sedimentation, stratigraphy, structure, igneous activity, and metamorphism in selected regions. Emphasis is placed on the concepts of plate tectonics and their relation to the evolution of mountain belts as evidenced by the geologic record in the Appalachians, the western Cordillera and the Alpine chains.

121. *Oceanography*

Mr. PRELL AND STAFF.

The oceans will be studied primarily from a physical and chemical viewpoint. Topics will include: material and heat budgets; definition and behavior of water masses; chemistry of sea water; 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.

135. *Meteorological Aspects of Climatic Change*

Mr. WEBB.

This course seeks to draw upon the principles of physical and dynamic climatology in order to develop an understanding of the complexities of climatic change. First, the principles of physical climatology are presented through a study of energy and mass budgets and models of these budgets. Factors influencing temperature and moisture balance are considered and evaluated in terms of their relative effects on climatic change. Second, the principles of dynamic climatology are presented. The features of the general circulation are defined and models for this circulation are introduced. Air masses and frontal boundaries are studied and records of recent climatic change are examined in relation to changes in atmospheric circulation. Prerequisites: Physics 3, 4 or 5, 6; Mathematics 9, 10; or written permission.

150. *Economic Geology*

Messrs. RUTHERFORD AND GROMET.

This course will involve the study of economic deposits of metals, energy sources, fertilizer materials, and some industrial materials in the earth. The emphasis will be on their origin (including the source, transport, and deposition); their geological associations; and to a lesser extent on exploration and extraction methods. There will be two major projects during the semester, which will constitute the laboratory for the course. Prerequisites: Geological Sciences 2 and 3 or written permission.

161. *Solid Earth Geophysics*

Messrs. HERMANCE AND FORSYTH.

Review of current problems in the study of the physics of the earth with emphasis on the fundamental mathematical and physical principles involved. Topics include seismology and the internal structure of the earth, the earth's gravity and magnetism, temperatures inside the earth, the dynamics of the earth's interior and the origin of mountain belts, and so forth. A background in geology is not expected and interested students in a variety of scientific disciplines are encouraged to make inquiries. Prerequisites: Physics 5, 6 or Engineering 3, 4; Mathematics 20 or 29; or written permission.

162. *Mathematical Foundations of Physics of the Earth*

Mr. PARMENTIER.

Application of methods of mathematical physics to describe physical processes for the solid Earth. Topics considered will include elastic and viscous deformation of the Earth, thermal processes and mantle convection, elastic and electromagnetic wave propagation, and gravitational and geomagnetic fields. An important objective of the course will be to gain familiarity with the application of basic mathematical tools such as Fourier analysis and integral transforms, Green's functions, and boundary layer methods for solving problems which arise in theoretical geophysics. Although this will be approached through discussion of topics of current geophysical interest, a background in geological sciences is not required. Prerequisites: Physics 47, 50 or Engineering 37, 53; Applied Mathematics 33, 34; or written permission.

163. *Interpretation Theory in Geophysics*

Messrs. FORSYTH AND HERMANCE.

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. A background in geology is not required. Prerequisites: 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: Physics 3, 4 or Engineering 3, 4; Mathematics 20 or 29; 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 theoretical problems and practical techniques will be discussed which are not only relevant to delineating subsurface structures of importance to resource exploration but relevant to understanding regional geophysical processes associated with mountain building and geodynamics as well. 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 53, or equivalent.

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.

224. *Stratigraphy*

The STAFF.

A study of the stratigraphic succession in certain important and typical areas, particularly in North America. Principles of stratigraphy, including classification, correlation and environmental and tectonic interpretation will be emphasized. Offered every year.

226. *Sedimentary Environments in the Stratigraphic Record*

Mr. MATTHEWS.

Advanced discussion of sedimentary environments.

227. *Sedimentary Petrology Seminar*

Mr. MATTHEWS.

Discussion of selected problems of recent interest in the fields of sedimentation and sedimentary petrology.

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. Prerequisite: Mathematics 9 and 10 or the equivalent. It is strongly recommended that the student take, or have taken, a basic course in computer programming.

235. *Quaternary Climatology Seminar*

Mr. IMBRIE.

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 America, 2) large mammal extinctions, 3) technological change in response to environmental change, and 4) human records of environmental change. Prerequisite: written permission.

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.

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.

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 anatexis and petrogenetic grids. Prerequisite: Geological Sciences 246 or written permission.

246. *Phase Equilibria*

Mr. HESS.

Principles of thermodynamics and phase equilibria in unary, binary, ternary and multicomponent systems using analytical and graphical methods. Other topics include solution theory, equations of state and the thermodynamics of surfaces. Prerequisite: written permission.

251, 252. *Advanced Structural Geology*

Messrs. CHAPPLE and TULLIS.

The first part of the course will be an introduction to the analysis of stress and strain, rheology of real and ideal materials, crystal plasticity, and experimental rock deformation. Applications to folding, faulting, igneous intrusion, development of preferred orientation, and deformation and recrystallization textures. Laboratory; occasional field trips.

The second part expands on the material covered in the first semester, while treating it in a more rigorous fashion. Tensor analysis of stress and strain, finite strain and its geological applications, derivation and solutions of the equations of motion of ideal materials, strain energy and variational methods, and their applications to geologic problems. Prerequisites: Geological Sciences 45 and Mathematics 10, or written permission.

255. *Topics in Structural Geology*

Messrs. CHAPPLE, TULLIS, PARMENTIER AND Ms. TULLIS.

Consideration of current problems in the field of tectonophysics. Prerequisite: Geological Sciences 251.

273, 274. *Geochemistry*

Mr. 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, wave propagation in the earth-ionosphere cavity. Prerequisite: Geology 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 A. R. SCHMITT (Chairman), WEIMAR; Associate Professors BARNOUW, CROSSGROVE, LOVE,¹ D. SMITH,¹ WARNOCK;² Assistant Professor K. GOODMAN;² Visiting Lecturer, Mr. HOFFMEISTER (1979-80).

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

German Literature. Prerequisite: German 11 and 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. The student will present at a Senior Colloquium the results of a special study which has been conducted. See also: Standard Interdepartmental Concentration Programs (page 50).

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 55.

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

¹On leave, Semester I, 1979-80.

²On leave, Semester II, 1979-80.

concentration with the addition of two 100-level courses from the German offerings 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).

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 development 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 thorough 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.

I. PRIMARILY FOR UNDERGRADUATES

1-2. *Beginning German* The STAFF.
Intensive course for beginners; acquisition of all four basic skills: listening, speaking, reading, and writing. Five hours per week.

1R-2R. *Beginning German: Reading* The STAFF.
Designed to meet the needs of graduate students and advanced undergraduates who wish to obtain a reading knowledge of German. Open only to juniors, seniors, and graduate students. Systematic presentation of grammar essentials and reading of texts from a variety of fields.

3. *Intermediate German I* The STAFF.
Emphasis on developing vocabulary and reading skills while maintaining speaking and listening abilities. Five hours per week. Prerequisite: German 2 or placement.

4. *Intermediate German II* The STAFF.
Readings in contemporary German texts. Stress on active use of German and vocabulary development. Five hours per week. Prerequisites: German 3 or placement.

11. *Introduction to German Literature: Fiction and Poetry* The STAFF.
Reading and discussion of representative short fiction and poetry from Goethe and the Romantics to Kafka and contemporary authors. Prerequisite: German 4 or placement.

12. *Introduction to German Literature: Plays and Poetry* The STAFF.
Reading and discussion of representative plays and poems from Schiller to Brecht and contemporary East and West German playwrights. Prerequisite: German 4 or placement.

19. *Writing and Speaking German I*

The STAFF.

Review of selected grammatical topics, exercises in vocabulary development, and conversational and written practice built on structured situations. Prerequisite: German 4 or placement.

29. *German Literature in English Translation*

The STAFF.

Topics vary. In 1978-79 Mr. Weimar offered: Post-war poetry in the two Germanies. Open to all undergraduate students.

51. *Writing and Speaking German II*

The STAFF.

Designed to develop facility in oral and written German. Stylistic analysis; discussion of significant aspects of contemporary German affairs. Prerequisite: German 19, or written permission.

II. FOR UNDERGRADUATES AND GRADUATES

NOTE: Most of the 100-level courses are offered in alternate years.

Prerequisite for all 100 courses: any combination of two of the following: 11, 12, or 19; or written permission.

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*

The STAFF.

Topics vary. In 1979-80 Ms. Barnouw will offer: Society in Twentieth-Century Literature. Prerequisite: a college level literature course or permission of the instructor.

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*

Mr. WEIMAR.

A study of representative works of the German Romantics in the context of European Romanticism; focus on Novalis, Tieck, Brentano, E. T. A. Hoffmann, and Eichendorff.

142. *Realism*

Mr. LOVE.

German, Swiss, and Austrian writing against the background of accelerated social change: from the decline of Romanticism to the rise of Naturalism.

143. *The Turn of the Century (1880-1920)*

Mr. WEIMAR.

Trends and writers: naturalism and impressionism; the flow and ebb of expressionism; Nietzsche, Hauptmann, Hofmannsthal, Schnitzler, Rilke, Trakl, Werfel, Kaiser, Kafka, and others.

144. *Prose Fiction*

The STAFF.

Studies in the German novel, *Novelle*, or short story, with varying topics. In 1978-79 Ms. Ryan offered: The novel of marriage.

145. *Drama*

The STAFF.

Topics vary. In 1977-78 Mr. Love offered: The lyric theater: German opera and libretto; and in 1978-79 Mr. Love offered: Comedy in the German language.

146. *Poetry*

The STAFF.

Topics vary. In 1978-79 Ms. Ryan offered: Twentieth-Century poetry.

147. *Contemporary German Literature* The STAFF.
Topics vary. In 1978-79 Ms. Ryan offered: Modern prose. In 1979-80 Ms. Goodman will offer: Trends in German literature since 1920.
148. *Aspects of Marxist Aesthetics* Mr. SMITH.
Marxist aesthetics and socialist realism. Introduction to the aesthetic theory derived from the various approaches to Marxism in contemporary socialist and non-socialist cultures.
153. *Introduction to Middle High German Language and Literature* Mr. WARNOCK.
The structure of the Middle High German language will be 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, and 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. Offered every year. Prerequisite: German 51 or written permission.
191. *Seminar in German Civilization* The STAFF.
Topics vary. In 1979-80 Mr. Crossgrove will offer: From alchemy to I.G. Farben: chemists, chemistry, and the chemical industry in German society from the Middle Ages to 1900.
194. *Undergraduate Seminar* The STAFF.
Topics vary. In 1979-80 Mr. Smith will offer: Film and fiction in the German Democratic Republic and the Soviet Union.
- 198, 199. *Senior Conference* The STAFF.
Any kind of study that is especially needed by seniors concentrating in German; particularly, (1) a systematic review of literature, (2) guided supplementary reading, (3) preparation of Honors theses. Open also to non-concentrators with written permission.

III. PRIMARILY FOR GRADUATES

NOTE: Most of the 200-level courses are offered every second or third year.

201. *Introduction to Germanic Philology* Mr. CROSSGROVE.
- 203, 204. *Old Icelandic* Messrs. CROSSGROVE AND RUSSOM.
- 211, 212. *Studies in Germanic Linguistics and Philology* 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.
222. *Middle High German Literature* Messrs. CROSSGROVE OR WARNOCK.
225. *Renaissance and Reformation* Mr. SMITH.
The topic offered in 1977-78 was: Germany and the Northern European Renaissance.
227. *Baroque Literature* Mr. WARNOCK.
232. *Literature of the Eighteenth Century* Mr. SCHMITT.
The topic offered in 1977-78 was: Enlightenment and Emancipation.
234. *Romanticism* The STAFF.
243. *Literature of the Nineteenth Century* The STAFF.
In 1977-78 Mr. Love offered: Kleist, Büchner, Grabbe.
246. *Modern Literature* The STAFF.

246. <i>Modern Literature</i>	The STAFF.
In 1977-78 Mr. Weimar offered: Symbolism. In 1979-80 Ms. Barnouw will offer: The Weimar Republic.	
261. <i>Studies in German Literature</i>	The STAFF.
In 1978-79 Mr. Love offered: Schopenhauer, Nietzsche, Wagner.	
284. <i>Poetry</i>	The STAFF.
285. <i>Narrative Prose</i>	The STAFF.
286. <i>Drama</i>	The STAFF.
288. <i>Studies in Literary Theory</i>	The STAFF.
291, 292. <i>Reading and Research</i>	The STAFF.

Hispanic and Italian Studies

Professors AMOR Y VÁZQUEZ, DURAND, FIDO¹, KOSOFF (Chairman), RIBBANS, TRUEBLOOD¹, SCHNERR²; Visiting Professor DELLA TERZA; Associate Professor Oldcorn; Assistant Professors Garfield and Loera; Adjunct Assistant Professors Manteiga and Tracy; Instructor, Ms. Gunzberg.

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, Italy, and the Spanish-speaking New World. 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 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 and Portuguese colonial periods.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

Hispanic Studies. Prerequisite: 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: Hispanic Studies 134, 135 and 136; two of the following: Hispanic Studies 19, 51, 170; and preferably two in older and two in modern literature. 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.

Language and Linguistics. Prerequisite: 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 or Linguistics 11 or 22; at least two of the following: Hispanic Studies 134, 135, 136; 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.

¹On leave, 1979-80.

²Retires in June, 1980.

Italian Studies. It is possible for students who begin the study of Italian at Brown to concentrate. Those interested should discuss their interest with the concentration advisor. Requirements: eight relevant courses beyond the second-year level, including Italian Studies 19 and 51 or their equivalents, 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.

Latin American Studies. Prerequisite: Language proficiency in Spanish and Hispanic Studies 19 or 51. Program: Hispanic Studies 13 or 132; 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 128, 136, 150; 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.

Honors in Italian Studies. The usual number of courses is ten, to be distributed in the manner recommended for the regular concentration program. Italian 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 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

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, Arabic or another language may be allowed.
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.

HISPANIC STUDIES

I. PRIMARILY FOR UNDERGRADUATES

1-2. *Basic Spanish*

Mr. LOERA AND 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 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: 2 or placement.¹

4. *Intermediate Spanish II*

Ms. GARFIELD AND 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: Placement, 3 or 2 with special written permission.

11, 12. *Expression and Values in Spanish Literature*

Messrs. DURAND AND LOERA.

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. GARFIELD AND LOERA.

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*

Ms. GARFIELD AND Mr. LOERA.

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

51. *Advanced Composition and Conversation*

Mr. MANTEIGA AND 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.

¹ See statement on Placement Tests, page 39.

II. FOR UNDERGRADUATES AND GRADUATES

Prerequisite for all courses: 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* Ms. GARFIELD.

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.

118. *Cervantes* Mr. KOSOFF.

A reading of *Don Quixote*, Cervantes' creative originality in the short story and drama will also be considered. Provision will be made for students without a reading knowledge of Spanish to read the course material in English. Offered in alternate years.

123. *Literature of Ideas in Spain* Mr. RIBBANS.

The record of the Spaniard's concern with "the problem of Spain" since the eighteenth century: Spain and the Spaniard in themselves, in relation to Europe and to mankind. Not offered every year.

125. *The Development of the Modern Spanish Novel* Mr. DURAND.

Representative works of major novelists of the nineteenth and twentieth centuries from *costumbrismo* through the masters of realism, naturalism, and symbolism to the most recent trends. Offered in alternate years.

127. *Modern Poetry of the Hispanic World* Mr. AMOR AND Ms. GARFIELD.

The resurgence of lyric poetry in the last one hundred years: Bécquer as predecessor, Rubén Darío and the *modernistas* as initiators, Machado, Lorca, Neruda, Jiménez, and others as culminating figures. Offered in alternate years.

128. *Literary Image of the Hispanic New World* Mr. AMOR.

Some literary themes and trends arising from the transplantation of a European culture to a new setting and its fusion with a native heritage: man against nature, the *gaucho* and the frontier, changing views of the Indian, revolution and social ferment, the role of the artist and the intellectual, the search for a distinctive cultural identity.

132. *Twentieth Century Spanish American Prose Fiction* Ms. GARFIELD.

A critical presentation of the major novelists and short story writers, including the relevant historical and sociological background. Not offered every year.

134. *Hispanic Literature in the Context of Cultural History I* Ms. WEISSBERGER.

Literature studied in the light of social and political history, history of ideas, and the development of other arts. The course deals with the problem of the emergence of a Hispanic identity in the medieval period and the extent to which various cultures, European and Arabic, act in the creation of Hispanic culture. Not offered every year.

135. *Hispanic Literature in the Context of Cultural History II*

Literature studied in the light of social and political history, the history of ideas, and the development of other arts. The course deals with the problem of the emergence of a Hispanic identity, the manner in which it absorbs subsequent cultural movements (such as the Renaissance), and its culminating assertion in the Baroque in Europe and America. Not offered every year.

136. *Hispanic Literature in the Context of Cultural History III*

Mr. AMOR.

Literature will be studied in the light of social and political history, the history of ideas, and the development of other arts. The course will consider such phenomena of cultural evolution in Spain and Spanish America as the literary reflections of the Enlightenment, the Wars of Liberation, and the emergence of new nations; indigenous and European elements in successive movements: romanticism, naturalism, existentialism, etc. Not offered every year.

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 1979-1980: Commitment and Aestheticism in Early Twentieth Century Literature. Mr. RIBBANS.

170. *Stylistics, Literary Translation, and Free Composition*

Mr. AMOR.

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. KOSOFF 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

200. *The Study of Literature: Methods and Approaches*

Mr. DURAND 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.

201. *History of the Spanish Language*

Mr. SCHNERR.

Outline of Vulgar Latin, reading and analysis of medieval and Renaissance materials, including some non-Castilian texts.

202. *Hispanic Linguistics*

Mr. SCHNERR.

The principals of general linguistics as applicable to the study and teaching of modern Romance languages, with specific reference to Spanish. Phonemic analysis of the contemporary language, including its regional variants.

203. *Studies in Spanish Literature of the Middle Ages*

Mr. SCHNERR.

Topic for 1979-1980: Juan Ruiz.

211. *Cervantes' Work, I*

Messrs. TRUEBLOOD AND KOSOFF.

212. *Cervantes' Works, II*

Messrs. TRUEBLOOD AND KOSOFF.

215. *Studies in Spanish Literature of the Golden Age*

Mr. RIBBANS.

Topic for 1979-80: Honor plays in the Golden Age.

216. *Seminar in Spanish Literature of the Golden Age*

Mr. KOSOFF.

Topic for 1979-1980: The Classic Picaresque: The Social and Theological Converso. Topic for 1979-1980: Renaissance, Mannerist, Baroque: Definitions and paradigms for Golden Age literature.

225. *Studies in Spanish Literature of the Eighteenth and Nineteenth Centuries.*

Messrs. DURAND AND RIBBANS.

Topic for 1979-80: The Novels of Galdós. Mr. RIBBANS.

227. *Studies in Spanish Literature of the Twentieth Century.*

Mr. AMOR.

235. *Studies in Spanish American Literature*

Mr. AMOR AND Ms. GARFIELD.

252. *Seminar in Spanish American Literature*

Mr. DURAND AND Ms. GARFIELD.

262. *Seminar in Spanish Literature* Mr. RIBBANS.
 Topic for 1979-80: An Introduction to Catalan History and Culture with Catalan Literary Texts. Mr. RIBBANS and Ms. ELLIOTT.
291. *Independent Research*
- 291A. *Research in Spanish Literature of the Middle Ages* Mr. SCHERR.
- 291B. *Research in Spanish Literature of the Golden Age*
 Messrs. TRUEBLOOD AND KOSSOFF.
- 291C. *Research in Spanish Literature of the Eighteenth and Nineteenth Centuries*
 Messrs. DURAND AND RIBBANS.
- 291D. *Research in Spanish Literature of the Twentieth Century*
 Messrs. AMOR, RIBBANS, AND TRUEBLOOD.
- 291E. *Research in Spanish American Literature*
 Messrs. AMOR, DURAND, AND Ms. GARFIELD.
- 291F. *Research in Intellectual History* Mr. RIBBANS.
292. *Thesis Preparation* The STAFF.

ITALIAN STUDIES

I. PRIMARILY FOR UNDERGRADUATES

- 1-2. *Elementary Italian* Mr. 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. Two hours of lecture, three hours of practice, and one hour of laboratory training. Readings from contemporary authors.
3. *Intermediate Italian I* Mr. GUNZBERG AND STAFF.
 Review of the fundamentals of grammar, with emphasis upon skills in speaking and writing. In addition to works of modern literature, readings from history, art, and other disciplines will be offered according to the special interests of the individual. Students with a good knowledge of another Romance language or a high aptitude for languages should consider taking this course in lieu of 1-2. Prerequisite: 1-2, or placement by examination,¹ or written permission.
4. *Intermediate Italian II* Mr. GUNZBERG AND STAFF.
 Continuation of 3. Prerequisite: 3, or placement by examination, ¹ or written permission.
19. *Writing and Speaking Italian I* Mr. 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* Mr. 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.

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

¹See statement on Placement Tests, page 39.

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* Mr. Oldcorn.

The realistic tradition in Italy since World War II. Given in English.

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. Topic for I, 1979-1980: The poetry of Carducci, Pascoli, and D'Annunzio and its background.

135. *Contemporary Italian Literature* Messrs. FIDO AND 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.

151. *Intellectuals and Power in Renaissance Italy* (History 198G)
Messrs. FIDO AND Molho.

155. *Literature of the Renaissance I* Mr. FIDO.
Major trends: humanism and fifteenth century prose writing; Petrarchism; the pastoral; epic-chivalric poetry; the novella and the theatre. Offered in alternate years. Topic for 1979-1980: The literature of the Quattrocento.

156. *Literature of the Renaissance II* Mr. Oldcorn.
The authors of the sixteenth century: Ariosto, Machiavelli; Guicciardini, Tasso. Offered in alternate years. Topic for 1979-1980: Torquato Tasso and baroque poetry.

161, 162. *The Divina Commedia* Mr. FIDO.
A close reading of Dante's poem in the light of contemporary European and American critical interpretations.

198. *Senior Conference*
Special work or preparation of an honors thesis under the direction of a member of the staff.

III. PRIMARILY FOR GRADUATES

201. *History of the Italian Language* Mr. Schnerr.
Outline of Vulgar Latin, reading and analysis of medieval and Renaissance texts, history of the establishment of a linguistic norm for Italian literature.

202. *Italian Linguistics* Mr. Schnerr.
The principles of general linguistics as applicable to the study and teaching of modern Romance languages, with specific reference to Italian.

210. *The Study of Literature: Methods and Approaches* Mr. FIDO 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. Not offered every year.

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* Mr. FIDO.
Monographic studies in major sixteenth and seventeenth century authors. Not offered every year.
217. *Studies in the Enlightenment and Romanticism* Mr. FIDO.
Writers and cultural movements from 1750 to 1860. Not offered every year.
219. *Studies in Modern Literature and Theatre* Mr. Oldcorn.
Problems and figures from 1860 to the present. Not offered every year.
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* Mr. Schnerr.
Elements of the historical and comparative grammar of the Romance languages with special attention to the late Latin period. Offered every year.
240. *Problems in Romance Linguistics* Mr. Schnerr.

History

Professors CURTIS, DUPREE, FORNARA, GLEASON,² GRAUBARD,² GRIEDER,³ LYON, McLoughlin,³ MOLHO, NEU,⁴ PADDEN, PATTERSON,³ RICH, ROHR, THOMAS, UNDERDOWN,⁴ WILLIAMS,² WOOD;⁴ Associate Professors CHUDACOFF, JONES,³ LITCHFIELD;¹ Assistant Professors BENEDICT, BUHLE,¹ GLUCK, LAMOREAUX, MCCLAIN; Lecturer, Mr. 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 preclude 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 may develop broad perspectives.

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.

¹On leave, Semester I, 1979-80.

²On leave, Semester II, 1979-80.

³On leave, 1979-80.

⁴On leave, 1980-81.

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.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

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 140. History 41, 42 is prerequisite for all courses numbered 140 through 148. These requirements may be waived by written consent of the instructor.

Concentration: Concentration consists of any eight courses, including those History courses offered by the Department of Classics. Only one of the introductory course sequences — History 1, 2, 41, 42, and 51, 52 — may count for the concentration. 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 members of the Department, what particular combination of courses will best fulfill this goal. The Department strongly recommends the following guidelines: (1) At least two of these eight 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. (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 these eight courses dealing with a period prior to 1700. (3) Each concentrator ought to take at least one undergraduate seminar. These seminars provide students with an opportunity to work more closely with members of the Department.

A standard interdepartmental concentration program in History and Chinese Language is described in the appropriate section of this catalogue.

Honors. History Honors offers qualified students an opportunity to do individual work in fields of particular interest under the supervision of members of the Department and to familiarize themselves with historical materials and the methods employed by historians.

Students with outstanding records will be admitted to the Honors program at the end of the junior year upon the written recommendation of two faculty members or with a grade point average in History courses of 3.0 or better plus one faculty recommendation. Honors students will be expected to complete the concentration program outlined above. Of the eight courses at least two should be seminar courses (History 92, 196, 197, 198 or any 200-level course); one of these — History 92 is strongly recommended — should be taken during the junior year. In addition, an Honors thesis (History 93, 94) is required, to be written during the senior year. The thesis is intended to demonstrate the student's ability to identify and answer significant historical questions through an extended piece of independent research.

Honors will be awarded to students whose course records and theses are both of honors quality.

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, one of which must be a research seminar, another of which would involve the writing of an M.A. thesis; (2) eight 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 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 four history seminars, generally two each term. The four seminars, to be taken with at least three different instructors, must include a minimum of two research seminars. In addition, first year students will enroll in two 100-level courses each semester with the requirements for graduate students for these courses to be specially set by each instructor. Occasionally, with the advisor's and the instructor's approval, individual reading courses will be substituted for the 100-level courses.

Students who have already earned a M.A. degree in another University may waive one 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. 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. This 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 Examination will focus on the problems and potentialities of the thesis.

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 examination will be taken during the student's registration week in September. In case of failure, the student will be given a second chance of passing the examination in January.
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 may be postponed until the end of the first term of full-time study (in January). In case of failure the student will be given a second chance of passing the examination in May.
4. Asian history: Proficiency in Chinese, equivalent to the completion of Chinese 7-8, plus Chinese 103 and 104 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 Northern Europe and Spain, 1450-1600

The History of Europe, 1600-1789

The History of Europe, 1789-1870

The History of Europe, 1870 to the present

The History of Early Modern England, 1485-1783

The History of Modern Britain, 1760 to the present

The History of France since 1648

The History of Germany since 1648

The History of Russia since 1689

The History of Central Europe since 1648

Spain and her American Empire, 1400-1800

The History of Science and Technology

European Social and Demographic History, 1700-1900

American history is divided into the following fields from which the student may choose no more than two, each with a different director.

1. Early American history
2. Modern American history
3. American economic and business history
4. American political and diplomatic history
5. American social and urban history
6. American science and/or technology
7. American intellectual and cultural history

Asian History. The student may present two of the following fields, plus one other historical field, and a fourth field to be chosen in consultation with the Department:

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

Medieval Continental Europe. The entire field will be tested in the written examination, but only a two-century period, to be agreed upon with the instructor, will be covered in the oral examination.

Students may petition the Department for fields that are not listed.

I. PRIMARILY FOR UNDERGRADUATES

1, 2. *Introduction to Modern Europe*

Messrs. ROHR, BENEDICT, GLEASON, MOLHO, Ms. GLUCK and others.

A series of major topics in European history from 1500 to the present with emphasis on modernization of society and culture.

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.

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. LYON.
A study of the collapse of the Roman Empire, and the development and function of seignorialism, feudalism, the town, the bourgeoisie, the guild, trade and finance, and capitalism.

104, 105. *History of Greece from Archaic Times to the Death of Alexander*
Mr. FORNARA.

Interested students should register for Classics 121-122.

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 crisis 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.

113. *France since 1815* Mr. GRAUBARD.
The political, social and cultural history of France from the Congress of Vienna till the inauguration of the Fifth Republic.

116. *European Social History in the Eighteenth and Nineteenth Centuries*
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.

117, 118. *European History 1748-1870* Mr. LITCHFIELD.
European political and cultural history in the period of the Enlightenment, the French Revolution, and early Industrialization. History 117 is devoted to the period 1748-1815, and to the impact of the Enlightenment, the French Revolution, and Napoleon. History 118 is devoted to the period 1815-1870 and to the impact of industrialization on politics, culture, and the state of England, France, Germany, and Italy.

119. *Europe 1870-1918*
A political and cultural history of Europe, 1870-1918, with emphasis on the pre-war decade.

120. *Europe, 1914 to the Present*
An intensive examination of two World Wars and their consequences for European Society.

121, 122. *The Expansion of Europe*

Mr. PADDEN.

Semester I: Europeans in America, 500-1700. Semester II: Comparative American Societies, 1670-1850.

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.

127. *National Mexico*

Mr. PADDEN.

The objective of this course is comprehension of contemporary Mexican society within its historical context. Emphasis is placed upon the Mexican Revolution and its role in the development of economic nationalism.

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 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)

137, 138. *Russian History*

Mr. GLEASON.

The development of Russia from the Kievan period to the present.

139. *Greco-Roman Historiography* (See Classics 151)

Mr. FORNARA.

Study of Greco-Roman historical writing from its pre-Herodotean origins to the fourth century writer, Ammianus Marcellinus. The major Greek and Latin historians will be read in translation; they will be studied primarily from the point of view of the *genre* itself and the literary goals of the individual writers.

140. *History of Imperial China: From the Sung Dynasty to the Mid-Ch'ing*

Mr. WIDMER.

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. (Subject to E.P.C. approval)

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. (Subject to E.P.C. approval)

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.

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.

185. *Perspectives in Technology and Environment*

Mr. DUPREE.

A systems approach to the history of technology emphasizing the interaction between artifacts and environment in historical periods selected for their special relevance. The three main subjects will be: 1) the expansion of Europe, concentrating especially on the exchange between European maritime and agricultural technology with the natural and social environment of the Americas; 2) the transformations of western European and American technology in the 18th and 19th centuries and the adaptation of the new structures in a global environment; 3) the transformations of the mid-20th century emphasizing the creation of nuclear, electronic and informational environments.

186. *Perspectives in Science and Society*

Mr. DUPREE.

A historical approach to the history of science in its social setting by examining selected periods of particular relevance. The periods will include: 1) The transition from vernacular measurement to scientific institutions from the 16th to 18th centuries; 2) The evolutionary synthesis of the 19th century and its consequences; 3) Mid-20th century scientific institutions and the policy issues they raise for society.

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 American History*

Discussion and research concerning various elements of American history. The topics that

are considered in individual sections of the course will vary from year to year.

198. *Undergraduate Seminar on Interpretations of European History.*

Discussion and research concerning various elements of European history. 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. *Proseminar in Renaissance History*

Mr. MOLHO.

Concentrated reading on selected topics in the Renaissance. Reading knowledge of either French, German, or Italian required.

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 Hispanic American colonial historiography. Extensive exercise in 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.

231. *Proseminar in Early Modern English History*

Mr. UNDERDOWN.

Reading on selected topics of English history and historiography, 16th-18th centuries.

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 industrialism 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* Mr. DUPREE.
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* Mr. DUPREE.
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* Mr. PATTERSON.
Topics in late nineteenth and twentieth century American history.
- 291, 292. *Reading and Research* The STAFF.
Work with individual students in connection with special reading, problems of research, or preparation of theses. Offered every year.

History of Mathematics

Professors PINGREE, SACHS (Chairman), and TOOMER.

The program of the Department is concerned with the history of the exact sciences in Antiquity and in the Middle Ages. 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 or historical studies may take part. For advanced research a good reading knowledge of foreign

languages, including at least French and German, is required. Emphasis will be laid on the study of original source material. The facilities of the Library are adequate for the printed literature, and the Department is constantly adding to its collection of photographs and microfilm of original documents.

Programs leading to the M.A. or Ph.D. degrees are worked out with regard to the previous training and requirements of the individual student.

I. FOR UNDERGRADUATES AND GRADUATES

141, 142. <i>History of Ancient Mesopotamia</i>	Mr. SACHS.
143. <i>Political History of Ancient India</i>	Mr. PINGREE.
151. <i>The Philosophical Background of Astrology</i>	Mr. PINGREE.
152, 153. <i>History of Ancient Astronomy</i>	Mr. TOOMER.
154, 155. <i>Babylonian Mathematics</i>	Mr. SACHS.
156. <i>Babylonian Observational Astronomy</i>	Mr. SACHS.
157, 158. <i>Sanskrit Mathematical Texts</i>	Mr. PINGREE.
193. <i>History of Indian Astronomy</i>	Mr. PINGREE.

II. PRIMARILY FOR GRADUATES

211, 212. <i>History of Medieval Astronomy</i>	Mr. TOOMER.
291, 292. <i>History of Conic Sections in Antiquity and the Middle Ages</i>	Mr. TOOMER.

Other courses taught by members of the Department are listed under the Classics Department and the Linguistics Department. All members of the Department teach F13, 14 Ancient World.

Languages and Literatures

The Departments of Languages and Literatures include the following departments:

Chinese (see Linguistics)	Hispanic Studies
Classics	Japanese
Comparative Literature	Italian Studies
Egyptology	Latin (see Classics)
English	Linguistics
French Studies	Portuguese
German	Russian
Greek (see Classics)	Slavic

A complete listing of the courses offered in each of these departments is provided below under the respective department headings. Immediately below is an abbreviated list of the literature courses in English translation offered in these several departments. (For more complete descriptions, see the complete course listings under the individual departments; see also listings under Religious Studies, Philosophy, and Modes of Thought.)

LITERATURE IN ENGLISH TRANSLATION

Classics

1. <i>Great Periods in the Ancient History of Greece</i>	Mr. WORKMAN.
2. <i>Great Periods in the Ancient History of Greece</i>	Mr. WORKMAN.

42. <i>The Ancient Novel</i>	Mr. WORKMAN.
61. <i>Ancient Greek Literature in Translation</i>	Mr. DONOVAN.
62. <i>The Greek Drama in English</i>	Mr. DONOVAN.
90. <i>Myth and Identity</i>	Mr. SEGAL.
<i>Comparative Literature</i>	
61. <i>The Functions of Literature</i>	Ms. NEWMAN AND Mr. BOSSY.
81. <i>Ideas, Myths, and Themes</i>	Mr. AHEARN.
121. <i>Theory of Literature</i>	Mr. AHEARN.
<i>English</i>	
123, 124. <i>A History of European Theatre</i>	Mr. WILMETH.
187. <i>Twentieth-Century American and European Drama to World War II</i>	Mr. KRAUSE.
194. <i>American and Continental Drama and Theatre Since World War II</i>	Mr. EMIGH.
<i>French</i>	
131. <i>Special Topics in French Literature I</i>	Ms. DORNBUSH.
131. <i>Special Topics in French Literature II</i>	Ms. SCHOR.
132. <i>Special Topics in French Literature</i>	Mr. HUGOT.
<i>German</i>	
29. <i>German Literature in English Translation</i>	Ms. BARNOUW.
<i>Hispanic Studies</i>	
118. <i>Cervantes. A reading of Don Quixote</i>	Mr. KOSSOFF.
<i>Italian Studies</i>	
101. <i>Dante in English Translation</i>	The STAFF.
<i>Portuguese</i>	
101. <i>Brazilian Literature in Translation</i>	Mr. VIEIRA.
<i>Russian</i>	
29. <i>Russian Literature in English Translation I</i>	The STAFF.
A survey of the most important works of Russian prose fiction in the 19th century, from Pushkin to Dostoevsky. All works will be read in English translation. Three hours a week of lecture and discussion.	
30. <i>Russian Literature in English Translation II</i>	The STAFF.
Selected works of Russian literature, chiefly but not exclusively fiction, from Tolstoy through the Soviet period. All works will be read in English translation. Three hours a week of lecture and discussion.	
See listings under Slavic Languages and Literature for some further courses which will accommodate students who have no knowledge of a Slavic Language.	

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 sponsors 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 conceptions 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. (New course, pending approval of the EPC)

185. <i>Junior Seminar</i>	The STAFF.
Required seminar for concentrators. Written permission required.	
191. <i>Senior Tutorial</i>	The STAFF.
192. <i>Senior Project</i>	The STAFF.
193, 194. <i>Senior Thesis</i>	The STAFF.

Linguistics

Professors KUCERA, LIEBERMAN, WRENN; Associate Professors BARON, BLUMSTEIN (Chairman), LATTIMORE, MESKILL; Assistant Professors DRESHER, JACOBSON; Lecturers Ms. LEE and Mr. RYAN; and members of associated departments.

The Department of Linguistics offers an undergraduate concentration in Linguistics and cooperates with Psychology in an interdepartmental standard concentration program in Psycholinguistics. Additional interdepartmental concentrations are available with Anthropology, Applied Mathematics, Computer Science, and the language departments. The graduate program offers courses leading to the degrees of Master of Arts and Doctor of Philosophy in linguistics, with specialization in psycholinguistics, neurolinguistics, speech physiology and phonetics, theoretical linguistics, historical linguistics, training curriculum supervisors in deaf education, and computational and mathematical linguistics.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

A minimum of eight courses (ten for Honors candidates), including Linguistics 22, 121, 131, and 165. The remaining courses may be drawn from other courses in Linguistics, with numbers above 100, and also appropriate courses in Anthropology, Classics, Modern Languages, and Applied Mathematics in consultation with the Concentration Advisor. Concentrators are urged to acquire some familiarity with the structure of a language outside the usual European families: e.g. Chinese, Hebrew, Sanskrit, Turkish. Joint programs with modern languages, applied mathematics, or anthropology can be arranged in conference with the concentration advisors concerned. See also Psycholinguistics concentration.

STANDARD PSYCHOLINGUISTICS PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

The Psycholinguistics program offers an interdisciplinary concentration relating language and behavior. The aim of the concentration is to apply the theoretical and experimental bases of both Linguistics and Psychology to a study of the psychological and neurological processes involved in the use of language and speech. Concentration programs may be designed which focus on areas of interest within the discipline. For example, students may develop programs emphasizing the acquisition and development of language in children; human linguistic processing; human memory, semantics and information processing.

Prerequisites: Psychology 1, 9, and Linguistics 22.

Requirements: A total of eight courses including 1) 3 background courses in Linguistics and Psychology, with at least one course from Psychology and one from Linguistics (Linguistics 119, 121, 123, 131; Psychology 27, 81, 102, 119); 2) Linguistics 141 and Psychology 152; and 3) 3 electives (Linguistics 45, 124, 132, 142, 143, 165, 170, 172, 251, 252, 253; Psychology 48, 180, 181, 182, 183, 185, 233; Anthropology 160, 260, 261).

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*

Ms. BLUMSTEIN.

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*

Ms. JACOBSON.

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.

52. *Language and Mind*

Mr. DRESHER.

The revolutionary linguistic theory of Noam Chomsky has provoked an ongoing interdisciplinary debate concerning the nature of language and mind. This course will review the impact of Chomsky's ideas on linguistics, philosophy, psychology, and artificial intelligence. Topics will include linguistics as a cognitive science, innate ideas vs. learned behavior, the theory of universal grammar, and computer simulation of human linguistic abilities.

II. FOR UNDERGRADUATES AND GRADUATES

111. *Introduction to Grammatical Analysis*

Mr. MESKILL.

Morphological segmentation and classification; derivational and inflectional processes; phrase structure and constituent analysis; relationship of structures and transformations. Prerequisite for undergraduates: 22.

119. *Semantics*

Mr. DRESHER.

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.

121. *Phonology I*

Mr. MESKILL.

Introduction to articulatory phonetics, with laboratory practice in phonetic transcription; basic phonemics, including the nature of the phonemic principle and problems in phonemic analysis; brief attention to acoustic phonetics and distinctive feature theory.

122. *Phonology II*

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: 121.

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 vocal tract output, and experimental techniques involving the perception of synthetic and natural speech. Prerequisite: 123.
126. *Generative Phonology* Mr. DRESHER.
The theory and practice of generative phonology. Topics will 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 permission.
131. *Introduction to Syntax* Ms. JACOBSON.
The basic principles of syntactic theory and argumentation. Prerequisite: 22, or 191, or written permission.
132. *Writing and Testing Grammars* The STAFF.
A study of generative-transformational grammars with the aid of a computer program developed by Joyce Friedman. Students will write a partial grammar of English (or other language of their choice) which will be automatically tested by computer-produced sentences and structural descriptions of such sentences. Review of basic principles of transformational grammar. No computer programming required. Prerequisite: 131, 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.
141. *Psycholinguistics: Introduction* Ms. BLUMSTEIN.
Survey of approaches to psycholinguistics. Topics include animal and human communication, biological and neurological prerequisites for language, speech perception, aphasia, child language, and language and cognition. Psychological evidence for theoretical linguistic assumptions are considered. Prerequisite: 22, or Psychology 1.
142. *Psycholinguistics: Syntactic and Semantic Processing* Ms. BLUMSTEIN.
Experimental bases for psycholinguistics research focusing on syntactic and semantic processing in normal adults. Review of current literature; introduction to experimental design and analysis. A class experiment and individual experiment will be conducted. Prerequisite: 141.
143. *Child Language Acquisition* Ms. BARON.
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, Psychology 81, or written permission.
144. *Topics in Child Language Acquisition* Ms. BARON.
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.

151, 152. *Elementary Sanskrit*

Mr. PINGREE.

Sanskrit grammar, reading, and composition; readings in classical Sanskrit literature.

153, 154. *Advanced Sanskrit*

Mr. PINGREE.

Readings in Classical Sanskrit. Prerequisite: one or more years of the study of Sanskrit at the college level.

161. *Introduction to Comparative Indo-European Linguistics*

The STAFF.

Introduction to the comparative method of linguistic reconstruction and to the history of the Indo-European family of languages. Knowledge of a modern European language other than English and some knowledge of Latin or Greek are desirable. Prerequisite: Linguistics 22.

165. *Language Change*

Mr. DRESHER.

Introduction to the study of historical linguistics. Topics include: Types of language change; linguistic reconstruction; the comparative method and wave theory; the status of 'sound laws'; the causes of change. Will focus on the relation between historical linguistics and linguistic theory from the models of the neogrammarians through structuralism to generative grammar.

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. *Mathematical and Computational Linguistics*

The STAFF.

Automata and formal language theory as related to natural language. Statistical properties of language. Automatic natural language processing systems. No computer programming necessary. Prerequisite: 170 or written permission.

181. *Linguistics for Foreign Language Teachers*

Mr. RYAN.

A. Foreign Languages. An introduction to the following topics as they relate to second language learning: theories of language; theories of language acquisition; linguistic analysis, the sound, grammar and lexical systems; contrastive analysis of English and the languages of interest to the students; personal and social attitudes towards particular languages; current language teaching practices.

B. English as a Foreign Language. An introduction to the following topics as they relate to the learning of English as a second language: theories of language; theories of second language acquisition; linguistic analysis, the sound, grammar and lexical systems of English; contrastive analysis of English and several other languages; personal and social attitudes towards English and U.S. culture; current language teaching practices.

A. and B. cannot both be taken for credit.

185. *Studies in Language Change*

Mr. MCINTOSH.

Shakespeare wrote "Early Modern" English; within fifty years of Shakespeare's death, "Modern" English was all but fully formed. Syntactic and stylistic components of this change will be studied in literary and non-literary texts, and in two translations of the same work into English, one c. 1600, the other c. 1725. Additional topics: relations between linguistic change and social class; changes in English prose style; nominalization; language change in the 1970s. Term papers may deal with texts from the 16th, 17th, 18th, and 20th centuries, or with any good sample of colloquial present-day English. Also see English 288A.

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

211. *Principles of Grammatical Analysis*

Mr. MESKILL.

Practical problems and techniques of grammatical analysis, working with a corpus of text in an unfamiliar language; writing and testing of model grammars. Prerequisites 111 or 131 or written permission.

240. *History of Linguistics*

The STAFF.

History of linguistic theory and practice from Plato to modern times.

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 Structural Linguistics*

The STAFF.

Topics will vary from year to year. Past topics have included animal communication and language, intonation, tense and aspect, modern Turkish structure, universals of language, syntactic theory, phonological theory.

253. *Seminars in Psycholinguistics*

Ms. BLUMSTEIN.

The implications of psycholinguistic research for linguistic theory. Topics will alternate yearly between 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 Mrs. 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 Mrs. 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 Mrs. LEE.

Reading of annotated teaching materials. Three reading sessions weekly. Prerequisite: Chinese 1-2.

7-8. *Introduction to Literary Chinese*

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*

Mrs. 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.

Master of Arts in Teaching

COMMITTEE FOR THE PROGRAM

ERNEST FRERICHS, PH.D., *Dean of the Graduate School; Professor of Religious Studies*
 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*

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 and for teachers in service who have demonstrated teaching ability and wish to increase this competence through the completion of a master's program in a liberal arts institution. 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. For the teacher in service, these might comprise a major portion of the program. 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 normally fulfills state certification requirements.

The pre-service candidate, in addition, will be expected to demonstrate successfully ability to teach in a supervised practice teaching situation arranged in the schools by the Education Department. Candidates who have had successful teaching experience may not be required to do practice teaching; in lieu of this they may elect courses in their field of academic interest.

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. Teachers in service who have demonstrated exceptional teaching ability and who wish to increase this competence through the completion of a master's program in a university are invited to apply.

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; if the applicant is a teacher in service, one letter should be from the present administrator or supervisor.

Applications for admission should be filed as early as possible, preferably by February 1. 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 department of the major.

Supervised practice teaching is required for pre-service candidates.

The course of study for the degree varies within broad limits according to the previous background and interests of the individual student. The program of a graduate of a liberal arts college who has had no courses in the field of education will differ from that of a graduate who is already fully licensed to teach. Each student will be encouraged to make maximum use of the resources of the entire University. There is no language requirement, although language study will be encouraged where it is pertinent.

Experienced teachers pursue a program of study with heavy emphasis on strengthening their subject matter backgrounds in appropriate academic fields. Education courses generally make up a minor part of their program. Candidates are not expected to engage in practice teaching. Experienced teachers normally complete degree requirements in one academic year of full-time study. Those who study part-time must complete degree requirements within a period of eight years.

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, BANCHOFF, BAUM, BROWDER (Chairman), FEDERER, FLEMING, FULTON², B. HARRIS, LUBIN, MACPHERSON¹, NOOMIZU², ROSEN³, STEWART, STRAUSS, WERMER; Associate Professors COLE, J. HARRIS, KALLIN, LANDMAN; Assistant Professors ANDERSON, MCCRORY, TAMARKIN; Assistant Professors JOCHNOWITZ, HOFFSTEIN, and MARSHALL.

Students are encouraged to take advanced courses whenever their preparation qualifies them to do so.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS 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 Mathematics 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, 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 58.

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.

¹On leave, Semester II, 1979-80.

²On leave, Semester I, 1979-80.

³On leave, 1979-80.

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 TOEFL at the approved level (See General Regulations).

The mathematical library is part of the Divisional Library of Physical Sciences. 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 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.

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, 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: Mathematics 9 or the equivalent.

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, line 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 126 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, 19, 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*

Theory of 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 Partial 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: Mathematics 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: Mathematics 18, 29 or 35.

127. *Topics in Functional Analysis*

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: Mathematics 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: Mathematics 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. *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.

223, 224. *Theory of Measure and Integration*

Variable content, chosen from such topics as: Hausdorff measure, Haar measure, normal and integral currents, Plateau's problem, curvature measures, probability theory, ergodic theory. Prerequisite: Mathematics 221, 222.

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.

227, 228. *Functional Analysis*

Variable content, topics such as Hilbert and Banach Spaces, spectral theory, locally convex spaces, distribution theory, Banach algebras, harmonic analysis, applications to differential equations. Prerequisite: Mathematics 221, 222.

229, 230. *Advanced Topics in Complex Analysis*

Special topics drawn from such areas as Riemann surfaces, several complex variables, complex manifolds, function algebras. Prerequisite: Mathematics 225, 226.

237, 238. *Partial Differential Equations* (Applied Mathematics 223, 224)

Elliptic boundary problems and the Cauchy problem plus topics such as: the Malgrange-Ehrenpreis-Hörmander 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.

243, 244. *Advanced Algebraic Topology*

Homotopy theory, homological algebra, cohomology theories, cohomology operations, topology of Lie groups, and other topics of current research interest. Prerequisite: Mathematics 241, 242.

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.

253, 254. *Advanced Algebra*

Variable content, usually drawn from topics such as algebraic number theory, class field theory, homology of groups, commutative algebra, algebraic K-theory, etc. Prerequisite: Mathematics 251, 252.

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.

281, 282. *Seminar*

The STAFF.

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 63.

Music

Professors DINNEEN, LAURENT, R. NELSON; Associate Professors FISCHER, JOSEPHSON (Chairman), P. NELSON, SHAPIRO, WALDBAUER; Assistant Professors CHRISTIE, ERMEY, KOETTING, TOTH.

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 PROGRAMS

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

3 *Prerequisite:* Music 13, 14 is a prerequisite to concentration; it must be completed by the end of the sophomore year. Program: Two courses from the series 193, 194, 195, 196, one course in ethnomusicology, one course in counterpoint, and four elective courses (excluding Music 1-2, 11, 12, 13, 14). Membership in one of the recognized choral groups, orchestra, or wind ensemble is recommended. Concentration in ethnomusicology requires ten courses including Music 5, 6, two courses from the series 193, 194, 195, 196; on consultation with the advisor, up to four courses in anthropology may be credited toward this concentration.

Honors. There are three co-equal Honors Programs in Music: (1) History (Western and non-Western), (2) Theory or Composition, and (3) Performance. A topic leading to a thesis in one of these areas is selected in consultation with the Honors advisor of the department.

GRADUATE PROGRAMS

MASTER OF ARTS. The program of study leading to this degree will be either in composition, musicology, 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 and also in keyboard technique, where a basic competence (including the ability to read at sight) will be required.

DOCTOR OF PHILOSOPHY. In Ethnomusicology only. Prerequisites for admission: Candidates for the Ph.D. in Music will be admitted by examination 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, and in keyboard technique, where a basic competence (including the ability to read at sight) will be required.

I. PRIMARILY FOR UNDERGRADUATES

1-2. *Introduction to Western Music*

Messrs. FISCHER AND LAURENT.

An historical survey from plainsong to the present time. Assigned listening as well as instruction in music notation and score-reading will be given, in order to provide the student with the skills required for basic literacy in music. Music 2 may be taken without Music 1 only with written permission. One hour listening session per week.

5, 6. *World Music Cultures*

Messrs. KOETTING AND TOTH.

An introduction to the major tribal and professional music idioms. Semester I covers Oceania, Africa, and the Indians of the Americas. Semester II covers the art musics of Asia including China, Japan, India and Indonesia. Each area is approached via four categories: 1) Historical, social and cultural context; 2) Musical instruments; 3) Theoretical systems, form and aesthetics; 4) Major representative musical and theatrical genres. Either semester may be taken independently. No prerequisites.

7. *Folk Music of Europe and the Americas*

Mr. KOETTING.

An introduction to folk idioms in music. Covers Eastern and Western Europe, British Isles, North America and Latin America. Includes balladry and oral epic, dance music, spirituals and blues. The music is studied in its historical, social, and cultural context; music theory, aesthetics, and musical instruments are considered where relevant. No prerequisites.

11. *The Fundamentals of Music*

Messrs. DINNEEN AND SHAPIRO.

For students with no prior theory or keyboard training. An introduction to music through elementary keyboard techniques including study of rhythm, melody, harmony, texture, tonality, timbre, and form. Two piano laboratory sessions per week plus a one and a half hour seminar. A minimum of five additional practice hours per week are required. Limited to 24 students by written permission.

12. *The Theory of Music*

Messrs. R. NELSON AND SHAPIRO.

Studies in elementary harmony, counterpoint, form, analysis, and composition, with written and keyboard training. This is a one-semester course for non-music concentrators. Written permission required.

13. *Elementary Harmony*

Messrs. P. NELSON, R. NELSON, AND ERMEY.

Written permission required.

14. *Intermediate Harmony*

Messrs. P. NELSON, R. NELSON, AND ERMEY.

A continuation of harmonic studies introduced in Music 13. Prerequisite: Music 13 or written permission.

15. *Advanced Harmony*

Mr. P. NELSON.

Written permission required. Prerequisite: 13, 14.

30. *Major Masters of Music*

Messrs. JOSEPHSON AND WALDBAUER.

The study of life and work of a major composer. Tutorials in music notation and score-reading are offered to students who require 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

music notation and score-reading are offered to students who require them. Two hour listening session per week.

33. *The Symphony*

Mr. JOSEPHSON.

A study of the symphony from Haydn to Mahler. Tutorials in music notation and score-reading will be offered to students who require them. Two hour listening session per week.

35. *History and Development of the Wind Instruments*

Mr. CHRISTIE.

A study of the evolution of wind instruments from the earliest forms to the present, with emphasis on the correlation between the physical, mechanical, and acoustical 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 as Dramatic Entity*

Mr. LAURENT.

An inquiry into the concept of opera as a drama based on critical studies of operas from the seventeenth century to the present. Includes consideration of the diametric attitudes concerning opera, collateral study of related libretti and dramas, and reading dealing with the aesthetic principles of the Baroque-Rococo, Romantic, and Contemporary periods.

38. *Solo Song*

Mr. LAURENT.

A study of the music for the solo voice. A brief survey of medieval, renaissance and baroque developments and a more extended treatment of the keyboard-accompanied song of the classic, romantic and modern repertoires, with particular emphasis on the German Lied. Individual projects may include historical/analysis papers, preparation of songs for performance, critical comparison of different recorded performances. Written permission required.

51-52. *Instruction in Vocal or Instrumental Music; or Instrumental Ensemble Music*¹

The STAFF.

Half-course each semester. For students who wish to continue their study of voice or instrument (Western or non-Western) or to study by means of performance the literature of chamber music. Written permission required.

53-54. *Instruction in Vocal or Instrumental Music; or Instrumental Ensemble Music*¹

The STAFF.

Half-course each semester.

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.

114. *Seminar in Composition*

Mr. R. NELSON.

115. *Seminar in Electronic Music*

Mr. SHAPIRO.

Primarily for students concentrating in theory and composition. The seminars will deal with theoretical and practical problems in acoustics and the composition and performance of music utilizing electronic media. Written permission required.

116. *Seminar in Electronic Music Composition*

Mr. SHAPIRO.

Prerequisite: Music 115 or written permission required.

¹Permanent credit for concentrators in Music only when Music 13, 14 is completed or proficiency in Theory is established by passing an examination given by the Department. For non-concentrators permanent credit only when Music 11, 12 or 13, 14 is completed or proficiency established by passing an examination given by the Department.

117. *Tonal Counterpoint*

Mr. P. NELSON.

The technique of imitation and canon; fugal writing in three or four parts; writing in the style of the choral prelude; analysis of fugues in the Well Tempered Clavier of Bach. Written permission required.

118. *The Technique of Orchestration*

Mr. R. NELSON.

Introduction to standard instrumentation; exercises in basic principles; analysis of styles of scoring. Written permission required.

119. *Form and Analysis*

Mr. WALDBAUER.

An examination of formal principles that have developed in western music since ca. 1300, and of analytic methods, including those of Schenker.

122. *Twentieth Century Techniques*

Mr. P. NELSON.

A course designed to develop the understanding necessary to recognize and employ the major technical innovations of this century in analysis and composition. Written permission required.

130. *Major Masters and Repertories of Music*

Messrs. DINNEEN, LAURENT, AND WALDBAUER.

The advanced study of a selected composer or genre of western music. Composers recently studied: Bach, Bartok, Verdi, Wagner.

135. *Introduction to Ethnomusicology*

Mr. TOTH.

History and Philosophy of the discipline; materials and methods of research; musical instruments and their classification; tuning systems, scales and modes; and comparative aesthetics. Written permission required.

136. *Ethnomusicology Field Methods*

Mr. KOETTING.

Problems and techniques of the ethnomusicological field and laboratory work; equipment and recording techniques; measurements, transcription and analysis. Each student will prepare and carry out a guided field work project. Written permission required.

139. *Music of Indonesia*

Mr. TOTH.

A study of the major instrumental and theatrical genres of Java and Bali, including Javanese and Balinese gamelans, Wayang shadow plays, ritual and trance dances. Emphasis on cultural and religious functions of music, music-theoretical systems, form and style. Written permission required.

140. *Organology and Musical Acoustics*

The STAFF.

Physical and physiological principles of music, tuning systems, and musical instruments around the world; instrument classification systems in theory and practice; musical instruments in ethnography. Written permission required.

141. *Music of India*

Mr. TOTH.

An introduction to music of North India (Hindustani) and South India (Karnatic); concepts of melody, rhythm, form; genres and styles; instruments. The roles, historic and contemporary, of musicians and types of music, and the interrelationship of these with Indian thought and life. Written permission required.

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.

155-156. *Advanced Instruction in Vocal or Instrumental Music*¹ (See 51-52)

The STAFF.

157-158. *Advanced Instruction in Vocal or Instrumental Music* (second year)¹ (See 53-54)

The STAFF.

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.

193. *Music in the Middle Ages and the Renaissance*

MESSRS. JOSEPHSON AND WALDBAUER.

The history of western music to the end of the sixteenth century. Prerequisite: Music 13, 14 or written permission.

194. *Music in the Baroque Era*

MESSRS. DINNEEN AND WALDBAUER.

The history of western music from the end of the sixteenth century through Bach and Handel. Prerequisite: Music 13, 14 or written permission.

195. *Music in the Classic-Romantic Era*

MESSRS. JOSEPHSON AND WALDBAUER.

A study of the principal categories of musical composition from 1750 to 1900. Prerequisite: Music 13, 14 or written permission.

196. *Music in the Twentieth Century*

MESSRS. DINNEEN AND WALDBAUER.

The most influential developments of contemporary music traced through the works of Debussy, Stravinsky, Bartók, Schönberg and his school, and others. Written permission required.

198. *Junior-Senior Seminar*

MR. JOSEPHSON.

The historical, analytic, and source-critical study of selected masterpieces, and a broad survey of the major genres of western music. Prerequisite: one counterpoint and one ethnomusicology course, or written permission. Primarily for concentrators.

III. PRIMARILY FOR GRADUATES

215-216. *Advanced Composition*

217-218. *Advanced Orchestration*

A study of the technical procedures and the aesthetic aims of the late 19th and 20th century composers in combining various instruments or voices and instruments in both chamber and orchestral works, as well as practical written exercises, both long and short, to be executed by the student. A basic knowledge of instrumentation and orchestration (Music 118 or its equivalent) plus score-reading ability is prerequisite.

219-220. *Analysis of 20th Century Music*

Detailed formal and technical analysis of selected representative works composed after 1900 and up to the present, including compositions in diverse genres.

235, 236. *Seminar in Ethnomusicology*

A one or two semester study in depth, of the cultural, aesthetic, and technical aspects of a single topic in ethnomusicology. May be repeated for credit. Written permission required.

267-268. *Advanced Analysis*

The use of various analytical methods in connection with music from c. 1400 to 1940, with particular emphasis on the analytical techniques developed by Schenker.

289. *Special Topics*

Topics or areas not dealt with or encompassed by the titled courses here listed.

¹Permanent credit for concentrators in Music only when Music 13, 14 is completed or proficiency in Theory is established by passing an examination given by the Department. For non-concentrators permanent credit only when Music 11, 12 or 13, 14 is completed or proficiency established by passing an examination given by the Department.

291, 292. *Individual Work in Research or Composition*

The Brown University Orchestra

Mr. FISCHER, Conductor.

Numbering some eighty players, the orchestra gives four to six concerts each season, including one featuring an outstanding student soloist. Membership is open to all students, faculty, administrative officers, and qualified amateurs from the community. No course credit.

The Brown University Band; The Brown University Wind Ensemble

Mr. CHRISTIE, Conductor.

The Brown University Band performs at major athletic events throughout the academic year. Auditions are held for the wind ensemble (numbering some 40 players) to prepare the modern band and wind ensemble repertoire. The group presents four to six concerts. In connection with both the orchestra and the wind ensemble, a selected group of brasses is auditioned to form a brass choir. This group rehearses regularly and performs six to eight times each season. The repertoire is drawn from the Baroque brass ensemble music and the modern school. No course credit.

The Brown University Chorus

Mr. ERMEY, Director of Choral Activities.

The Brown University Chorus rehearses four hours per week. The Chamber-Singers, drawn from the membership of the Chorus, performs with the Chorus as well as by itself. Membership in the Chorus is open to graduate students as well as undergraduates. Inquiries should be made to Mr. Ermey, Director of Choral Activities. No course credit.

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. Rehearsals at 48 College Street, time to be arranged. For more information contact ethnomusicology staff.

The Early Music Group at Brown

Mr. JOSEPHSON, Director.

The Early Music Group performs two concerts each year. Membership in the instrumental group is open to all qualified musicians. Singers for the choir are chosen from among members of the Brown Chorus. No course credit.

Neural Sciences

The program in Neural Sciences is administered by an executive committee of the Center for Neural Sciences composed of Professor LEON N. COOPER (Co-director) (Physics); Professor FORD F. EBNER (Co-director) (Biology and Medicine); Professor CHARLES ELBAUM (Physics); Professor WALTER FREIBERGER (Applied Mathematics); Professor MITCHELL GLICKSTEIN (Psychology); Professor ULF GRENANDER (Applied Mathematics); Professor HENRY KUCERA (Slavic Languages); Professor JAMES T. McELWAIN (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 behaviour. The research interests of affiliated faculty include both theoretical and experimental approaches to understanding the function of the nervous system.

UNDERGRADUATE PROGRAMS

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. This 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 sciences courses for the ScB. 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 and 2, NS 100 and Biomed 110. One seminar course and electives for focus complete the concentration. Honors projects and independent studies are arranged with individual faculty members.

GRADUATE PROGRAM

Graduate programs in the Neural Sciences reside within the participating departments, and the requirements are those of the individual department. The Center encourages students whose interests cross over traditional departmental borders, and participates in arranging interdisciplinary graduate programs.

I. PRIMARILY FOR UNDERGRADUATES

1. *Nervous System* (Biomed 91)

Mr. GLICKSTEIN.

Designed as a systematic introduction to the structure and function of the central nervous system. 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, and the diversity of nervous systems in vertebrate and invertebrate animals.

2. *The Nervous System: Specific Topics* (Biomed 92)

Mr. GLICKSTEIN.

Designed as a more specific treatment of selected topics related to the nervous system. Among these will be: 1) control of food intake, body temperature, and respiration; 2) visual acuity; 3) control of body movements and eye movements; 4) the chemistry of mood; 5) the control of behavior by invertebrate nervous systems; and 6) models of neural function.

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: NS 1 and 2, Biology 11-12, Physics 3-4, Chemistry 3, 11 and written permission of the instructor.

101. *Understanding the Brain* (University 129)

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)

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.

Philosophy

Professors CHISHOLM, LADD, LENZ, QUINN (Chairman), SCHMITT, SOSA, TOMAS; Associate Professors ACKERMAN, BROCK, LUSCHEI, VAN CLEVE; Assistant Professors SUSMAN-BOWEN; Postdoctoral Fellow, HEINSEN.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS 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: 125, 168, 172, 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 courses must be at the advanced level (i.e. 155 or above), and one must be done above 190. Advisor: Mr. VAN CLEVE.

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: 142, 143, 160, 168, 180, 182A, 182B, 197; 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. LADD.

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, 178, 179, 181, 183, 184, 185, 186, 187, 192, 193, 194, 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 100, Biology 144, Chemistry 114, 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. SUSMAN-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.

2. *Mind and Matter*

Mr. TOMAS.

An introduction to philosophy through a study of conceptions of the human mind and its relation to man's material environment. Topics for discussion will be chosen from the following: mind, pure thought, and intelligence; practical thinking, the will and action; conscious and unconscious mental activity; sensation and learning; extrasensory perception; the "mind-body problems," and dualism and behaviorism in modern thought. Emphasis will be given to the utilization of philosophical and logical tools in studying materials in some of these problem areas.

3. *Scepticism 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 opposing 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*

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*

Mr. LADD.

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 psychoanalysis 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. QUINN.

This 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 of 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*

Mr. HEINSEN.

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*

Mr. VAN CLEVE.

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.

11. *Classics of Philosophy*

Mr. SOSA.

An introduction to philosophy through classic works. Parts of some such works will be selected: among these may be works of Aristotle, Augustine, Aquinas, Locke and Marx. Others will be read in their entirety: among these may be several Platonic dialogues, Descartes's *Meditations*, Hume's *Dialogues on Natural Religion*, Kant's *Groundwork of the Metaphysics of Morals*, and Mill's *On Liberty* and *Utilitarianism*.

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

125. *History of Philosophy in America*

Mr. TOMAS.

A survey of the development of philosophy in America from the colonial period to the present.

141. *Philosophical Analysis of Current and Classical Literature*

Mr. TOMAS.

Application of the analytical and evaluative techniques of philosophy to the content of "philosophical" literary works. Reading and philosophical criticism of literature containing ideas significant for ethics, metaphysics, social policy, religion, art science, and other major human interests. Offered in alternate years.

142. *Reason and Revolution*

Philosophical perspectives on the relation between theory and practice.

143. *Moral Problems*

Mr. BROCK.

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 (Feuerbach, 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 (Dumèry). 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.

153. *Philosophy of Art*

Mr. TOMAS.

The nature of art and beauty, their relations, and their functions in society, esthetic contemplation, the esthetic feelings, and the esthetic object. Standards of criticism. Offered in alternate years.

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. *Social Ethics*

Mr. BROCK.

A critical examination of the main types of ethical theory, especially as they relate to the ethical foundations of social institutions like the family, the state, and international order and law. No prerequisites. Not open to freshmen except with the consent of the instructor.

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 the 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. QUINN.

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 semantical paradoxes, logical reconstruction of arithmetic, and glimpses of metatheory. Sequel to Philosophy 55 which is a prerequisite.

164. *Theoretical Ethics*

Mr. LADD.

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.

Basic questions of ontology; the distinction between abstract and concrete objects; change and becoming; identity; necessity; agency.

168. *Freedom and Community in Rousseau and Kant*

Mr. LADD.

A critical examination and comparison of the principal ethical and political ideas in the philosophies of Rousseau and Kant. The approach will be analytical rather than historical. Discussion will focus on the themes of freedom and community as developed by two outstanding non-utilitarian philosophers out of their conceptions of man, society, and culture. Readings will include contemporary discussions of the same topics. Offered in alternate years. Prerequisite: one course in philosophy, preferably 158 or 181, or written permission.

169. *Existentialist Ethics*

A critical examination of existentialism as an ethical theory. Readings from classical existentialists (Kierkegaard, Nietzsche) and twentieth-century phenomenological existentialists (Heidegger, Sartre, Merleau-Ponty). Prerequisite: one semester of philosophy.

170. *Survey of Medieval Philosophy*

A careful reading of some prominent philosophical texts in the Christian medieval tradition, concentrating for the most part on central issues in metaphysics and epistemology, e.g. the existence and nature of God, the relation between faith and reason, the status of universals, the nature of material substances and the possibility of empirical knowledge. The main figures to be treated will be Augustine, Anselm, Abelard, Bonaventure, Aquinas, Scotus and Ockham.

172. *The Philosophy of Spinoza*

Mr. LADD.

The *Ethics* of Spinoza will be approached as a systematic attempt to reconcile ethics and religion with the outlook of modern science. His philosophy will be critically examined and evaluated in the light of recent developments in the philosophy of language and the philosophy of mind as exemplified, for example, in the writings of Wittgenstein, Fromm, Hampshire, and others. Topics to be discussed will include: the nature and purpose of

metaphysics, the identity of mind and body, free will and determinism, the distinction between reasons and causes, the ethics of self-fulfillment and of rational understanding, and mysticism and science. Offered in alternate years. Prerequisite: one course in philosophy or written permission.

175. *Theory of Knowledge*

Mr. SOSA.

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.

178. *Philosophy of Biology*

Mr. QUINN.

An introduction to some philosophical problems generated by contemporary biological thought. Topics to be discussed include the following: Mechanistic and organismic biology, the problem of the reduction of biology to chemistry and physics; Purpose in nature, the problem of functional and teleological explanations in biology; Evolutionary indeterminism, the problem of prediction in the synthetic theory of evolution; Nominalism and realism in taxonomy, the problem of the species concept in an evolutionary context; Metaphysical aspects of evolution, the problem of "progress" in evolution; Evolutionary ethics, the problem of the relation of biological facts to human values. Offered every third year as part of a cycle which includes 179 (Philosophy of Social Science) and 161 (Philosophy of Physics). Prerequisite: general background knowledge in biology or philosophy.

179. *Philosophy of Social Science*

Mr. QUINN.

An introduction to some philosophical problems relating to the social sciences. Among the topics to be discussed are the following: varieties of explanation in the social sciences; the role of structural-functional theories in the social sciences; social facts, social laws and reduction; freedom, determinism and predictability; behavior and action as explanatory categories; value-free science and ideology; and social activity as rule-governed behavior. Lectures, discussions and papers are the proposed teaching methods. There is no formal prerequisite, but some general background knowledge in a social science, history or philosophy is recommended. Offered every third year as part of a cycle which includes 161 (Philosophy of Physics) and 178 (Philosophy of Biology).

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 Luxembourgh 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. *Philosophical Logic*

Mr. SUSMAN-BOWEN.

Logical study of basic philosophical concepts such as necessity, knowledge, and obligation. An examination of the notions that enable us to apply logic in the assessment of our thought, such as existence, truth, falsity, name, property, and proposition. Prerequisite: Philosophy 55, 163, or consent of the instructor.

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. SUSMAN-BOWEN.

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.

189. *Hegel's Logic*

Mr. SUSMAN-BOWEN.

Reading and discussion of Hegel's *Science of Logic*, a major work which has been a crucial influence on many subsequent currents of thought. Evaluation of Hegel's claim to have developed a dialectical logic which transcends such distinctions as subjective/objective, logical idea/nature, and even being/nonbeing. Prerequisite: one course in philosophy.

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.

192. *Topics in Mathematical Logic*

Mr. SUSMAN-BOWEN.

Turing machines; undecidable sets of integers; the Friedberg theorem; hyperarithmetic hierarchies. Offered every third year. Prerequisite: Mathematics I, Philosophy 163, or consent of the instructor.

193. *Introduction to Recursive Function Theory* Mr. SUSMAN-BOWEN.
This course will include either elementary model theory or hierarchy theory. The topics to be discussed in model theory will include elementary results on quantifiers, the method of ultraproducts, automorphisms of models, categoricity in power, etc. The topics in hierarchy theory will include arithmetic and hyperarithmetic, analytic, ramified analytic, and constructible hierarchies. Offered every third year. Prerequisite: permission of the instructor.
194. *Introduction to Set Theory* Mr. SUSMAN-BOWEN.
Iterative models of set theory; consistency results of Gödel; independence results of Cohen. Offered every third year. Prerequisite: Mathematics 1, Philosophy 163, or consent of the instructor.
196. *Undergraduate Seminar in History of Philosophy* Mr. LENZ.
Topic for 1979-80: British Empiricism and its Twentieth Century Counterparts.
197. *Undergraduate Seminar in Value Theory*
198. *Undergraduate Seminar in Metaphysics and Epistemology* Mr. SOSA.
Topic for 1979-80: Universals.

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 investigation 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 1979-1980: The Concept of Empirical Evidence.
204. *Seminar* Mr. VAN CLEVE.
Topic for 1979-1980: Personal Identity.
205. *Seminar* Mr. SOSA.
Topic for 1979-1980: Experience, Perception and Thought.
206. *Seminar* Mr. BROCK.
Topic for 1979-1980: Absolutist Moral Theories.
207. *Seminar* Mr. TOMAS.
Topic for 1979-1980: Art, Expression and Symbolism.
209. *Seminar* Mr. LENZ.
Topic for 1979-1980: Ethical Theories: Their Logic and Their Concept of the Person.
210. *Seminar* Mr. LUSCHEI.
Topic for 1979-1980: Logic and Ontology.
211. *Seminar* Mr. CHISHOLM.
Topic for 1979-1980: Abstract Objects.
212. *Seminar* Mr. QUINN.
Topic for 1979-1980: Chance, Cause and Reason.
216. *Seminar* Ms. ACKERMAN.
Topic for 1979-1980: Reference and Propositional Attitudes.
217. *Seminar* Mr. SUSMAN-BOWEN.
Topic for 1979-1980: Combinatory Logic.

Physics

Professors BAIRD, BEYER, BRAY, COOPER, ELBAUM, ESTRUP, FALLIEROS, FARNSWORTH¹, FELDMAN, FRIED, GERRITSEN, GURALNIK, HELLER, HOUGHTON, KANG², KOLSKY, KOSTERLITZ³, LANOU, LEVIN³, LINDSAY¹, MARIS, MASSIMO, MAXSON, PECK, QUINN, SEIDEL, SHAPIRO, STILES (Chairman), TAUC, WEINER, WESTERVELT, WIDGOFF (Executive Officer), WILLIAMS¹; Visiting Professor FRIEDMAN; Adjunct Visiting Professors MORSE, PEASLEE; Visiting Professor (Research) GUERIN; Associate Professors CUTTS, TAN, YING; Visiting Associate Professor IE; Assistant Professors JEVICKI, PELCOVITS³, RUDNICKA; Assistant Professors (Research) DULUDE, PETERSEN; Research Associates BERKCAN, BLOSS, BRICK, KENWAY, LAU, LI, RIDNER, SUZUKI, WOO; 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 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.

Interdepartmental Programs See also the interdepartmental programs in Mathematics and Physics, page 59.

STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF SCIENCE DEGREE.

Physics: Prerequisites: Physics 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.

¹Emeritus

²On leave, Semester 1, 1979-1980.

³On leave, 1979-1980.

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 11, 12.

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 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 25, 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 205 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 in 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.

3, 4. *Fundamentals of Physics*

Basic course in physics including mechanics, heat, electricity and magnetism, light and optics, and modern physics. For concentrators in Biology, Chemistry, Geological Sciences, Biological and Medical Sciences, and other fields requiring a strong foundation in physics. Lectures, conferences, and laboratory. Six hours of attendance. Corequisites: Mathematics 9, 10 or written permission.

5, 6. *Introduction to Physics*

Basic course in physics for those who intend to concentrate in that field. 5: a rigorous treatment of classical mechanics through oscillations and gravitation; 6: waves, relativity, and an introduction to quantum mechanics. Electricity and magnetism are covered in the concentrator's third semester, in Physics 47.

11, 12. *Physics: Concepts and Applications*

Designed primarily for students interested in the teaching of science at the high-school level. The course is an introduction to basic physics including mechanics, heat, electricity and magnetism, light and optics, and modern physics. Laboratory work is provided. Emphasis will be placed on the unity of the physical and biological sciences, and on the relation of basic physical principles to modern technology. There will be periodic sessions in which students work directly with local high schools using materials learned and developed in class. Corequisites: Mathematics 9, 10, or written permission. This course satisfies all the requirements satisfied by Physics 3, 4.

21, 22. *Beginning Astronomy*

For the student who has had 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 or 6, or written permission.

45. *Topics in Contemporary Physics*

Sequel to Physics 3, 4 for concentrators in Biological and Medical Sciences, Chemistry, or other fields in which a further development of modern physics is desirable. Topics in atomic and nuclear physics and structure of matter will be treated. Four hours of attendance (three lectures and one conference). Prerequisite: Physics 3, 4 and Mathematics 9, 10 or approved equivalents.

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 or 6 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.

II. FOR UNDERGRADUATES AND GRADUATES

110. *Wave and Quantum Physics*

Development of quantum mechanics and applications drawn from among the following areas of modern physics: solid state, molecular, atomic, nuclear and particle physics. Prerequisites: Physics 47 or 60 and Mathematics 18 or 29, or approved equivalents. Not open to Physics concentrators.

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 optics. 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

201. *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 $\frac{1}{2}$. 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 year.

236. *Group Theory II*

Lie groups and Lie algebras. 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 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 viewed 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 Fluids*

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

Professors BEISER, CORNWELL, GOODMAN, KAU, KIRKPATRICK (University Professor), NORDLINGER¹ (Chairman), PERKINS, STULTZ,¹ Associate Professors COBB, ZUCKERMAN, Assistant Professors BRINTNALL, FELDMAN, HALL, MOST.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

Nine courses in Political Science are required for concentration, including Political Science 1 or Political Science 50 and one departmental research seminar (Political Science 182). At least one departmental offering should be chosen from three of the following four sub-fields of the discipline: political theory, American politics and government, comparative politics, and international relations. With the approval of the Department, a student may select two courses from among certain offerings outside the Department as credit towards a concentration in Political Science. In addition to the nine courses required for concentration, Political Science concentrators are urged to have a minimum of two courses in at least one other Social Science Department. It is recommended that concentrators take Political Science 155 (Introductory Statistics for Political Research) early in their program.

Honors. As above, except that ten courses are required, including the Honors seminar (Political Science 172), ordinarily taken in the student's sixth semester. This may be substituted for the required departmental research seminar. In addition, candidates will prepare an Honors thesis during their senior year, when they may register for Political Science 191, 192. One or both of these courses may be counted among the ten required courses.

MODIFIED STANDARD CONCENTRATION PROGRAMS FOR THE BACHELOR OF ARTS DEGREE.

Ten courses are required for concentration. Six of these shall be in Political Science, including Political Science 1 or Political Science 50 and at least one departmental research seminar (Political Science 182). At least one departmental offering should be chosen from three of the following sub-fields of the discipline: political theory, American politics and government, comparative politics, and international relations. The four remaining courses shall constitute a coherent program of study outside the Department (e.g., in Urban Studies, American Civilization, Economics). All should be beyond the introductory level, and they should complement each other, and the concentration as a whole, in some evident way to be demonstrated in writing by the student. These four courses require the approval of the Department. Concentrators are urged to take Political Science 155 (Introductory Statistics for Political Research) early in their program.

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 on oral examination, and submitted an approved A.M. thesis.

I. PRIMARILY FOR UNDERGRADUATES

1. *The American Political Process*

Messrs. COBB AND BRINTNALL.

Analysis of some of the basic processes of politics focusing on the American experience. Topics will include political socialization; participation; leadership; issue formation; interest group behavior; policymaking; and methods of political analysis.

¹On leave, Semester II, 1979-1980.

10. *Introduction to Public Policy*

Mr. MOST.

Focus on the content, formulation, implementation and impacts of public policies. Both the domestic and foreign policies of the U.S. and other nations will be considered. Topics will include the general decision-making perspective, organizations process and bureaucratic models of policy-making, the roles of executives, legislatures, interest groups and other actors in the policy process, the significance of the setting in which policies are made, and the importance of the international system.

11. *On Philosophy, Art, and the Quest for Secular Salvation*

This course provides a critical introduction to the study of modern political theory and the arts, particularly literature, film, and theatre. The course examines the central issues of praxis in modern political thought and the conceptual and historical relationships between art, philosophy and politics. The instructor defends the "tragic sense" of philosophical and political understanding in the works of Unamuno, Kazantzakis, Camus, and others who challenge the ontological and political assumptions of political theorists of secular salvation from the 17th century to the present. Hobbes, Locke, Condorcet, Saint Simon, Rousseau, Bentham, Mill and Marx.

14. *American Legislative Politics*

Mr. CORNWELL.

The internal politics of Congress and the role that Congress plays in government policymaking. 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 policy-making. State legislatures will also be discussed in comparison with Congress, in connection with each of these headings.

22. *American Urban Politics*

Mr. BRINTNALL.

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.

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.

45. *American Security Policy*

Mr. KIRKPATRICK.

The development of national security policy and the roles of those departments and agencies of government responsible for its implementation, including the Departments of Defense and State, the Central Intelligence and U.S. Information Agencies. Case studies of the operations of security policy in the Cold War.

50. *Foundations of Political Analysis*

Messrs. COBB AND ZUCKERMAN.

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 explanation, the formation and testing 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, Marxism and Weberian analyses of social class, power analysis, and rational economic action.

II. FOR UNDERGRADUATES AND GRADUATES

101. *Liberalism and Bourgeois Existence*

This course examines critically the conceptual, methodological, political and moral assumptions of modern liberalism. Reading assignments, lecture topics and class discussions are organized in five sections which focus on historical periods in the development of liberal political theory and the life world of the bourgeois person.

102. *Power and Democracy in The United States*

Mr. FELDMAN.

Is the United States a democratic polity, and if so, how does the public achieve control of public policy? This course will critically consider a number of competing theories and descriptions of the distribution of political power, such as the basic pluralist-democratic model and the elitist and Marxist critiques.

104. *Political Philosophy*

Study of various issues and problems in political philosophy, focusing each year on different conceptual and substantive topics. Critical analysis of the central conceptions of man and politics that bear upon these topics, particularly those relating to praxis in contemporary public life.

105. *Civil Liberties*

Mr. BEISER.

A study of civil liberties in America in theory and practice. Topics include free speech, church-state relations, fair trials, conscientious objection, and the civil rights movement. Taught as a discussion course. Written permission of the instructor required.

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.

111. *American Political Parties*

Mr. CORNWELL.

This course is designed to acquaint the student with the conduct of party and electoral politics in the United States. The primary focus will be on the role of political parties, and particularly parties as organizational entities, in the American political system. There will be special emphasis on parties as a major means by which the citizen channels his desires and complaints to government, and participates in government.

112. *Citizen Politics: Public Opinion and Mass Political Behavior*

Mr. FELDMAN.

A detailed examination of the attitudes, opinions, and political actions of the American public. Among the topics covered will be: political ideology, the role of social class, voting behavior and the structure of support for political parties, the political impact of the mass media, and the origins of political protests.

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. *The Presidency and Public Policymaking*

Mr. HALL.

Analysis of patterns of policymaking within the American Federal Executive. Topics include: models and theories of decision making, crisis management and incremental change, innovation and obstacles to innovation within bureaucracies, the uses and misuses of formal knowledge in the policymaking process and the characteristic styles of political executives, civil servants, the military and other executive elites.

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. *Federalism and Urban Public Policy*

Mr. BRINTNALL.

Examination of urban public policy formation and implementation in the context of intergovernmental 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.

121. *Latin-American Politics*

Mr. MOST.

An introduction to the Latin American setting, the problems which confront Latin American nations and the policy responses to those difficulties. Traditional concerns of research on Third World modernization and development are linked with a focus on public policy-making problems and prospects in the region.

122. *Political Violence*

Mr. NORDLINGER.

Analysis and explanation of various types of political violence, revolution, civil war, and the military coup, including assessment of different strategies and counter tactics as these affect the outcome of attempted seizures of power. Special attention is devoted to the Russian Revolution, the Chinese Revolution, and Nigeria's military coups and civil war.

123. *The Politics of Terror*

Mr. ZUCKERMAN.

Focus on Nazi Germany, Stalinist Russia, and the Holocaust of European Jewry. Novels and diaries as well as social science sources will be used to depict and understand the behavior of victims and brutalizers in these societies.

125. *Politics of European Democracies*

Mr. ZUCKERMAN.

What are the inter-relationships between social and political structure 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.

127. *Marxism-Leninism and the Soviet State*

Mr. GOODMAN.

A study of the historical and ideological foundations, the organization, and the technique of the Soviet system.

128. *Modernization and Political Development*

Mr. KAU.

A comparative examination of the interplay between socio-economic modernization and political development. Emphasis given to relevant theories from several social science disciplines. Special consideration of selected countries in Asia and Latin America.

129. *Chinese Communist 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.

135. *Modern African Political Systems*

Mr. STULTZ.

Comparative study of the politics of representative African states. Emphasis will be 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.

141. *Contemporary International Politics*

Mr. NORDLINGER.

The course deals with major aspects of international politics since 1945: the origin of the cold war, American, Soviet, and Chinese foreign policy, nuclear deterrence, limited wars, strategies of guerrilla warfare, collective security, and arms control.

142. *Problems for International Policy*

Mr. PERKINS.

Responses to the contrasts of strength and weakness, wealth and poverty, which dominate global politics. Illustrated with regard to particular areas with participation of members of the American Universities Field Staff. Open to seniors concentrating in International Relations and to others 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.

144. *Covert Operations and Russian Foreign Policy*

Mr. KIRKPATRICK.

There are those who contend that the era of the "Cold War" has passed and been replaced by a period of "detente". If "detente" is understood to mean efforts by the United States and the Soviet Union to reduce the tensions and potential sources of conflict and to reach understandings on a broad range of subjects then we are indeed in such a period of history.

145. *The Role of Intelligence in World Politics*

Mr. KIRKPATRICK.

Focuses on the mission and use of the intelligence services of the United States with examination of the intelligence processes, use of intelligence in policy formulation, and controls by Congress and the President. The intelligence services of the Soviet Union, Great Britain, France, Germany and Israel also are examined.

146. *Foreign Relations of the United States*

Mr. PERKINS.

Foreign relations considered historically, in terms of the functioning of the American political system, and with regard to major conditioning factors in the external environment.

147. *The Dynamics of Community Formation*

Mr. COBB.

Consideration of the bases of political community at the tribal, urban, national, and international levels. Topics covered include: origins of war, settlement of disputes, and the likelihood that communities can survive high levels of conflict.

148. *The Politics of U.S. International Economic Relations*

Mr. HALL.

An introduction to the political importance — both foreign and domestic — of U.S. international economic relations. Content includes analysis of the growing importance of economic factors in the conduct of international relations, economic explanations of U.S. foreign policy, the nature of the U.S. policy process on issues affecting international economics, the role of international business in foreign economic relations, and the American government's use of foreign assistance, import and export controls and monetary policy as instruments of international influence.

149. *Introduction to International Conflict*

Mr. MOST.

Examines the most salient aspects of the conflict side of the conflict/cooperation continuum in international relations. The course clarifies concepts related to international conflict, probes the various alternative explanations of violent international hostilities, and considers the means for avoiding or resolving conflicts in the future.

155. *Introductory Statistics for Political Research*

Mr. FELDMAN.

Introduction to basic research methods in empirical political analysis. Examination of questions of research design, data collection techniques, data analysis and statistics, and computer utilization.

172. *Honors Seminar*

MESSRS. NORDLINGER AND MOST.

Required for Honors concentrators in the spring of the junior year. Other students may enroll with the written permission of the instructor.

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 sections 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

The following seminar is open to undergraduates by written permission.

245. *American Use of Military Power*

Mr. HALL.

Comparative historical analysis of American use of military force and threats of force in Asia, Africa, Latin America, the Middle East and Europe since WWII to the present. Subjects include U.S. efforts in deterrence, military assistance, covert operations, and overt intervention. The limits and utility of U.S. force assessed in light of changing political and economic factors. Systematic use made of historical case studies.

246, 247. *The President as Commander-In-Chief: Leadership and Command*

Mr. KIRKPATRICK.

The President's role as Commander-In-Chief, his civilian advisors, and the military commander's impact are analyzed in cases involving both peace and war. Historical studies will be used in evaluating the changing concepts of the Presidential role in the history of the Republic. Semester I: from Washington through Lincoln; Semester II: Andrew Johnson to the present.

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., *Associate Professor of History*

PETER EVANS, PH.D., *Associate 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 Bio-medical Science*

ALDEN SPEARE, JR., PH.D., *Associate Professor of Sociology, Associate Director*

The Population Studies and Training Center is a multidisciplinary unit affiliated 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, which does not have its own degree program, 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 urban studies and ecology, social organization, or an interdisciplinary field, such as economic development, historical demography, or mathematical modelling. 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 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, 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, and the Hewlett Foundation. A small number of post-doctoral fellowships are also available through the Center. Visiting research appointments are also made to allow both young scholars and

established faculty to make use of the Center's facilities and training opportunities at Brown. 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.

The Center maintains a wide range of facilities, sometimes in cooperation with other social science groups, to aid the research and training activities of its program. It also provides liaison with various health, population, and urban research organizations and agencies in the community, nationally, and overseas. At Brown, the Center supports, in cooperation with other programs, the Social Science Data Center, which maintains a set of computational equipment and terminals tied into the University's IBM system 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, research experience, and access to data are also available through the Population Research Laboratory, which has undertaken a number of sample surveys of Rhode Island population. An extensive Data Bank includes a large collection of tapes containing basic socio-demographic data covering both more and less developed nations. The Center also maintains a Demography Library, which has a strong collection of census and vital statistics reports as well as books, monographs, periodicals, and unpublished papers covering all facets of population.

Current research activities of Center faculty encompass a wide range of topics, including, among others, studies of natural and regulated fertility; interrelations among modernization, urbanization, fertility, and migration; migrant adaptation and household change; social mobility and fertility; health status and its effects; morbidity and mortality; nuptiality and divorce; family life cycle; demographic transition; methodological innovations in demographic survey research; mathematical modelling; and population policy formulation and evaluation. As part of the ongoing research and training, the Center sponsors a series of colloquia and pro-seminars which 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

Professor GEORGE MONTEIRO (Chairman); Associate Professor NELSON H. VIEIRA; Visiting Professor MARIO J. RAPOSO; Lecturers ONESIMO T. ALMEIDA and JOAO P. BOTELHO. The Undergraduate Program in Portuguese and Brazilian Studies is advised by a cooperating Committee including the above and the following: Professors ELMER CORNWELL (Political Science), DWIGHT HEATH (Anthropology), EDWIN HONIG (English), ROBERT PADDEN (History), ALBERT VAN NOSTRAND (English); Associate Professors PETER EVANS (Sociology), GEORGE HICKS (Anthropology), LOIS MONTEIRO (Biological and Medical Sciences); Instructor ANANI DZIDZIENYO (Afro-American Studies).

The Center for Portuguese and Brazilian Studies offers three degree programs: (1) A.M. degree in Portuguese Studies and Bilingual Education, (2) A.B. degree in Portuguese and Brazilian Studies (interdisciplinary), and (3) 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, community services and projects, as well as the Brown Bilingual Institute, a pre-service and in-service program offering instruction in bilingual educational philosophy, methodology, linguistics, second languages, and second language teaching. 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.

As an undergraduate contribution to the curriculum, the Center offers a continuing Group Study on "The Portuguese and American Educational Systems: ESL Tutorials for Portuguese Students." Of particular interest is that the students in the first of these Group Studies prepared a sociological study of the Portuguese child in the American educational system at the elementary and secondary levels which led naturally to the project of those in the second of these Group Studies, which was the construction of a manual to be used by ESL tutors. The students in the third Group Study, building on the work of their predecessors, prepared a battery of specific ESL tutorial materials to be used at the elementary and secondary levels. Such sequential and cumulative use of the Group Study concept, producing as it does tangible functional results, is in concert with the applied educational philosophy of 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 PROGRAM

A.M. DEGREE PROGRAM IN PORTUGUESE STUDIES AND BILINGUAL EDUCATION

This interdisciplinary program will offer graduate level study, conducted in Portuguese, 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.

- As partial fulfillment of their requirements for the A.M. degree, candidates will successfully complete in Portuguese the following courses: (a) Philosophy of Bilingual Education, (b) Bilingual Methods and Materials, and (c) Studies in the Bilingual Curriculum.
- Candidates will develop and complete a special project related to bilingual materials and curriculum. This project is subject to the staff's prior approval.
- 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.

I. 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 will also present aspects of Portuguese and Brazilian culture as well as opportunities for projects in Fox Point. The course will offer a two-semester sequence in one semester with ten meetings each week. Elective for students who have not presented Portuguese for admission, this course will carry double credit and a common grade will be assigned for 1 and 2.

11-12. *Modern Luso-Brazilian Literature*

Mr. VIEIRA.

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, Guimarães 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: placement. Conducted in Portuguese.

19. *Advanced Writing and Speaking Portuguese*

Mr. VIEIRA AND STAFF.

Designed to improve the student's skill in oral and written expression, this course will use selected readings as a basis for compositions and conversation. Readings from Luso-Brazilian short stories, modern theatre, current events, and selections in history, sociology, political science, and anthropology. Four hours weekly. Prerequisite: 1-2 or placement.

II. FOR UNDERGRADUATES AND GRADUATES

101. *Brazilian Literature in Translation*

Mr. VIEIRA.

Designed to acquaint students with the literature of Brazil from the 1920's to the present. Genres to be studied will include theatre, poetry and the novel. Stress will be placed upon literary analysis and upon the strong sociological characteristics of modern Brazilian letters. Authors to be studied: Carlos Drummond de Andrade, José Lins do Rego, Graciliano Ramos, Rachel de Queiroz, Jorge Amado, Guimarães Rosa, and Clarice Lispector. Not offered every year.

103. *Portuguese Stylistics: Advanced Language Study and Curriculum Writing*

Mr. ALMEIDA.

Students will examine and master: (1) Portuguese structural forms; (2) various writing styles (literary, colloquial, historical, anecdotal, epistolary, etc.), and genres (short story, poetry, novel, drama, etc.); (3) various texts for purposes of stylistic analysis and practice in writing; (4) the various dialects of Portuguese (Continental, Azorean, and Brazilian); (5) examination of materials in Portuguese and Azorean language and civilization for adaptation to a Portuguese curriculum in language arts and social studies. Conducted in Portuguese.

150. *Topics and Themes*

Section 1. Topic: *Machado de Assis and Brazilian Realism*

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. Not offered every year.

160. *Topics and Themes*

Section 1. Topic: *The Social-Political Novel of Contemporary Portugal*

Mr. RAPOSO.

Focusing upon the pre-revolutionary writers who criticized the *modus vivendi* of dictatorial and imperialistic Portugal, this course will above all discuss elements such as class struggles 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.

Section 2. Topic: *The Novelistic and Autobiographical I: Fictional Reality vs. History*

Mr. VIEIRA.

Aimed at examining the theory and technique of first-person narration, the course will compare the two genres for purposes of critically approaching the fine line between verisimilitude and reality. Using nineteenth and twentieth-century Brazilian works as a basis, first-person narrative technique will be studied in the novel to show the ironic interplay between self-conscious narrators and authorial intent as contrasted with the literary merits of different autobiographies in forms of memories, diaries, letters, and simple narratives. Briefly tracing the history of first-person narration, the course will also treat a few significant narratives and historical frauds of other literatures such as the seventeenth-century French work, the *Lettres Portugaises*. Conducted in Portuguese.

Section 3. Topic: *Portuguese Civilization in Today's World*

Mr. RAPOSO.

Aimed primarily at analyzing Portugal's cultural heritage and social structure in the context of the contemporary world, this course will address itself to the above via essays, poetry, theatre, and the novel. Conducted in Portuguese.

Section 4. Topic: *Research in Luso-Brazilian Studies: Recent Findings from the Field*

MESSRS. MONTEIRO, HICKS, EVANS, and others.

This course will provide students with a contemporary picture of Portugal and Brazil through various related fields by a number of scholars at Brown who have recently returned from the above countries. Lectures will present such topics as the current socio-economic picture in Brazil; cultural anthropology in the Azores, Portugal; the political situation in Portugal; race relations in Brazil. Students will develop one project in one of the above areas as a culminating exercise. One of the principal aims of the course is to expose students to a myriad of disciplines which focus upon a general topic as well as to guide these students toward further research in their fields of interest. Conducted in English.

Section 5. *Romanticism in Portugal*

Mr. RAPOSO.

This course will discuss the Portuguese literary and cultural scenes between 1820 and 1870. This picture will be examined via the novel, short story and poetry. Significant attention will be given to historical and passionate novels, the fantastic, and romantic lyricism. This period will also be studied in light of the socio-political scene and the victory of the bourgeoisie of 1820. Conducted in Portuguese.

Section 6. *Portuguese Africa and Portuguese-Speaking World*

Mr. DZIDZIENYO.

This course will analyze Portuguese colonialism in Africa from an historical and political perspective. Independence and the contemporary situation of the ex-Portuguese colonies will be discussed in light of the rest of the Portuguese-speaking world. Conducted in English.

Section 7. *The Woman's Voice in Portuguese Literature*

Mr. RAPOSO.

Tracing literary assertions made by Portuguese women from the end of the eighteenth to the twentieth century, this course will focus on the evolution of the feminine persona. Conducted in Portuguese.

198. *Reading and Guided Study*

Mr. VIEIRA AND STAFF.

III. PRIMARILY FOR GRADUATES

201. *Bilingual Education*

Mr. VIEIRA AND STAFF.

This course will analyze and stress definition of bilingualism; the relationship between bilingualism and ethnicity; the 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 Portuguese. Every other year, 1975-76, 1977-78; not offered in 1976-77.

202. *Problems in Bilingual Education*Section 1. *Social Studies Materials for the Bilingual Classroom*

Mr. ALMEIDA.

This course will focus upon those curricular problems related to the preparation, adaptation and creation of Portuguese Social Studies materials for the bilingual classroom. Materials for Science and Math will also be prepared with the guidance of the instructor and various curricular specialists. Along with the theoretical analysis and discussion, students will be expected to develop materials and projects in their particular field of interest. Conducted in Portuguese.

Section 2. *Language Arts for the Bilingual Curriculum*

Mr. ALMEIDA.

This course will examine "Literatura Juvenil" - the concept of creativity for the bilingual child and its pedagogical implementation. Conducted in Portuguese.

212. *Methods and Materials for Portuguese-English Bilingual Programs*

Mr. ALMEIDA.

This course will aim at students 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 measurements for the bilingual course of study. In addition to the above, students will develop special study projects in resource materials for various teaching grade levels and will observe and evaluate on-going bilingual classes. Conducted in Portuguese.

291, 292. *Reading and Guided Study*

Mr. VIEIRA AND STAFF.

Reading in Portuguese language, literature, civilization, and bilingual studies. Conducted in Portuguese.

Psychology

Professors BLOUGH, CHURCH, CORBIT, DAVIDS, EIMAS (Chairman), ENGEN, GLICKSTEIN, JONES, KLING, LIPSITT, MILLWARD, POVAR, RIGGS (Emeritus), SCHRIER, SHEPP, SORRENTINO; Associate Professors ANDERSON, CURRAN, SIQUELAND, WOOTEN; Assistant Professors, Ms. BLOUGH (Research), LEHMKUHLE, SPOEHR; Lecturer, Mr. HAYDEN; Administrative Supervisor, Mrs. DEVINE; Research Associate, Ms. DANIEL.

For a description of facilities, see page 392. Applicants for admission to the graduate program should address inquiries to the Chairman.

Psychology 1, or a passing grade on the Psychology Placement Examination, is prerequisite to all courses, Psychology 9—199 inclusive.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAM FOR THE BACHELOR OF ARTS DEGREE.

Nine courses in Psychology, including Psychology 1 and 9; 119, 120 or 152; an advanced seminar (Psychology 180 through 196, or 136 or 174); and five additional Psychology courses (including any of the preceding courses which were not used to satisfy the requirements). Biomed I or another Biology course must be completed before Semester VI. (The Biomed requirement should be completed before taking Psychology 119 or 102). Applied Mathematics 115 or Mathematics 161, 162 may be substituted for Psychology 9. (Independent Studies may not be counted for concentration credit).

STANDARD CONCENTRATION FOR THE BACHELOR OF SCIENCE DEGREE.

The Sc.B. program in Psychology provides a framework within which students with scientific interests and abilities may concentrate in the behavioral sciences. Satisfactory completion of this program will provide the background needed for graduate study in comparative, experimental, or physiological psychology.

a. *Languages.* A reading knowledge of a modern foreign language, to be satisfied by placement at the 4-level upon admission, or by passing a 3-level course or a 2R course.

b. *Courses.* Psychology 1, 9, and 199 plus at least one from each of the following groups: 50, 102, 104, 107, 181, 182; 119, 120, 152; 81, 136, 183, 184, 185, 186; 21, 22, 30, 33. A research sponsor for Psychology 199 must be selected not later than the first week of Semester VII. Graduate courses may be substituted for some of these required courses upon approval of the Sc.B. advisor.

c. *Supporting Subjects.* Eight courses to be selected, with the approval of the Sc.B. advisor, from three of the following subjects: (1) Mathematics, (2) Applied Mathematics, (3) Biomedical Sciences, (4) Physics, (5) Chemistry, (6) Engineering.

Interdepartmental Programs. See also the description of the interdepartmental concentration in Applied Mathematics on page 53, in Human Biology on page 56, and in Psycholinguistics on page 60.

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 Adviser.)

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; and 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.) may 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 the behavior of man. Lectures, laboratory, discussions and demonstrations.
9. *Quantitative Methods in Psychology* Mr. CHURCH.
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.
17. *Programming the Laboratory Computer* Mr. MILLWARD.
The purpose of this course is to teach BASIC with two applications in mind: one is to write programs to analyze data and the second is to program a computer that monitors an experiment in real time. The course provides tools for research and understanding of contemporary theory in Psychology.
21. *Social Psychology* Ms. BLOUGH.
The extension of general psychological principles and methods to the study of social behavior.
22. *Psychology of Prejudice* Mr. JONES.
A study of the psychological variables influencing the development, maintenance, and reduction of prejudice, and the methods of measuring prejudice.
27. *Perception* Mr. WOOTEN.
A survey of the experimental and theoretical literature dealing with all aspects of the perceptual process.
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.
Prerequisites: Junior or senior standing and credit in Psychology 30 (Personality). The dynamics of behavior will be studied as basis for detailed consideration of the neurotic personality, conflict and symptom formation and the psychosomatic disorders. Further topics include the effects of brain damage on behavior, and the major psychoses, especially schizophrenia. Case studies will be presented and attention will be given to theories and methods of therapeutic treatment of psychopathology. The contribution of experimental and clinical research to understanding of these matters will be emphasized.
48. *Seminar in Human Thinking and Problem Solving* Ms. SPOEHR.
An analysis of the basic methods of solving mathematical, scientific, and logical problems, such that these methods can be used as tools in other subject matters. Theoretical aspects will be based on psychological research on human problem solving, and on advances in artificial intelligence and computer science.
50. *Comparative Psychology* 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.

66. *Applied Psychology*

Mr. SCHRIER.

Survey of research in the principles of applied psychology. Topics will include industrial psychology (improvement in working conditions, morale, efficiency, etc.), engineering psychology (adapting the work, living, and play environments to the capacities of the human organism), consumer psychology and advertising, psychology applied to crime (lie detection, interrogation, accuracy of witnesses, etc.) and aspects of psychological testing (as, for example, for vocational selection and guidance). Prerequisites: Psychology 1, 9.

81. *Child Psychology*

Messrs. EIMAS AND LIPSITT.

A study of behavior and development in childhood. Emphasis will be placed on such basic psychological processes as motivation, perception, and learning. Social events and processes that affect the child's development will be studied. Considerable attention will be devoted to empirical researches relevant to child psychology.

II. FOR UNDERGRADUATES AND GRADUATES

100. *Trends in Cognitive Development*

Mr. SHEPP.

A study of some major aspects of cognitive development with an emphasis on Piagetian and information processing approaches to questions of human development. Prerequisite: 1.

102. *Physiological Psychology*

Mr. CORBIT.

The neural and chemical bases of behavior.

104. *Psychological Assessment*

Mr. DAVIDS.

Presents 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. Prerequisite: Psychology 9.

108. *Nervous System and Behavior: Origins of Ideas*

Mr. GLICKSTEIN.

An inquiry into the nature of the relation between mental events, voluntary behavior, and the brain.

113. *Educational Psychology*

Ms. SPOEHR.

The application of psychology to education. Prerequisite: Psychology 1 or equivalent.

119. *Sensory Psychology*

Mr. ENGEN.

An experimental study of basic sensory and perceptual processes and psycho-physical methods. Laboratory one afternoon per week. Prerequisite: Psychology 9.

120. *Animal Behavior: Simple Learning and Conditioning*

Mrs. SORRENTINO.

Experimental, ethological and physiological approaches to infrahuman and human behavior. The major emphasis will be on learned behavior: classical and operant conditioning processes including reinforcement, extinction, aversive control, stimulus control and motivation. Laboratory one afternoon per week; the experiments, employ animal subjects. Prerequisites: Psychology 9 and written permission.

128. *History of Modern Psychology*

An inquiry into the historical development of modern psychology, with special reference to the concept of motivation. Prerequisites: 9, 30.

136. *Advanced Abnormal Child Psychology*

Mr. DAVIDS.

A study of the determinants and effects of psychopathology in children. Emphasis will be placed on personality dynamics, motivation, learning, and inter-personal relations of emotionally disturbed children. This course will utilize the case method in local institutions. Limited to senior psychology concentrators.

152. *Human Information Processing and Cognition*

Ms. SPOEHR.

Presents a broad introduction to the field of human information processing and cognition, organized around three topics: sensory information processing, memory, and thinking. Laboratory meeting once a week. Prerequisite: Psychology 9.

165. *Advanced Quantitative Methods in Psychology* Messrs. CHURCH AND EIMAS.
A study of advanced quantitative methods in Psychology, with special emphasis on probability theory, nonparametric statistics, experimental design, and analysis of variance. Both mathematical foundations and psychological applications will be presented. Prerequisite: Psychology 9 and Psychology 119 or 120 or 152 and written consent of instructor.
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: Psychology 33 and written permission.
172. *Psychological Distress: A Coping Strategies Approach to Etiology and Treatment* Mr. CURRAN.
Examines a relatively new way of regarding individuals experiencing psychological distress. Rather than considering these individuals as mentally ill, this approach regards the maladjusted as possessing deficiencies in the development of coping strategies. Readings will consist of original experimental and theoretical papers, and grades will be based on examinations and papers. Class time will consist of a three-hour lecture-discussion. Prerequisites: Psychology 1, 30. Enrollment limited. Written permission required.
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 contrasting 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 "humanistic." Prerequisites: Psychology 1, 30. Enrollment limited. Written permission required.
175. *Mechanisms of Motivation and Emotion* Mr. CORBIT.
Focus is on the neural mechanisms of motivation and emotion. First, the mechanisms of innate biological drive are examined. Second, acquired drives are considered in an effort to identify the principles governing the acquisition of learned desires and aversions. Finally, the basic laws of innate and acquired drives are combined in a general theory of motivation, and the implications of this theory for behavioral contributions to homeostasis, health and disease are explored. Special emphasis is given to an analysis of obesity and addictions, health problems with a clear behavioral etiology. Prerequisite: Psychology 102 or permission of the instructor.
180. *Information Processing Models of Memory* Messrs. ANDERSON, MILLWARD AND SAVAGE.
The current mathematical theories of human memory are considered in a seminar format. Three approaches are emphasized. One approach begins with a model based on neural structures (Anderson). A second approach views memory from a computational viewpoint (Savage). The third approach builds a model of memory based on artificial intelligence (Millward). Prerequisite: 1.
181. *An Introduction to Artificial Intelligence* Mr. MILLWARD.
Sometimes called theoretical psychology, artificial intelligence is concerned with the construction of computer models of cognition in areas such as scene analysis, problem

solving, inference, and natural language processing. For this reason it is important to learn to program with the preferred tool of A. I., LISP. Besides learning to program in LISP, example models will be demonstrated and their implications for psychological theory elucidated. Prerequisites: one or more semesters of programming and a class standing above Junior level. Psychology 152 is highly recommended as background although not necessary for those with many other science courses. Students are expected to attend the occasional guest lectures on Artificial Intelligence.

182. *Topics in Cognitive Science*

Mr. MILLWARD.

Follow-up of Psychology 181. Each year a special topic will be considered. Students will be expected to work as a group on developing some special computer system as well as learn about the area of interest. Examples of topics to be considered are: natural language processing, models of semantic memory, and intelligent computer assisted instruction. Prerequisite: Psychology 181 or written permission.

183. *Selective Attention and Cognitive Development*

Mr. SHEPP.

A study of the development of perception, memory, and problem solving in the human organism, with a special emphasis on the role of selective attention in this development. Prerequisites: Psychology 9, 152, and 81; permission of instructor.

184. *Infant Learning and Development*

Mr. LIPSITT.

Behavioral processes of the first year of life are examined. The onset and course of development of such response systems as smiling, walking, talking, and fear are explored with a view toward understanding constitutional and experiential determinants of behavioral development. To some extent, consideration extends into the second year of life particularly with respect to the development of affectional and aggressive behavior. Each student conducts a relevant research project and/or does a critical synthesis of published works on some aspect of infant behavior. Prerequisites: Psychology 9, 81, and 120 or 152.

185. *Language and Communication*

Mr. EIMAS.

An examination of human and nonhuman languages in terms of their formal structure, the biological and experiential factors related to their evolution and development, and their capacity for the transmission of information. The readings will include primary sources from Linguistics, Psycholinguistics, Comparative and Developmental Psychology, and Ethology. Prerequisites: Linguistics 22 suggested.

186. *Perceptual and Social Development*

Mr. SIQUELAND.

A comparative study of the early development of perception and socialization of human and nonhuman organisms, with focus upon the biological and psychological determinants of development. Prerequisites: Psychology 9, 81.

187. *Psychological Theory*

Mr. CHURCH.

An examination of several types of explanation of psychological processes through intensive examination of several examples. Types of explanation to be considered are physiological, behavioristic, and introspective. Prerequisite: Psychology 9.

188. *Psychological Study of Social Issues*

Mr. JONES.

This course will acquaint advanced students with major researches and findings, methods and controversies in the psychological study of current issues of social interest. Students will examine the literature in such areas as intergroup aggression; generations and social change; the police and the community; psychological dimensions of population policies; school desegregation; pornography; sex role behavior, and/or other topics engaging recent social concern. Prerequisite: Psychology 21. Limited enrollment, upperclassmen.

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 anxiety, cognitive variables, social learning theory, etc. Review of developments in recent research. The

formulation of research ideas toward clinical application and an integration of existent findings with theoretical constructs in personality theory are stressed. Prerequisites: Psychology 9 and 33.

192. *Measurement of Mind*

Mr. ENGEN.

Lectures and discussions on the philosophical, theoretical, and experimental problems of measuring psychological or "mental" attributes. The attributes to be considered range from simple sensations and skills such as reaction time to so-called higher mental or cognitive processes such as intelligence and cognitive/linguistic abilities. Involves topics basic to psychophysics and measurement of individual differences in psychological testing. Prerequisite: Psychology 1. Psychology 9 is recommended.

195. *Hearing and Deafness*

Mrs. 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 audition will be evaluated. Lectures, seminar reports, and demonstrations. Prerequisites: 119, 102 or written permission.

196. *Advanced General Psychology*

The STAFF.

This course is designed to help students integrate their knowledge of psychology. Conducted in general by the seminar method. Elective for seniors concentrating in psychology. Other students admitted only by written consent of the instructor.

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 analyse 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 a Psychology Department sponsor. May not be taken more than once for concentration credit.

III. PRIMARILY FOR GRADUATES

200, 201. *Introduction to Psychological Research*

Mr. SHEPP and STAFF.

Required of and restricted to first-year graduate students.

202. *Quantitative Methods in Psychology*

Mr. ENGEN.

A study of quantitative methods in psychology, including, measurement and psychophysics. Both mathematical foundations and psychological applications will be included. Offered in alternate years.

203. *Research in Experimental Psychology*

The STAFF.

205. *Teaching Practicum in Psychology*

The STAFF.

Each student will be assigned to one or two laboratory sections, with increasing responsibility for supervising 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*

The STAFF.

A study of selected topics in sensory and physiological psychology, learning, animal behavior, human cognition, information processing, and developmental psychology. Offered every year.

210. *Seminar in Vision* Mr. WOOTEN.
A seminar in the basic processes of vision.
212. *Perception* Mr. WOOTEN.
A study of the variables that determine what is perceived. Among the variables considered are input from the senses, attention, and past experience.
215. *Seminar in Sensory Processes* The STAFF.
Offered every year. May be repeated for credit. For current topics, see Course Announcement.
228. *Neuropsychological Mechanism in Sensory Systems* Mr. GLICKSTEIN.
The relations of anatomical, neurophysiological and behavioral data will be considered. The basic techniques employed in the study of these problems will be studied. Cross-species behavioral and anatomical comparisons, the effects of experimental lesions, and the subsequent recovery of functions will be included in the discussions. Special attention will be given to the visual system and its role in the control of visual discriminations.
229. *Seminar in Neural Foundations of Behavior* Mr. CORBIT.
A seminar devoted to the intensive study of selected problems in physiological psychology, emphasizing neurological and physiological mechanisms underlying homeostatic regulation, motivation, and learning.
232. *Seminar in Learning* 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 and instructors, see Course Announcement.
234. *Seminar in Developmental Psychology* The STAFF.
Offered every year. May be repeated for credit. For current topics and instructors, see course announcement.
240. *Experimental Surgery and Laboratory Animal Medicine* Mr. POVAR.
Basic anesthetic and surgical techniques of special interest in experimental and physiological psychology will be studied. The role of nutrition, and care of the experimental animal before, during, and after surgery will be assessed. The control of disease in laboratory animals will be discussed. Lecture, demonstrations, and laboratory. Prerequisite: Graduate standing and permission of the instructor.
- Psychological Colloquium*
A weekly meeting for the discussion of research problems presented by visiting scholars and members of the Department. No credit.

Religious Studies

Professors DIETRICH, FRERICHS, MILHAVEN, MOEHRING,¹ NEUSNER,² REEDER; Associate Professor TWISS (Chairman); Assistant Professors GERO, SARASON,³ WULFF⁴; Visiting Associate Professor GOODBLATT⁵; Visiting Assistant Professor PEDERSEN⁵; Adjunct Lecturer, Mr. ZAIMAN; Post-doctoral Fellow in the Humanities, Ms. GRUMET.

¹On sabbatic leave. Semester II, 1979-80.

²On leave on special assignment, Semester II, 1979-80.

³Through June 30, 1979.

⁴On leave on special assignment, Semester I, 1979-80; on leave of absence, Semester II, 1979-80, and Semester I, 1980-81.

⁵1979-80.

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 his or her 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 the concentration program and a list of the component courses. The program is expected to encompass at least one course in a religious tradition other than that of primary interest, and to take account of more than one approach to the study of religions, e.g., philosophical, literary, or historical. A Religious Studies concentration with Honors requires, in addition, an Honors thesis (Religious Studies 192, during both semesters of the senior year).

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 American Civilization, Bio-Medical Ethics, and Renaissance Studies. Students who anticipate professional academic study of religion should include the study of French and German in their programs. In some fields a knowledge of the appropriate classical language is essential for advanced work. Students should start work in these languages as early as possible.

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 candidate 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 three areas: History of Religions: Judaism; History of Religions: Early Christianity; and Western Religious Thought.¹

Requirements for Doctoral Programs

HISTORY OF RELIGIONS: JUDAISM

Qualifying examinations

1. Theory of religion
2. Topics in Western Religious Thought *or* Earliest Christianity *or* Eastern Religions

The Qualifying Examination in Theory of Religion must be taken by the beginning of the second year in the student's program. All other qualifying and preliminary examinations

¹During the week preceding the opening of classes in September, entering graduate students will be examined orally on a topic submitted in advance by the student. The topic will be selected from the general area in which the student wishes to specialize.

must be completed by the end of the first semester of the year in which the student expects to receive the degree. 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.

Preliminary examination

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 religions

Language requirements

The student must demonstrate by ETS examination a reading 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.

HISTORY OF RELIGIONS: EARLY CHRISTIANITY

Qualifying examinations

1. Theory of religion
2. Theological and philosophical perspectives of modern historians of early Christianity
3. Cults of the Graeco-Roman period
4. History, literature, and religion of ancient Israel till the time of Ezra
5. Judaism till the codification of the Mishnah

The Qualifying Examination in Theory of Religion must be taken by the beginning of the second year in the student's program. All other qualifying and preliminary examinations must be completed by the end of the first semester of the year in which the student expects to receive the degree.

Preliminary examination

1. History, literature, and religion of the New Testament¹
2. Christianity down to the seventh century¹
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.

¹These are comprehensive in character and involve the social and political history of the periods and the history of scholarship in the areas.

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.

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 satisfactorily complete Religious Studies 200 (Theory of Religion); they will study a religious tradition in an upper-level course which employs the methods of the history of religions; they 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

Note: Courses not otherwise designated are offered every year.

1. *Introduction to Judaism*

Mr. NEUSNER.

The problem of the definition of Judaism; the biblical legacy; Talmudic Judaism; medieval Judaic philosophy and rationalism; mysticism; the symbolic and mythic structure of classical Judaism; modulations of the classical tradition in modern times; American Judaism.

2. *Introduction to Christianity*

Mr. GERO.

Christian faith, life and thought in their contemporary form, historical development, and scriptural origin.

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*

Mr. NEUSNER.

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 1979-80: Law and Society in Judaism.

11. *Approaches to the Study of Religion*

Mr. REEDER.

The nature of religion as part of human experience; the relation of religion to personality, social structure, and culture; the historical study of religion; the procedures of philosophy of religion and constructive religious thought; emphasis on writers such as Eliade, Geertz, and Freud; illustrative data from ancient and contemporary religions.

15. *Introduction to the Bible: Ancient Israel*

Mr. GOODBLATT.

The literature, history, and religion of ancient Israel. The Hebrew Bible against the background of the Ancient Near East emphasizing the history and religion of the Hebrew people. Readings in translation from the priestly, prophetic, and wisdom literature. Contemporary methods of biblical criticism.

18. *How to Read a Jewish Book*

Mr. SARASON.

Judaism has produced, as its primary enduring religious expression, both the Book, the Bible, and many books. This course analyzes important documents in the history of Judaism as religious literature, asking, first of all, what is a holy book? What are the types of holy books, the forms given to them, the roles played by them, the larger meanings assigned to them, in the history of Judaism? Among the documents: a biblical book important in the later history of Judaism, a tractate of Mishnah, Avot, the Siddur, a tractate of a medieval law code, a classic of mysticism, a modern theological essay.

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.

21. *Faith and Reason*

Mr. TWISS.

The nature of religious faith and its relation to human cognition. Important theories of theistic faith will be distinguished and carefully elucidated to highlight phenomena commonly designated by the term "religious faith": propositional belief, personal trust, loyalty to cause, appeal to authority, passionate commitment, and being in the world. Analysis of concepts associated with religious faith: religious experience (numinous and mystical), revelation, and miracle. Readings drawn from classical and contemporary sources in theology and the philosophy of religion. Topic for 1978-79: An examination of the grounds for belief and disbelief in God in light of contemporary scientific theories — the crisis of religious faith, skepticism about the validity of religious experience, the religious significance of atheism, the role of faith in science and religion.

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.

Responses of Christian thought to developments in modern culture. Certain groups in modern culture are struggling 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. Various contemporary Christian thinkers argue for Christian support of one or more of these struggles. Focus on some of these Christian responses to the movement towards greater freedom and self-affirmation of blacks, women, and homosexuals.

24. *Religious Thought and the Human Sciences*

Mr. MILHAVEN.

Modern sciences, such as psychology and sociology, are making current images of the human person that challenge ones affirmed in the Christian tradition. This course will examine certain of these challenges and certain responses of contemporary Christian thought. The study will center on images of the person stemming from psychoanalytic theory and practice.

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 be engaged in discussing and appraising these ideas and attitudes and in pursuing their further implications and the questions of religious thought that they raise.

41, 42. *Biblical Hebrew*

Elements of Hebrew grammar and syntax. Translation of prose narratives from the Hebrew Bible.

43, 44. *Biblical and Post-Biblical Hebrew*

Prerequisite: Religious Studies 41, 42 or its equivalent. Hebrew morphology, phonology, and syntax. Poetry and prose readings from Bible, Midrash, and Mishnah.

45A, 46A. *Studies in Hebrew and Aramaic Religious Literature: Talmud Studies*

Mr. ZAIMAN.

Selected rabbinic texts, with selected traditional commentaries and textual studies, leading to skill in textual study, familiarity with basic legal concepts, and vocabulary. Prerequisite: Religious Studies 43, 44 or written permission.

45B, 46B. *Studies in Hebrew and Aramaic Religious Literature:*

Modern Hebrew Literature Studies

Selected fiction (Gordon, Shalom Aleichem, Agnon) for its portrayal of modern Judaism and nonfiction (Ahad HaAm, Y. Kaufmann, scholarly journals) for its bearing on the study of Judaism in all periods. Prerequisite: Religious Studies 43, 44 or written permission.

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.

65. *The Mystical Tradition in Judaism*

The mystical tradition within Judaism with emphasis on religious experience, types of mystical communities, and the corresponding literature. Examples: autobiographical re-

ports of such experiences from different periods, theosophic exegesis of classical texts, legal formulations of pietistic-mystical behavior, descriptions of mystical communities. Some attention to the development of mystical doctrine.

67. *Modern Judaism*

Mr. SARASON.

Judaism in modern times as a problem of interpretation: the interpenetration of "religious" and "secular." Ostensibly "religious" and "secular" responses to the problem of modernity: religious reform (Reform, Neo-Orthodoxy, Conservatism), Jewish socialism, Zionism, cultural autonomy (Dubnow), *Yiddishkeit* and Hebraism, the "non-Jewish" Jew. An attempt will be made to integrate these diverse responses into a coherent picture of how a classical religious tradition is transformed through interaction with modern culture.

68. *American Judaism*

Ms. GRUMET.

Analysis of the character of Judaism in America in answer to the questions: what is Judaic, in the classical sense, about American Judaism, and what is American in its character? Further, how does Judaism in America testify to the imagination and perception of reality, social and cosmic, of American Jews as an "ethnic" group?

71. *Introduction to the Bible: Earliest Christianity*

Mr. MOEHRING.

The literature, history, and religion of earliest Christianity. The beginnings of Christianity to the middle of the second century. Critical study of the earliest Christian literature with special emphasis on the New Testament.

72. *Christianity in Late Antiquity*

Mr. GERO.

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*

Mr. GERO.

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, 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. *Religious Traditions of India: Vedic Religion, Jainism, Hinduism*

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. *Religious Traditions of India: Buddhism*

Ms. WULFF.

The development of Buddhist thought and practice in India. 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. Topic for 1978-79: Conceptions of the path to Nirvana in Theravada, Mahayana, and Tantric traditions.

83. *East Asian Buddhism: China and Japan*

Ms. PEDERSEN.

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.

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. Topic for 1978-79 and alternate years: The Song of Songs and the Love Lyric. Topic for 1979-80 and alternate years: The Book of Job and Joban Literature.

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* Studies in the history, literature, and doctrinal developments, both Eastern and Western, of the first nine centuries of Christianity. Topic for 1978-79: Themes in Pauline Theology (Mr. Donfried); Topic for 1979-80: New Testament Ethics. Exegesis of selected passages from the New Testament illustrating the attitudes of early Christians toward certain problems of personal and civic ethics, in particular sexual morality, marriage, the role of women in the family and in the church, slavery, military service (Mr. Gero).

122. *Ethics of Judaism* Messrs. REEDER AND SARASON. 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* Mr. TWISS. Topic for 1979-80: Comparative Religious Ethics. Cross-traditional analysis and comparison of the religious, moral, and legal elements in selected codes of conduct. Basic norms and attitudes, ideas of selfhood and moral agency, notions of welfare and happiness,

interpretations of suffering and death, and ultimate sources of authority found in patterns of practical reasoning in nonliterate societies, Christian traditions, Judaic texts, and Asian cultures. Some attention to modern debates about ethical relativism.

128. *Bio-Medical Ethics*

Mr. TWISS.

Selected conceptual problems and moral issues raised by recent developments in biology and medicine. Key concepts in medical care will be analyzed in order to exhibit the philosophical underpinnings of bio-medical practice and research: health, disease, life, death, treatment, cure. Questions of moral and social policy in medical decision-making and health care in the following areas: i) the relevance of medical prayers, oaths, and codes for defining the role-responsibility of the physician/researcher; ii) the duties and rights of physician, client, family, and civil society in medical genetics; iii) the limits of human, including fetal, experimentation; iv) problems of justice in the distribution of scarce life-saving therapies. Readings will be drawn from medicine, moral philosophy, religious ethics, sociology of medicine, law, and public policy, and will be discussed in a case-study format. Prerequisite: one course in the Biological and Medical Sciences.

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 1978-79: Meditation and mysticism in twentieth century religious thought. Topic for 1979-80: Meditation and mysticism in early Christian thought.

135. *History and Hermeneutics*

MESSRS. SARASON AND 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 (Eusebius, Sherira Gaon, Kautsky, Graetz, Troeltsch). Particular attention will be given to recent work in analytic philosophy of history (Collingwood, Dray, Danto, Goldstein) and hermeneutical theory (Dilthey, Ricoeur, Gadamer). Topics for investigation include: the role of causal analysis in history, the logic of historical explanation, and the epistemology of historical judgment. Offered in 1978-79 and on a cyclical basis.

138. *Topics in Western Religious Thought*

Topics for 1978-79 and 1979-80: Freudian ego and id from perspectives of Christian personalism (Mr. Milhaven); Religion and alienation in twentieth century culture (Mr. Dietrich). Topic for 1979-80: Augustine, Luther, and the introspective conscience of the West (Mr. Dietrich).

161. *Israelite Religion in Its Near Eastern Context*

A study of the religion of ancient Israel through an examination of selected literary and archeological 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. Offered on cyclical basis.

165. *Judaism in Medieval Times*

Mr. GOODBLATT.

The religious developments in Judaism under Islam and Christendom to 1750; legal,

mystical, and theological traditions; sectarian and messianic movements. Offered in 1979-80 and on a cyclical basis.

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. Offered on a cyclical basis.

170. *Biblical Interpretation in 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, form-critical, 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*

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*

Mr. DIETRICH.

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 in 1978-79 and 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*

Topic for 1978-79: Theologies of revolution: violence and nonviolence in the struggle against social injustice (Mr. Reeder). Topic for 1979-80: Theology of secularity as found in the life and thought of Dietrich Bonhoeffer (Mr. Milhaven).

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 1978-79: "History of Religions" as a method for the study of the religions of antiquity (Mr. Moehring); Archaeology and the religion of ancient Israel (Mr. Frerichs). Topics for 1979-80: Religions of China and Japan (Ms. Pedersen); Archaeology and the religion of ancient Israel (Mr. Frerichs); Jewish secular culture in America, 1906-65 (Ms. Grumet).

190. *The Formation of Early Rabbinic Judaism*

Mr. NEUSNER.

A study of the formative century in Rabbinic Judaism, ca. 70-170, the main streams which entered into earlier Rabbinism, the primary themes and motifs characteristic of Rabbinism from this time onward, and the foundations of the literature which preserved those distinctive religious conceptions, including close reading of the primary documents in English translation. Offered on a cyclical basis.

191. *Individual Study Project*

The STAFF.

Directed reading, research. Secs. 1, 2: Readings in Hellenistic Greek. Representative Greek texts from Alexandria (Mr. Moehring).

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*

194. *Topics in Hellenistic Judaism*

Mr. MOEHRING.

Topic for 1979-80: Judaism before A.D. 70.

195. *Topics in Early Christianity*

196. *Topics in Judaic Studies*

197. *Topics in Modern Jewish Thought*

III. PRIMARILY FOR GRADUATE STUDENTS

200. *Theory of Religion*

Ms. WULFF.

Major approaches to the study of religion, including those of "history of religions" and phenomenology. Evaluation of theories in terms of their adequacy to comprehend phenomena from several religious traditions. Focus for 1978-79: anthropological, psychological, and philosophical interpretations of religious phenomena, including myth and ritual.

211, 212. *Seminar: Western Religious Thought*

Topics for 1978-79: The logic of religious discourse, with special attention to the question of literalness (Messrs. Twiss and Buchdahl, Anthropology); Kantian and Thomistic theories of normative ethics (Mr. Reeder). Topics for 1979-80: Kant and religious interpretations of morality (Mr. Reeder); The grammar of faith (Mr. Twiss).

221, 222. *Seminar: Biblical Studies*

231, 232. *Seminar: Early Christianity*

Topic for 1978-79: Alexandria as a focal point of religious life (Mr. Moehring). Topics for 1979-80: History and historiography: Hellenistic, Jewish, and early Christian (Mr. Moehring); Old Testament Pseudepigrapha (Mr. Gero).

241, 242. *Seminar: Judaic Studies*

Topic for 1978-79, 1979-80: Literary and historical analysis of Talmudic traditions (Mr. Neusner); Topic for 1978-79: The modern study of Midrash (Mr. Sarason).

291. *Independent Research*

Members of the staff will offer independent reading courses in the following areas:

Mr. FRERICHS:

Sec. 1 *Nineteenth Century Biblical Interpretation, especially Jewish*

Sec. 2 *Contemporary Biblical Hermeneutics and Methods of Interpretation*

Mr. MILHAVEN:

Sec. 3 *Issues in Contemporary Christian Ethics*

Sec. 4 *Christian and Psychological Understandings of the Human Person*

Sec. 5 *Theological Perspectives on Secular Values and Divine Transcendence*

Ms. WULF:

Sec. 6 *Interpretations of Myth*

Sec. 7 *Hindu Texts*

Sec. 8 *Buddhist Philosophy*

Sec. 9 *Religion and Drama*

Sec. 10 *Religion and Aesthetics*

Mr. NEUSNER:

Sec. 11 *History of Religions in Sasanian Iran*

Mr. TWISS:

Sec. 12 *Søren Kierkegaard's Thought*

Sec. 13 *Ontological and Cosmological Arguments for God's Existence*

Sec. 14 *Cognitivity of Religious Discourse*

Sec. 15 *Problems of Religious Epistemology*

Sec. 16 *Projectionist Theories of Religion*

Sec. 17 *Phenomenology of Religious and Moral Consciousness: Rudolf Otto and Max Sheler*

Sec. 18 *Issues in Science and Religion*

Sec. 19 *Philosophy and Theology of History*

Sec. 20 *Comparative Religious Ethics: Theory and Application*

Sec. 21 *Ethics of John Calvin*

Sec. 22 *Philosophical and Theological Approaches to Human Rights*

Sec. 23 *Religious Thought and Evolutionary Ethics*

Sec. 24 *Contemporary Problems in Bioethics*

Mr. DIETRICH:

Sec. 25 *Late 19th and Early 20th Century Christian Thought: Protestant and Roman Catholic*

Sec. 26 *Topics in Theology: Modern Judaic and Christian*

Mr. REEDER:

Sec. 27 *Views of the Relation of God and Morality*

Sec. 28 *Interpretations of Obligation and Virtue in Theological Ethics*

Sec. 29 *The Problems of Evil*

Mr. MOEHRING:

Sec. 30 *Hellenistic Judaism: Philo*

Sec. 31 *Hellenistic Judaism: Josephus*

Sec. 32 *Early Christianity and the Roman Empire*

Sec. 33 *Representative Historians of Early Christianity in the 19th and 20th Centuries*

Sec. 34 *Current Issues in the Study of Early Christianity*

Sec. 35 *Issues in Greek and Hellenistic Religions*

Mr. GERO:

Sec. 36 *Christian Literature in the Patristic Period*

Sec. 37 *Byzantine Ecclesiastical History and Literature*

Sec. 38 *The Ancient and Medieval History of the Churches of the Christian East*
(Armenia, Georgia, Syria, Egypt, and Ethiopia)

Sec. 39 *Gnosticism*

292. *Preparation of Theses and Dissertations*

The STAFF.

Note: A notebook containing descriptions of all courses numbered 1-199 may be consulted in the lounge at 59 George Street.

Renaissance Studies

COMMITTEE

PHILIP J. BENEDICT, *Assistant Professor of History*

LAURA DURAND, *Associate Professor of French*

SAMUEL J. HOUGH, *Assistant Librarian, John Carter Brown Library*

SEARS JAYNE, *Professor of English*

BARBARA K. LEWALSKI, *Professor of English, Chairman*

ANTHONY MOLHO, *Professor of History*

KAREN A. NEWMAN, *Instructor in 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*

¹ALAN S. TRUEBLOOD, *Professor of Hispanic and Italian Studies and Comparative Literature*

IVAN F. WALDBAUER, *Associate Professor of Music*

¹SUSANNE 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.

¹On leave of absence, 1979-80.

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 and with Professor Lewalski.

Semiotics

The Program in Semiotic Studies is administered by an Executive Board composed of Professors BARNHILL (Theatre Arts), CASSILL (English), SCHOLLES (Chairman) (English: Director of Semiotics), and WINNER (Slavic Languages); Associate Professors BARON (Linguistics), and SILVERMAN (English: Director of Film Studies). The Program is advised by a cooperating Committee including the Executive Board and the following: Associate Professors BASS (Theatre Arts), CROSMAN (French), HENKLE (English), RUSSOM (English), WALDROP (English); Assistant Professors BLAKELY (French) and DOANE (English); Lecturer Ms. TANNENBAUM (Theatre Arts); Visiting Lecturer Mr. FISHER (English).

UNDERGRADUATE PROGRAMS

The concentration in Semiotics is designed to allow students to emphasize the study of a particular form or medium of expression (such as film or poetry) within the framework of a general program of study in signs and signification. Concentrators may stress either the critical or the creative dimensions of their chosen fields. They may see their work as preparation for graduate study or a career in some aspect of communications or some expressive medium, or they may aim at a general competence in the arts and processes of language and communication.

A concentration in Semiotics consists of ten semester-courses, with a minimum of two and a maximum of five drawn from each of the following three areas: Semiotic Theory, Semiotic Analysis, and Semiotic Production. For Honors in Semiotics a senior project must be approved in the junior year. While the concentration has no language requirement as such, work in a foreign language, especially French, is recommended.

In addition to the courses listed, offerings in other departments count toward the Semiotics concentration. More detailed information about the concentration is available from the Semiotics Program office.

I. PRIMARILY FOR UNDERGRADUATES

7. *Introduction to Film Writing* (Theatre Arts 7) Mr. BASS.
A systematic study in the creative process of cinematic writing, from the selection of a story idea to the completion of a screenplay.
8. *Intermediate Journalistic Writing* (English 8) Mr. HENKLE and STAFF.
A course in expository writing on social, cultural, or political concerns appealing to a general audience.

9. *Semiotic Composition*

The topics change from year to year and instructor to instructor. In 1979-80 the following sections are offered:

Section 1. Composition of verbal and non-verbal signs Mr. CASSILL.

Section 2. Writing as discourse Mr. SCHOLES and STAFF.

12. *Foundations of the Theory of Signs* Messrs. SCHOLES and SILVERMAN.

The elements of semiotics for potential concentrators and other interested students. In 1979-80 the course will emphasize visual theory and spectatorial attitudes, with particular attention to film.

13. *Advanced Journalistic Writing* Mr. HENKLE.

The writing of articles and essays analyzing social, political, and cultural issues and attempting to persuade. Emphasis is on writing for a broad audience, as in a magazine format.

14. *Persuasion* Ms. TANNENBAUM.

A study of the preparation and analysis of arguments, with major emphasis on reasoning and evidence.

22. *Persuasive Communication* Ms. TANNENBAUM.

A course in public speaking, rhetorical criticism, and attitude change.

32. *Interpersonal Communication* Ms. TANNENBAUM.

An exploration of human interaction, the primary focus on student involvement in a large number and variety of in-class activities. The units covered include communication models, verbal communication, and non-verbal communication.

45. *Modes of Linguistic Representation* (Linguistics 45) Ms. BARON.

Exploration of three basic modes of linguistic representation — speech, writing, and sign language — as distinguished from non-linguistic communication (e.g., kinesics, art, and pantomime). Interested students should register for Linguistics 45.

65. *Introduction to Film Analysis: The Silent Film* Mr. WALDROP.

A history of film as an art form, from its beginnings in the 1890's to the coming of sound in the late 1920's.

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. FISHER.

An introduction to the elements of 16mm film production, with emphasis on conceptualization, development and refinement of ideas, planning and preparation.

81. *Study at RISD* (Theatre Arts 81)

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 Theories of Semiotics* (Comparative Literature 81) Mr. WINNER.

The course includes: the study of the evolution of the concepts of sign; analysis of a variety of sign systems, from the simplest to the most complex; study of the application of semiotic theory and methodology to the established disciplines in the humanities and the social sciences; study of problems such as precultural and non-cultural communication.

113. *Semiotics and the Arts* Mr. WINNER.

Examination of semiotic theory as applied to verbal, visual, musical, and filmic arts.

115. *Mass Communication*

Ms. TANNENBAUM.

A course in the theories and effects of the mass media.

163. *Special Topics in Film* (Theatre Arts 163)

Topics change from year to year and from instructor to instructor. Topics for 1979-80:

Section A (Sem. I). *Feminist Film Theory and Criticism*

Ms. DOANE.

Section A (Sem. II). *Cinema of Desire: Bertolucci, Mizoguchi, Ophuls*

Ms. SILVERMAN.

Section B (Sem. II). *L'Oeuvre de Jean Renoir: 1930-1939*

Mr. BLAKELY.

166. *Senior Seminars*

Designed for senior semiotics concentrators, who will be given preference in registration.

Topics for 1979-1980:

Section A (Sem. I). *Michel Foucault: Discourse and Power*

Mr. SILVERMAN.

Section B (Sem. I). *The Films of Jean-Luc Godard*

Mr. SILVERMAN.

Section C (Sem. I). *Reading Freud*

Ms. DOANE.

Section A (Sem. II). *Semiotics of Poetry*

Mr. SCHOLES.

Section B (Sem. II). *Readings in Film Theory*

Ms. DOANE.

198. *Senior Conference in Semiotics*

The STAFF.

Preparation of Honors Projects under the supervision of the staff.

Center for Research in Semiotics

EXECUTIVE COMMITTEE

THOMAS G. WINNER, *Director, Slavic Languages and Comparative Literature*

NAOMI BARON, *Linguistics*

JAMES KOETTING, *Music*

DAVID LATTIMORE, *Linguistics - Chinese*

ROBERT SCHOLES, *Semiotics Program and English*

CHARLES SEGAL, *Classics*

VINCENT TOMAS, *Philosophy*

The Center for Research in Semiotics, established in 1977-78, is an association of faculty from various academic departments with a shared interest in the study of sign systems in all modalities (verbal, nonverbal, etc.), both in their theoretical aspect and in their relation to various disciplines and domains. The Center assists departments and programs in the development and presentation of departmental and interdepartmental interdisciplinary courses in the field of semiotics. While the Center does not, at this time, have its own graduate degree program, it sustains and develops programs in semiotics in close cooperation with interested departments and individuals, promotes interdisciplinary research and instruction in semiotics, and is the focus of independent Ph.D. programs in semiotics. It works in close coordination with the undergraduate Program in Semiotics which awards a B.A. in this field. Descriptions of undergraduate degree programs in semiotics are given in the section on the Program in Semiotics. In addition to the above, the activities of the Center include: initiating and developing individual and cooperative research programs which involve both students and faculty within Brown University and in other cooperating institutions in the United States and abroad; and organizing of special seminars, lectures, symposia, and colloquia in semiotics. An informal consortium consisting of semiotic centers at Brown, Indiana and Yale, has embarked on various programs, including the development of a collaborative agreement with the Department of Logical Semiotics of the

University of Warsa, Poland, which calls for exchange of faculty, students and research materials. Similar agreement with other foreign institutions are in the discussion stage. The Center houses the editorial offices of the national journal of the Semiotic Society of America.

Slavic Languages

Professors ARANT, KUCERA, TERRAS, WINNER; Associate Professors CAREY, DRIVER (Chairman), MATHIESEN; Assistant Professor LEVITSKY; Lecturer, Ms. MONAHAN.

PLACEMENT. See Page 39.

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 4I, or demonstrating equivalent training by examination. The requirements for concentration are Russian 19, 51, 41, 42, plus any two 100-level Russian or Slavic courses; Linguistics 11, 22 and 52. 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, 41, 42, 170, 171. With the approval of the department, any two literature or linguistics courses 100-level or above will complete the concentration.

Russian Language and Literature – Literature-oriented. Prerequisite as in standard program. Requirements: Russian 19, 51, 29 and 30 or 131 and 132, 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 or 131 and 132 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 or 131 and 132, 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. Students will normally take the following courses: Russian 19, 51, 41, 42, 131, 132; one course in preparation of a thesis (Russian 198); plus any two Russian or Slavic courses 100-level or above, or two semesters of a second Slavic language; Linguistics 11, 22, or 52, or (with the permission of the instructor) any 200-level course in Russian literature or Slavic linguistics.

Russian Studies. Prerequisite: A reading knowledge of Russian to be demonstrated by satisfactory completion of Russian 4 or 4I or by demonstrating equivalent training by examination. The requirements for concentration are Russian 19, 41, 42, plus any two 100-level Russian courses, History 137, 138, plus a suitable course in Political Science.

Russian Studies (alternate program). Prerequisite as in standard program. Requirements: Russian 19, 29 and 30 or 41 and 42, plus two 100-level Russian courses, plus one of the following: Political Science 127 or 143. With the joint approval of the Slavic Department and the other departments involved in the area studies program, substitutions may be made.

Honors in Russian Studies. The program, involving three academic disciplines and allowing the students to emphasize either literature or the social sciences, provides an integrated study of Russian history, government, and literature. All courses require some use of the Russian language.

The program consists of four courses in Russian literature: Russian 41, 42, plus any two 100-level Russian courses, one course in advanced language study: Russian 19 or 51; three courses from the following: History 137, 138, Political Science 127, 143, 182I; one semester course of work in preparation of a thesis (Russian 198). The thesis may involve one or more of the disciplines studied. With the approval of the concentration advisor, two other relevant 100-level courses may be substituted for Russian 41, 42.

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 his Slavic language of specialization. The student will usually demonstrate this knowledge by passing, if his 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 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 both 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 three 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.

1I-3I, 2I-4I. *Intensive Russian*

Mrs. 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 electing this course should expect to spend a minimum of one hour each day on outside assignments, many involving use of the Language Laboratory.

1R-2R. *Russian for Reading*

Ms. ARANT.

This course is designed to develop reading skills as quickly as possible during Semester I through a concise introduction to the grammar necessary to achieve this goal. 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.¹ Four hours a week.

4. *Intermediate Russian II*

Messrs. TERRAS AND LEVITSKY.

Readings and discussion of a number 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.¹ Four hours per week.

19. *Writing and Speaking Russian I*

Ms. MONAHAN.

Practice in writing and speaking Russian. Four hours per week: readings, weekly written assignments, oral discussion of material read. Prerequisite: Russian 4 or 4I or placement by examination.

¹See statement on Placement Test, page 39.

29. *Russian Literature in English Translation I*

Mr. LEVITSKY.

A survey of the most important works of Russian prose fiction in the 19th century, from Pushkin to Dostoevsky. 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*

Mr. LEVITSKY.

Selected works of Russian literature, chiefly but not exclusively fiction in the 19th century, from Tolstoy through the Soviet period. All works will be read in English translation. Three hours a week lectures, plus discussion in smaller sections.

41, 42. *Russian Literature: Introductory Course*

Mr. LEVITSKY.

Reading in Russian of selected works by important authors, among them Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, and Tolstoy. Lectures, in Russian, on literary problems and on important aspects of literary history. Prerequisite: Russian 4 or written permission.

51. *Writing and Speaking Russian II*

Ms. MONAHAN.

Intensive practice in speaking and writing Russian. Idiomatic use of the language will be stressed. Weekly written assignments. Four hours. Prerequisite: Russian 19 or written permission of the instructor.

SLAVIC

93. *Soviet Dissident Movement*

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. Will first focus on the works of such writers as Ehrenburg, Dudintsev, and subsequently on Yevtushenko, Voznesensky, Tvardovsky, Bulat Okudzava, Lydia Chukovskaya, Daniel, Siniavski, Galanskov, Brodsky, Maximov, Solzhenitzyn, and Mamleev. The oppositional activity of Amalrik, Litvinov, Essenin-Volpin, Sakharov, Zhores Medvedev, Grigorenko, and Bukovsky will also be discussed. The reading list will include memoirs from camps of the following authors: Evgenija Ginsburg, Marchenko, and Dimitri Panin. Some of the new samizdat translations which belong to the Mamleev collection will also be investigated. 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. Ms. CAREY.

II. FOR UNDERGRADUATES AND GRADUATES

RUSSIAN

131. *Introduction to Nineteenth-Century Realism*

Mr. DRIVER.

Developments in Russian literature through the Romantic period to the early works of the major Russian Realists. Open also to students in fields other than Russian who will be permitted to do the reading in translation. 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.

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. WINNER.

An examination of Tolstoy's art with particular emphasis on the formal aspects of his prose. An examination of the early prose (The Caucasian stories, The Sevastopol Tales) 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. WINNER.

An examination of the development of Dostoevsky's art with special emphasis on the evolution of thematic and formal elements. The great novels (*Crime and Punishment*, *The Idiot*, *The Devils*, *The Brothers Karamazov*) will be read as well as several of the early works (*Poor Folk*, *White Nights*, *Notes from the Underground*). 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, with written permission, do the reading in translation. Offered in alternate years.

185. *Turgenev*

Mr. TERRAS.

An examination of I.S. Turgenev's fiction in the contexts of (a) the social, political, and ideological development of mid-nineteenth-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, incl. the novels *Rudin*, *A Nest of Gentlefolk*, *On the Eve*, *Fathers and Sons*, *Smoke* and *Virgin Soil*, 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*

Mr. WINNER.

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. Among the nineteenth century poets to be

considered are: Khomyakov and Karolina Pavlova, Fofanov and Myrrha Lokhvitskaya. Among the twentieth century poets are: symbolist poets Balmont, Brjusov and Zinaida Gippius; acmeist poets Gumilev, Mandelstam and Anna Akhmatova; emigre poets Khodasevich, Nabokov, Marina Tsvetaeva, Irina Odoevtseva; poets of the revolution, Mayakovsky, Maria Shkapskaya; post-war poets Evtushenko, Voznesensky and Bella Akhmadulina; and poets of the new emigre wave, Brodsky, Galich and Natalya Gorbanevskaya. In this course, the theoretical framework for analysis will be based on the critical comparisons developed by Claudine Herrman 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.

Reading programs will be arranged on individual authors or special topics. May be repeated for credit.

SLAVIC

101. *The Slavic World and Cultures*

Mr. MATHIESEN.

An introduction to the several cultures of the Slavs from prehistoric times up to the present. The main patterns of these cultures will be examined historically and typologically. No knowledge of any slavic language is required.

105. *The Theory of Slavic Standard Languages*

Mr. MATHIESEN.

A survey of the history and present status of the 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 the 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, preceeding the political liberation of Bulgaria; second, from 1877 to 1912; third, from the Balkan wars to the second World War; fourth, contemporary. The following writers, poets, dramatists, and literary groups will be studied: from the first period, L. Karavelov, S. Rakovski, R. Slaveykov, K. Botev, V. Drumev; from the second period, A. Konstantinov, S. Mikhaylovski, A. Strashimirov, I. Vazov, T. Vlaykov, K. Velichkov, P. Slaveykov, P. Yavorov, P. Toddorov, Elin Pelin, G. Stamatov; from the third period, D. Nemirov, K. Konstantinov, V. Petkanov, M. Belcheva, S. Chiligirov, S. Kostov, R. Stoyanov, mystical writers, symbolist poets, Zlatorog group, Strelets group (The influence of French Romanticism on Bulgarian literature will also be investigated); and from the fourth period, socialist realism and contemporary literature. The readings for this course will be done in Bulgarian, Russian, English and French.

123, 124. *Slovene* Mr. WINNER.
(For Czech, Belorussian, Ukrainian and other Slavic languages, see Slavic 198, 226, 227, 238, 231.)

173. *Approaches to Literature* Mr. WINNER.
Examination of various intrinsic and extrinsic approaches to the study of literature with practical exercises. Open to students without a knowledge of Slavic languages. Offered every year.

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.

187. *The Poetics of the Short Story: A Comparative Study of Slavic and West European Literature* (Comparative Literature 142) Mr. WINNER.
The evolution of the short story as a genre and its poetics will be followed by a comparative study of the development of the Russian, Czech, Polish, French, German, English, and American short story. What are the relations of the short story to other artistic forms (novel, poetry, drama, film, etc.).

188. *The European Avantgarde* (Comparative Literature 181) Mr. WINNER.
The avantgarde movements of the 1920s and 1930s in the Slavic world and in Western Europe (Russia, Czechoslovakia, Poland, Germany, France, England). Various literary currents (Dadaism, Futurism, Surrealism, Poetism, etc.) and their diverse forms (prose, drama, poetry) as well as avantgarde film art. What is the relation of avantgarde literature and film to other avantgarde forms of the period (e.g. Cubist and Surrealist painting, atonal and other experimental forms of music, etc.)? What is the relation of "avantgardism" to the general scientific and cultural climate of its time? What are the philosophical and aesthetic foundations of these movements? And what are their effects on the art of the 1950s, 1960s, and 1970s?

189. *Introduction to Semiotics* (Comparative Literature 181) Mr. WINNER.
Contemporary semiotics postulates that all human cultural interaction is based on communication, language, images, sounds, objects, gestures, kinship systems, economic exchange systems, etc., and that all these phenomena constitute systems of signs. The evolution of the concept of signs from the Stoics and St. Augustine, through Locke and Pierce, to the present day (Saussure, Jakobson, Levi-Strauss, Barthes, Eco, etc.). Simple sign systems (traffic signals, systems of etiquette and politeness) and more complex systems (natural languages, the various arts, general cultural and social systems, etc.) as perceived by contemporary scientists in both Western and Eastern Europe. Graduate students will fulfill special requirements.

190. *Semiotics and the Arts* (Comparative Literature 282) Mr. WINNER.
The concept of art as a sign as developed in the 1930s by members of the Prague Linguistic Circle, and since then by semioticians in Eastern and Western Europe and the Western Hemisphere. The course will examine semiotic theory as applied to verbal, visual, musical, and filmic arts. Semiotic theories of artistic levels of culture, polysemiotic aspects of art (e.g. in those arts in which more than one sign system functions), the problem of texts and artistic codes, aesthetic creation and reception, will be discussed. Students will apply theories to specific art works in individual research projects. Graduate students will carry out an extra project to be determined individually. No knowledge of foreign languages required. Prerequisite: Comparative Literature 181 (Introduction to Semiotics) or permission of the instructor.

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*

Mis. 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 analyses will be based on a study of the infrastructure of each work and the external influences of the period. Included are the literary and theoretical contributions of Polocky, Trediakovsky, Lomonosov, Sumarokov, Kheraskov, Maikov, Bogdanovich, Derzhavin, Karamzin, Bobrov, Batiushkov, Shiskov, and others. 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*271, 272. *Seminar in Russian Literature*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 theses.

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.
231. *A Comparative Analysis of Belorussian and Russian* Mr. MATHIESEN.
A contrastive study of the phonology, morphology, and syntax of present-day Belorussian and Russian. Reading and analysis of Belorussian texts. 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* Mr. WINNER.
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.

274. *Studies in Structural Poetics* (Comparative Literature 265) Mr. WINNER.
The work of the seminar will concentrate on the aesthetics and poetics of the Prague School and its semiotic theories, and examine later structuralist and semiotic approaches to poetics and literary studies. No knowledge of Slavic languages required.

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.

Social Science Data Center

The Center is an interdepartmental research and training facility for the social sciences at Brown. The Center provides a number of services for the social service departments. Included among these are (1) the maintenance of a data archive which, at present, includes over 150 social science data sets. A description of each data set may be obtained from the Center's data librarian in Maxcy Hall; (2) The Center conducts various workshops on the use of the Computer and the data center facilities; (3) a staff of consultants is available to help social science users; (4) the Center develops and distributes computer-based systems of social data management and statistical analysis which offer a wide range of opportunities for maximizing the use of the archives.

Sociology

Professors GOLDSTEIN, ZIMMER, PFAUTZ¹, SAKODA, POTTER, MARSH, WESSEN, RUESCHEMEYER, MARTEL; Associate Professors SPEARE (Chairman), ANDERSON, EVANS, MONTEIRO; Assistant Professors KOBRIN, MARKS, STEPHENS, WHITT, YEDIDIA.

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 new Department Guide.

¹On leave of absence, 1979-80.

UNDERGRADUATE CONCENTRATIONS

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 in sociology are required including Sociology 1 or equivalent (Sociology 3, 5 or 7), 101, 102, 110 and two undergraduate seminars or (with permission) graduate seminars. Only one course from among those numbered 1-7 and one from those numbered 10-21 may count for Concentration credit. With adviser consent, students may substitute other courses for those listed above. Students also are encouraged to enroll in Sociology 198 in order to develop — by thesis or otherwise — an individual integration of their concentration studies. Concentrators should work out their program with an adviser 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 contains suggestions for individual programs of study relating to such special fields of interest as education, law, management, population studies, public health and social work.

Honors will be awarded to students who, in the judgment of the faculty, fulfill their concentration aims with distinction. While no special courses are entailed, candidates should note that the University requires an Honors Thesis which should be planned with an adviser the senior year (see Honors Program.) For a more intensive program, some graduate courses may be included (with approval). A four-year combined A.B./M.A. 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, with particular emphasis on the comparative study of modernization, and (3) 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.

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, the IBM 360, 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 341 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 Departmental Computer Laboratory.

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.

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, including the comparative study of modernization, 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.

Students may select their two fields of specialized inquiry from among these three areas, or they may choose one of the above fields and a second specialty which cuts across the three 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 Examinations 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.

I. PRIMARILY FOR UNDERGRADUATES

1. *Sociological Perspectives*

Mr. WHITT.

An introduction to basic concepts and major perspectives of sociology, applied to the analysis of socialization, language and culture, social classes, political processes in the community, work, and the natural environment. A specific goal is to teach the student to apply sociological insights to the analysis of everyday life.

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. STEPHENS.

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.

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: Social Structure and Personality*

Mr. PFAUTZ.

An analysis of the significance of culture and social interaction for the development of personality. The nature and function of language, group norms, and social structure in the socialization process. Social and cultural factors in motivation, neurosis, and national character.

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*

Ms. KOBRIN.

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*

Messrs. SAKODA, AND SPEARE.

Introduction to commonly-used methods of research in sociology — questionnaire construction and processing, field observations, content analysis, census data, data analysis, simulation, use of computer programs.

110. *Introductory Statistics for Social Research*

Mr. SAKODA.

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. WHITT.

Interested students should register for Urban Studies 116.

120. *Population Growth and the Environment*

Ms. ANDERSON.

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 Teaching* (Education 121)

Mr. SCHNEIDER.

See Education 121 for description.

122. *Urban Education* (Education 122)

Mr. SCHNEIDER.

See Education 122 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*

Mr. PFAUTZ.

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 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. SPEARE.

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)

Ms. MARKS.

See Urban Studies 132 for description.

133. *The Metropolitan Community* (Urban Studies 133)

Ms. MARKS.

An analysis of the growth and development of the metropolitan community in industrial society. Emphasis on the problems arising from this new widespread settlement pattern including the sociological impact of the changing distribution and composition of the population, the need for and the consequences of urban renewal, the changing distribution of institutional functions, and the politics of metropolitan areas.

135. *Environment and Urban Life* (Urban Studies 135)

Mr. WHITT.

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. STEPHENS.

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.

142. *Law and Society*

Mr. RUESCHEMEYER.

Examines law and legal institutions in a sociological perspective. Major themes are: the tension between inequality in society and the ideal of equality before the law, the interrelations between legal sanctions and other social forces controlling people's behavior, the law as a product of social and economic change, and the role of the law in bringing about change as well as maintaining the status quo.

144. *Social Movements and Social Protest*

Mr. PFAUTZ.

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*

Messrs. EVANS AND MARSH.

A sociological analysis of complex organizations and their role in modern society. Examines how organizational structures affect choices of goals and effectiveness in attaining them. Special emphasis is on political and service organizations, which are treated in contrast to economic organizations. Examines bureaucracy as a product of social change and a factor shaping the directions of future social change.

154. *Human Needs and Social Services* (Urban Studies 154)

Mr. YEDIDIA.

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.

155. *Sociology of Medicine*

Mr. YEDIDIA.

Analysis of the social aspects of health, illness, and medical care in various societies, with emphasis on the United States. Included will be such topics as sociological analysis of the

hospital, the medical profession, and public health agencies; attitudes and beliefs about health and illness; and social factors in the distribution of illness. Attention will be given to the current organization of the American medical system and related policy issues.

158. *The Sociology of Work and Industry, I*

Messrs. WHITT AND 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 inter-organizational 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 study of the causes, correlates and consequences of the process whereby nations become modernized. Theories and research in sociology and the other social sciences will be examined as they bear upon the problems of development, especially the relationship between factors internal to societies and the international setting of societies.

161. *Sociology of Education* (Education 161)

Mr. SCHNEIDER.

See Education 161 for description.

162. *Educational Policy and Social Change* (Education 162)

Mr. SCHNEIDER.

See Education 162 for description.

164. *Social Inequality*

Mr. STEPHENS.

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 of sociological theory and research in our own and other societies, both present and past.

187. *Undergraduate Seminars*

Open to juniors and seniors 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. PFAUTZ.

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. *Special Topics in the Urban Community: Social Welfare Policy and U.S. Cities* (Urban Studies 187C)

Ms. MARKS.

Will examine how social welfare policies at the federal level — e.g. AFDC, Social Security, other cash transfer programs, proposals for income maintenance — relate to the social structure of cities. 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 economics 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***Mr. YEDIDIA.**

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***Mr. SAKODA.**

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.

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.

196. *Contemporary Sociology: Junior Seminar***The STAFF.****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. SPEARE.**

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*

Mr. PFAUTZ.

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 cross-national, will be used together with studies of stratification in the United States. 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. 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 comparisons of these with the earlier modernizing Western societies. Offered every year.

208. *Social Movements*

Mr. PFAUTZ.

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* Mr. WHITT.

An analysis of the sociological bases of power, political organization, and decision-making in U.S. cities. Offered in alternate years.

213. *Medical Sociology* Mr. WESSEN.

A systematic examination of selected aspects of medical sociology. In particular, illness behavior, both mental and physical, and the development of formal and informal social organizations concerned with such behavior will be analyzed. Offered every year.

214. *The Metropolitan Community* The STAFF.

An analysis of the major non-ecological studies of urban communities, with emphasis on social organization and stratification. Offered in alternate years.

215. *Research in Modernization* Messrs. EVANS AND MARSH.

This is a research seminar, designed to follow Sociology 207. Students will be encouraged to use available data banks and library sources in order to conduct empirical tests of theories and hypotheses concerning the modernization of societies.

217. *Topics in Societal Analysis: Comparative Social Mobility* The STAFF.

An intensive consideration of the methodology and techniques of mobility research. Course includes description of types of mobility analysis and critical examination of examples of mobility research. An extensive body of cross-national data is available for analysis and topics to be studied are the process of status attainment, the relationship between geographical and social mobility, and the consequences of mobility for other types of behavior, e.g., fertility, family patterns, political behavior, class consciousness, etc. Offered in alternate years.

218. *Population Growth and Economic Development* Ms. KOBRIN.

The relation between population growth, natural resources, and economic change both in developed and in underdeveloped countries; and 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* Mr. PFAUTZ.

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. SAKODA.

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. The course will include data analysis using the ECTA computer program for loglinear models. Other optional topics include factor analysis, measures of segregation, spurious index correlation. 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*

Ms. ANDERSON, Messrs. SAKODA AND POTTER.

Offered irregularly.

- (a) Advanced computer programming in sociology.

Mr. SAKODA.

Prerequisite: Sociology 242 or consent of the instructor.

- (b) Stable Population Theory

Mr. POTTER.

- (c) Factor Analysis

Mr. SAKODA.

Prerequisite: Sociology 222 or consent of the instructor.

- (d) Historical Demography

Ms. ANDERSON.

- (e) Analysis of Deficient Demographic Data

Ms. ANDERSON.

228. *Urban Institutions and Organizations*

Ms. MARKS.

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 and Illness in the Urban Setting*

Mr. YEDIDIA.

The impact of urban life on the physical and mental health of city residents in a variety of different societies. Emphasis given to incidence of illness, illness behavior, and the organization of medical services in the urban setting. The political processes affecting these issues and methods of inquiry. 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.

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.

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*

Mr. 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* The STAFF.
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* The STAFF.
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.
242. *Computer Applications in Sociology* Mr. SAKODA.
Basic knowledge of computer usage for social sciences. Use of social science packaged programs. Introduction to job control language. Basic FORTRAN programming. Use of terminals. Offered every year.
246. *The Impact of Metropolitanization: Special Topics* Mr. WHITT.
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, WILMETH (Chairman); Associate Professors EMIGH, BASS; Lecturers, Mr. LUCAS, Ms. STRANDBERG, and 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 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 Prof. 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 (versus 10, pending EPC approval) are:

- A. Theatre Arts 123-124 (to be taken prior to semester VII); Theatre Arts 25.
- B. Four courses in dramatic literature or theatre studies.
- 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.

I. PRIMARILY FOR UNDERGRADUATES

21. *Voice and Diction*

Ms. TANNENBAUM.

Fundamentals of oral communication: voice, articulation, Phonetics, techniques of delivery, and understanding interpersonal communication through the medium of speech. Course limited to 20. A section on voice and diction for the stage will be offered. Written permission required.

23-24. *Play Production*

Mr. BARNHILL.

The elements of dramatic analysis and interpretation, as applied to the art of acting. In special cases the course may be repeated. Written consent required. Course limited to 25. Eight hours of attendance.

25, 26. *Technical Production of Plays*

Mr. LUCAS.

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.

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. 25 is normally a prerequisite to 26, but arrangement possible with consultation.

31. *Dance and Movement for the Theatre*

Ms. STRANDBERG.

One and one-half hours of class, four days a week. Prerequisite: Attainment of an intermediate level in any dance technique. Written permission required. Course limited to 40.

32. *Dance Composition and Choreography*

Ms. STRANDBERG.

Prerequisite: Some experience in dance composition or dance choreography. Written permission required. Course limited to 40.

65. *Introduction to the Analysis of Cinematic Conventions.*

See Semiotics 65.

66. *Introduction to Cinematic Coding and Narrativity*

See Semiotics 66.

71. *Introduction to Filmmaking*

See 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 the 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. (Pending approval of EPC.)

II. FOR UNDERGRADUATES AND GRADUATES

119, 120. *Play Production, Advanced Course*

Mr. EMIGH.

Written consent required. For qualified graduate students and for those undergraduates who offer 23-24 as a prerequisite. Under special conditions, permission may be granted without fulfillment of the prerequisites.

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, styles of acting. Suggested for concentrators in Theatre Arts, American Civilization, and American Literature. Written permission required.

123, 124. *A History of the European Theatre*

Mr. WILMETH.

Semester I: The theatre and the theatre arts of ancient, medieval Europe and the Renaissance in England.

Semester II: The European theatre and theatre arts from the Italian Renaissance to 1920, with special reference to the English theatre. The emphasis both semesters will be on the development of the theatre in relation to production, acting, management, scenery and costuming, and architectural styles and changes. Representative plays from the periods covered will be included.

125. *Non-Western Theatre and Performance*

Mr. EMIGH.

A seminar open to graduate and undergraduate students. A study of selected performance idioms and traditions of Asia, Africa, and the Americas. Use will be made of slides, films, and tapes, and visiting artists and guest faculty from various disciplines. (Pending approval of EPC.)

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, British music hall, minstrel show, burlesque, and popular theatre. Written permission required. (Pending approval of EPC.)

127. *The Lyric State, 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. (Pending approval of EPC.)

128. *Topics in Theatre Studies*

Messrs. EMIGH and LUCAS.

Prerequisite: 122, 123, 124 or permission. Topics for 1979-80: The Lyric Stage 1600 to Present (Lucas); Seminar in Dramatic Theory (Emigh).

130. *Advanced Scenic Design and Technical Production*

Mr. LUCAS.

A course designed to provide the student with research and experimentation into the materials and media of scenic and lighting design. Also included is work on a variety of theatrical productions including opera, ballet, non-proscenium staging, and theatre management. Prerequisite 25, 26.

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.

152. *Seminar in Theatre Arts* The STAFF.
Special topics in stage direction and theatre studies in a seminar format. Intended primarily for concentrators in Theatre Arts. Written permission required.

163. *Special Topics in Film History*
See English 163.

166. *Seminar in Film Criticism*
See English 166

180. *Seminar in Dramatic Theory* Mr. EMIGH.
Studies in Western and Non-Western dramatic art. Theatrical theory from Aristotle to Grotowski. Written permission required. (Pending approval of EPC.)

189. *Independent Reading and Research* The STAFF.
A program of intensive reading and research on selected topics arranged in terms of special needs and interest of the student. Written permission required.

199. *Senior Honors Thesis Preparation* The STAFF.

RELATED COURSES

Courses in dramatic literature offered in other departments, in particular English, Greek Classics, French, Comparative Literature, German and Italian, can be taken for credit in the concentration. 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. An inter-departmental research team, known as the Center for Urban Studies, was formed and funded by grants from the National Science Foundation, the Economic Development Administration, the Department of Transportation, the Rockefeller Foundation, and the Department of Health, Education, and Welfare.

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), W. JORDY (Art), P. SYMONDS (Engineering); Adjunct Professor M. FELDMAN (Urban Studies); Associate Professor H. CHUDACOFF (History); Associate Professor V. HENDERSON (Economics); Assistant Professors M. BRINTNALL (Political Science), C. MARKS (Sociology), J. A. WHITT (Sociology), J. M. SCHNEIDER (Education).

Inquires regarding Urban Studies should be addressed to the Chairman, Box 1833.

UNDERGRADUATE PROGRAMS

STANDARD CONCENTRATION PROGRAMS 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. *Quantitative methods* (one course): selected from among Psychology 9; Economics 162; Political Science 155, Sociology 110; Mathematics 162; Applied Mathematics 115; and Biology and Medicine 149.
2. *Core curriculum* (one course from *each* of four disciplines): selected from among Art 56 and 59; Economics 141 and 142; History 175 and 176; Political Science 22 and 118; and Sociology 116, 130, 132, 133, 135, 154, and Urban Studies 102.
3. *Seminar* (one course): selected from among *Urban Studies* 187C, 188; *Anthropology* 222; *Art* 159; *History* 197C; *Political Science* 182; and *Sociology* 210, 228A, 228B and 231.
4. *Complementary curriculum* (three courses): selected from among *Urban Studies* 23, 101, 190, and 191; *Afro-American Studies* 110; *American Civilization* 152; *Anthropology* 121 and 122; *Classics* 54; *Economics* 148, 151, and 195; *Engineering* 90, 132, 194D, 194F; *Political Science* 147, 182 (selected topics); *Psychology* 22; *Sociology* 15, 102, 127, 144, 148, 158, and 187G; *Education* 100-101, 161. (Courses listed under groups 2 and 3 above, and not used to satisfy those requirements, may be used to fulfill this requirement).

Honors: Candidates for honors concentration should apply during the second semester of their junior year. Eleven courses are required of an honors concentrator, including two courses of thesis preparation taken in the senior year. An honors concentrator is exempt from the seminar requirement. To receive an honors degree, a candidate must be examined orally on the thesis by an appropriate committee. 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. BRINTNALL.
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. *Internship in the Urban Community* Mr. FELDMAN.
Application of theoretical and classroom experience to practical field experience 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 sponsors. A final, analytical report will be required. Written permission required.

102. *Issues in the Development of a National Urban Growth Policy* Mr. FELDMAN.
 (1) Emergence of National Urban Issues in Pre-WW II USA; Essays in planning-local state, regional and national; Federal sponsorship of state planning (Sec. 701) to federal requirements in planning (urban renewal, environmental impact of statements); The roles of the legal, administrative and planning processes in policy formation; From a National Urban Policy to a National Human Settlement Policy-requisite condition. (2) Case materials and underlying theories of urban strategies; legislative reports (primarily congressional); General Accounting Office program evaluation reports. (3) The course will focus on the history of selected issues, e.g., slum clearance, aid to depressed areas, urban transportation, growth, no-growth and the environment; an analysis of various kinds of planning ("master," development, project, incremental) as applied to urban policy issues; and will examine national urban strategies in selected foreign nations and the current status of national urban policy formation in the United States.
116. *The Modern Corporation and Metropolitan America* Mr. WHITT.
 (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. BRINTNALL.
 Examination of urban public policy formation and implementation in the context of intergovernmental 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. SPEARE.
 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* Ms. MARKS.
 This course will develop a systematic analysis of the urban housing market, including the examination of housing supply by type and availability, the role of housing subsidies, problems of land use, and tenants and tenant action among socioeconomic status groups. The intent is to produce a specialized investigation of housing which relies on the literature of sociology and urban studies for its explanation.
133. *The Metropolitan Community* (Sociology 133) Ms. MARKS.
 An analysis of the growth and development of the metropolitan community in industrial society. Emphasis on the problems arising from this new widespread settlement pattern including the sociological impact of the changing distribution and composition of the population, the need for and the consequences of urban renewal, the changing distribution of institutional functions, and the politics of metropolitan areas.
135. *Environment and Urban Life* Mr. WHITT.
 The major interrelations that exist among three systems: (1) human society, (2) human-made or "artificial" environment (varying from personal space to metropolitan regions), and (3) the natural environment (material and energy cycles, natural resources, climate, etc.). Special attention to the city as the focus of particularly intense society-environment interactions.

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. YEDIDIA.

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.

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*

Ms. MARKS.

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 greenbelt and new town planning, garden cities and urban renewal. A research project related to urban planning policy will be required.

187I. *Social Welfare Policy and U. S. Cities*

Ms. MARKS.

For juniors and seniors who are pursuing concentration in 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.

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.

PRIMARILY FOR UNDERGRADUATES

10. *The Asian Experience in America*

Messrs. KAU, LEE, and LEUNG.

Asians in America are caught in an intellectual and cultural crisis. On the one hand, they are held up as models of "successful" assimilation and upward mobility; on the other hand, they see in the Asian communities some of the worst housing and health conditions, sweatshop working conditions and wages, rising crime and juvenile delinquency, and the lingering effects of segregation and discrimination. This contradiction has created a moral and intellectual crisis particularly among the second and third generation Asian-Americans. To them, the "normal" paradigms for professional success and mobility seem no longer adequate. Yet no clear alternative has emerged and the void is filled with alienation and anomie.

A major factor in this crisis among Asian Americans stems from the lack of understanding of their own heritage and history, and their subsequent lack of an historical perspective on and a perceptive assessment of the reality of contemporary American society. The prevailing myths, ranging from Confucius to coolies, from Charlie Chan to Kwai-chang Caine, have further compounded their intellectual frustrations. The purpose of this course is to penetrate this shroud of myths and to bring to light the reality of Asian experience in America. The course will focus primarily on the Chinese, Japanese and Filipino communities, but experiences of other ethnic groups will also be brought in for comparative analysis.

The first half of the course will present a historical survey from the mid-19th century to the Second World War. This survey will focus on: the causes and patterns of immigration; the absorption of Asian labor into the expanding American economy; legislative and diplomatic efforts at discrimination and exclusion; and the development of Asian communities in America. The second half of the course will analyze the major issues facing Asians in contemporary America: these include economic conditions, education and social mobility, community power structure and political participation, and the problem of ethnic identity, alienation and assimilation.

The course will combine lectures, student reports and class discussion. Written work will consist of two book reviews and a term paper. Students will be also encouraged to organize occasional panels, and workshops, to discuss topics of special interests to the Asian students and the academic community at Brown.

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

¹See also Special Themes and Topics/Seminar Courses (page 374) and Special Themes and Topics/Foundations Courses (page 377).

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. Written permission required.

27. *Social Issues in Biology*

Ms. FAUSTO-STERLING and Mr. FAUSTO.

Biological theory and research often effect social policy in our society. We will examine biological theory and social policy both from an historical and a current viewpoint. Emphasis will be placed on (1) an understanding of the biological theories involved, (2) a critique of the notion of the independent, culture-free, neutral scientist, and (3) an examination of the relationship between supposedly non-applied biological research and social policies in arenas as diverse as criminology, immigration, education, marriage laws, and workers' health and safety. We will deal with theories of biological determinism as they affect views of I.Q., race and heredity, women, and aggressive behavior in men. The most modern theory of biological determinism — Sociobiology — will be dealt with as a separate topic. In addition we will do a case study of basic research on the effects of asbestos in worker health in order to examine the notion of scientific objectivity.

27. *Male vs. Female: Stereotypical Western Role-Modelling as Seen Through Folklore and Children's Literature*

Ms. ARANT.

In narrative folklore of the Western world (folktales, ballads, and epic poetry), women on the whole have played restricted stereotypical roles. In fairy tales, for example, she is an evil-working monster, a downtrodden or imprisoned maiden waiting to be rescued from her misery by a male hero who will transform her into a princess, or she is "the pot of gold at the end of the rainbow" for the hero whose prowess enables him to withstand testing and win the "prize."

This course will study the stereotypical roles of both men and women in folklore and children's literature, one of its modern literary manifestations, in order to determine the impact of these stereotypical male and female roles on the "romantic" myths, mores and models which to a great extent still influence male and female roles in society today.

33. *Faustian Man*

Messrs. WEIMAR, DONOVAN, FRERICHS, and SABOL.

Faust is one of the archetypal human figures. Like Don Juan and Don Quixote, he has fascinated and challenged writers and readers for centuries and seems to change with the times and tempers of the artists whom he attracts. His restless dynamic quest for knowledge, power, and experience has made him a symbol of Western man. He has taken shape in many forms: epic, drama, dance, poem, novel, short story, opera, and symphony. We shall first look at the prototypes: the Titanic rebel of Greek myth (the Prometheus play of Aeschylus) and the biblical story of the man tested by Satan and God (Job). The focus will be on the Faust figure of legend and literature: the would-be superman, damned and dispatched as a sinner, celebrated and saved as a hero, or demonically inspired and destroyed as a genius. Excursions into demonology, the fields of madness and genius, and the art of translation will be essayed by all.

The basic texts will be an Elizabethan drama (Marlowe's *The Tragical History of Doctor Faustus*), Goethe's *Faust*, and a modern novel, Thomas Mann's *Doctor Faustus*. It is recommended that students be able to read a little bit of German or French.

34. *Voices of the Two Germanies: Lyric Poetry (in Translation) as an Expression of and Protest against the Zeitgeist* Mr. WEIMAR.

An introductory study of the two Germanies as reflected in representative lyric texts of leading East and West German poets. The works will be examined as literary texts (imagery, rhythm, tone, etc.) and as cultural documents (expressions of protest against and affirmation of ideological problems and positions of confrontation and convergence).

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 and will also examine the hospital as seen by modern writers and film makers. This social institution will be examined through the study of sociological and literary works on the hospital and through optional observation in the hospital.

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 reknown (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, discussion, reading of one or two major works, slides, music, one research paper, course conference, but no final examination.

53. *The Image of the Jewish Shtetl in Yiddish (and other Eastern European) Literature*

Messrs. WARNOCK and TERRAS.

The *shtetl* — the Eastern European Jewish or partly-Jewish small town — was the subject of passionate but 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.

This course will begin with a brief historical introduction to the cultural and linguistic background of Eastern European provincial life. The primary goal is to examine how the *shtetl* was portrayed in the shorter prose writings of a number of Yiddish authors: Sholem Asch, Mendele Mocher Sforim, I. L. Peretz, I. M. Weissenberg, I. M. Dick, David Bergelson, S. Ansky, Joseph Opatoshu and I. B. Singer. For contrast we will read and discuss several works dealing with the topic by Russian (and perhaps some other non-Yiddish writing) authors. Several Yiddish films (with English sub-titles) that likewise show facets of *shtetl* life will be shown.

All readings can be done in English, and there is no foreign language requirement. However, students with knowledge of Yiddish will be encouraged to read at least some of the works in the original language, and an additional weekly meeting will be scheduled for these students for work on the language and for further discussion of the stories in Yiddish.

64. *Women and Health Care*

Ms. FARNES.

The goal of this course is to provide a systematic examination of (1) the ways in which the health care system has responded to the needs of women as patients, and (2) the roles women play as health care workers. In the process we expect to gain some understanding of how things came to be as they are now and to explore various avenues for change. We will proceed from an overview of health care systems and their components and interactions to a consideration of social problems women face in these components. A historical survey will be developed to apply to specific relevant roles (i.e. as health care recipients, deliverers of health care), and we will emphasize myths and controversies about women's physiology which have conditioned these roles. Finally, current roles of women in different health care systems will be compared, with emphasis placed on current movements which are modifying these roles in our society.

70. *The American Experience in Vietnam*

Mr. NEU.

This seminar explores the American encounter with Vietnam. It will focus on: 1) the origins of American intervention and the course of American policy from the early 1960's to the collapse of South Vietnam in 1975; 2) the nature of Vietnamese society and culture and of the revolutionary process there; 3) the impact of the war on American society and foreign policy. The war in Vietnam was a seminal event in recent American History, dominating the 1960's, reshaping the careers of politicians, soldiers, and bureaucrats, and ultimately creating tremendous disruptions and strains in American life. The seminar examines high-level policy, the experience of participants, and the distinctiveness of Vietnamese culture. The reading includes memoirs, scholarly studies, journalistic narratives, and works on Vietnamese society. Former participants will visit the classroom and help give students a sense of what it was like to fight there, a feeling for the texture of the time and place. Open to all undergraduates. Enrollment limited to 25. Written permission required.

71. *Man and Nature in the American Mind*

Ms. LAWRENCE.

This is an inquiry into the human relationship to nature in America. It will involve a consideration of views toward both inanimate and animate forms of nature and attitudes toward the wild. The central dilemma of man's view of himself either as an integral part of nature or as an element completely outside of, and implicitly superior to, other living forms will be addressed. Included will be an exploration of the question as to whether nature is always to be regarded with an exploitative attitude — seen as existing specifically for human use and consumption — or whether it is to be regarded as having an existence of its own right. Discussions will include possible applications of insights concerning the man-nature relationship to current problems involving human interaction with the natural environment.

73. *Bertrand Russell – Philosopher, Social Reformer, and Anguished Aristocrat*

Mr. WEGNER.

Bertrand Russell was perhaps the greatest intellect of the early 20th century, but was an anguished and deeply frustrated private individual. The course will examine Russell's public contributions to philosophy, education and social reform as well as his private life — which is extraordinarily well documented because he was a prolific letter writer. Studying his philosophical and social writings will serve as a vehicle for confronting many of the important philosophical, moral and social issues facing contemporary society. Consideration of the underlying human being will allow us to examine the relation between creativity, religion and sexuality and perhaps provide some perspective on our own motivations for pursuing academic courses of study.

91. *Peace and War (Anthropology)*

Mr. LEIS.

Interested students should register for Anthropology 91.

The main objective of this course is to examine critically social-cultural theories of social stability, power, rationality, conflict, and revolution. In pursuing this theme we begin with the nature-nurture question of whether "war is in our genes" or whether peaceful, coopera-

tive behavior is basic to human nature. Stated another way, we begin with an analysis of basic assumptions about human nature and the question of freedom of choice. The data will derive largely from the anthropological literature on political, economic, and religious aspects of nonliterate and industrial societies; the analyses will interrelate various theoretical perspectives in several disciplines, ranging from sociobiology to comparative religions study. Although the topic of peace and war infers a global consideration of international politics, the focus here will be to approach the consideration through a more microsmic attention to the principles inherent in the social order such as offered in the theories of alliance and exchange. The course will be open to all undergraduates, but is primarily oriented to those with little or no anthropology background.

102. *History of Biology and Medicine*

Messrs. BECK and ERIKSON.

In this seminar we 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 on two afternoons each week 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. This seminar is 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. Enrollment will be restricted to 15-20 students, 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 Biological and Medical Sciences (Room 102, Biomedical Building; tel. 863-3355). Offered in alternate years.

104. *Non-Western Performance* Messrs. EMIGH, BARNHILL, KOETTING, and BEEMAN. A seminar open to graduate and undergraduate students. A study of selected performance idioms and traditions of Indonesia, India, Iran, Africa, Japan, China, and Latin America. Faculty members from various disciplines will participate, along with outside performers and lecturers. Extensive use will be made of slides, films, and tapes, and visiting artists. S/NC.

FOR UNDERGRADUATES AND GRADUATES

105. *Culture and Health*

Ms. NEWMAN.

This undergraduate course will focus on definitions of health and disease and the cultural contexts within which they arise. Some of the topics will include charismatic medicine, cross-cultural perspectives on health behavior, folk medicine, and comparative formal medical systems.

108. *The Third World in the 1970's*

Messrs. KAU, LEE, and LEUNG.

Since the turbulent 1960's, the "Third World" movement has emerged as a major political and intellectual force in the international scene. In the United Nations the coalition of Third World nations has begun to disrupt the conventional patterns of world politics; in university campuses across the nation the "Third World Student Centers" have become a new conspicuous phenomenon in the academic life. But what is the "Third World"? Why do billions of people, here and abroad, identify themselves as part of the Third World? What aspirations and frustrations do they share? What problems and issues do they face? What are their cultural and political heritages, their social and economic roots? What is the degree of their unity, their diversity? What policy options and strengths do these peoples have in

coping with the acute crises of political instability and economic underdevelopment? This course is designed to stimulate and challenge students to think seriously and systematically about these crucial questions which the peoples of the Third World confront today. The course will begin with an in-depth examination of the political and economic heritages of Third World societies. This will be followed by an attempt to identify major internal and external causes of poverty, disorder and injustice that plague these lands. Among major topics to be analyzed are social stratification and power distribution, political reform and revolutionary violence, ethnic conflict and nation-building, the colonial heritage and neo-colonialism, racism, and super-power politics. The course will also examine specific models and strategies of modernization and development that have proved to be effective, and explore the trends and possible impact of the Third World movement on the Western World in the 1980's. The course will be conducted as a seminar with strong emphasis on a critical review of reading material and class discussion. Each student is required to write a research paper on a topic to be determined in consultation with the instructor. This course is recommended for upperclass persons who have previous experience in social science courses. Written permission of the instructor is required for enrollment.

150. *Justice and Health Care Delivery*

MR. DANIELS.

Issues of distributive justice lie at the center of much current debate about health care delivery. Unfortunately, they have been given relatively little systematic philosophical attention. The seminar will examine topics relevant to formulating a theory of distributive justice for health care, one which addresses controversy in three main areas: (1) debates about equality of access to the health care system; (2) problems of planning policy in the allocation of health care resources, especially on the macro level; (3) proposals for greater regulation of health care providers, to contain cost and increase quality accountability. The seminar will begin by analyzing the distributive principles which explicitly or implicitly underlie current proposals for reform and planning. For example, HSA decisions on certificate of need, or Blue Cross decisions on coverage and cost control, and some national health insurance proposals might be examined here. A second phase of the seminar will examine the problems facing the applicability of general theories of distributive justice to the problem of health care. Utilitarian, Libertarian and Contractarian (Rawls) theories all have no direct or natural applicability to problems of health care. The seminar will examine why the gap exists and some proposals for filling it. Finally, the results of the first two phases of the seminar will be pulled together into a proposal for a distributive theory for health care and its implications for the type of planning discussed in the first phase of the course will be examined.

Readings will include relevant selections from theories of distributive justice, documents on planning decisions and policies, and relevant articles by health planners, economists and sociologists. Throughout the course, the emphasis will be on making the philosophical issues accessible to health professionals.

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.

PRIMARILY FOR UNDERGRADUATES

7, 8. *Voices of Romanticism*

MR. LAURENT.

Although Romanticism was a complex, and sometimes contradictory state of mind, several distinguishable features found expression in the reaction to man's earlier construing of human experience in terms of reason alone. These "voices" or qualities are reflected in the Romanticist's preoccupation with the mystery of the universe, the fascination with the remote in time and in space, the emotional and imaginative aspects of man's nature, a subjective, individual approach to life, the interpretation of nature in personal terms, opposition to academic rules and tradition, and an emphasis on faith as a support to religion. The central aim of the course is a consideration of representative works which exemplify those qualities. Close reading, listening, study of paintings, written reports, and critical discussion will be done on the following works: Semester I: Goethe, *Faust*; Mozart, *Piano Concerto in D minor*; Beethoven, *Eroica Symphony*; Sterne, *Tristram Shandy*; selected paintings of Goya, Ingres, and David; Cooper, *Inquiry Concerning Virtue or Merit*; Rousseau, *Confessions*; Macpherson, *Fingal, An Ancient Epic Poem*; Blake, *Songs of Innocence*; Coleridge, *The Ancient Mariner*; Burke, *Reflections on the Revolution in France*; Godwin, *Political Justice*.

Semester II: Weber, *Konzertstück for Piano and Orchestra*; Schubert, *Die Schöne Müllern*; selected piano works of Chopin; Scott, *The Talisman*; Hugo, *Hernani*; selected paintings of Constable, Turner, and Delacroix; Kant, *Critique of Pure Reason*; Hegel, *Philosophy of History*; Keats, *Endymion*; Shelley, *Prometheus Unbound* and *Queen Mab*; Byron, *Don Juan*; Fichte, *Addresses to the German Nation*; selected writings of Faraday; Davy, *Consolations in Travel*; Darwin, *Origin of Species*. Additional reading will be required dealing with the primary aspects of the course. Enrollment will be limited. Open to juniors and seniors with permission of the instructor.

25. *Machines—Ideas and Some of Their Consequences*

MR. GRENANDER.

Purpose: To study the mutual influence between some basic mathematical ideas and the development of machine technology; to look into some of the social, economic, and cultural consequences of these ideas via these technological developments.

Contents: Starting with simple mechanical devices that are not strictly machines, the following categories may be discussed: (1) Machines transforming energy: the steam engine (Carnot cycle), hydroelectric power (theory of dams), self-regulating devices; (2) Machines in the factory: the Jacquard loom, the paper mill (control theory); (3) Traffic control machines: control of telephone traffic (queuing theory), control of traffic of vehicles (traffic flow theory); (4) Information machines: Pascal's calculator, Babbage's analytical engine, the von Neumann machine, the System/360 (ideas in computer architecture); (5) Abstract machines: The finite automation, Turing machines, artificial intelligence machines.

When discussing this material we shall ask questions such as: How did the current state of technology stimulate the development of new mathematical ideas? Conversely, did available mathematical tools lead to technological innovation? Can we trace some of the effects of such ideas in society?

The above list of contents is only intended as an indication of what sort of material will be discussed; it may be adjusted to suit the composition of the audience.

Prerequisites: Since the emphasis of the course will be on the conceptual level, an attempt will be made to keep the discussion as non-technical as is possible without losing the substance of the course. The ideas will be formulated and analyzed in mathematical terms, however, and therefore some command of the mathematical language is needed. Some knowledge of calculus, simple differential equations, elementary probability and comput-

ing is desirable although the mathematical level of the course may be adjusted later on to fit the background of the audience. Enrollment will be limited. Permission of instructor required.

35. *Indian Civilization*

Mr. PINGREE.

This course provides an introduction to aspects of Indian history, society, literature, and religion. Offered in alternate years beginning with 1979-80.

FOR UNDERGRADUATES AND GRADUATES

105. *The Informative Way of Life*

Mr. BARNES.

This inquiry into the nature of the life process as eventually developed in the human mind probes the beginnings of life in the universe, explores some of the philosophic meaning in life's uncertain and irresistible development, extends into characteristics of mind and behavior, and ends in efforts to apply these to problems of today's precarious world. The course, based on reading and discussion, is so adjusted as to be applicable to students in any field of study. It is designed for juniors, seniors, and graduate students.

109, 110. *Conceptions of Man; Diversity and Coherence.*

Mr. MORGAN.

Current beliefs concerning the human being are multifarious and often incompatible. For example, much praise is bestowed on rational discourse and action; yet often reason is said to be nothing but rationalization, or irrationality is extolled. For many people, the "subjective," the "emotional," and the "personal" are primarily sources of interference with our highest and most serious pursuits, but to others they are central to being human. Modernity is bent on continual increase of man's scope and powers by means of machines; yet man himself and his affairs are viewed as mechanisms by ruling disciplines. Dedication to values is thought to be essential to human life; at the same time, values are held to be "purely relative" or a matter of "personal prejudice." Everyone believes in freedom; but much of our thought insists and many social practices take for granted that freedom has no reality. Selfhood and relationship are experienced and described as being in crisis. The search for meaning manifests itself in innumerable forms in which promise and destructiveness are difficult to disentangle.

In this course we will explore some of the outstanding characteristics and divergent views of the human being. We will examine some of the reasons for the differences and conflicts, and we will search for more adequate and coherent understanding.

Two lectures weekly. Discussion in sections, once weekly. Designed as a year course, but in exceptional circumstances one semester may be taken. There are no specific admission requirements; however, the course is planned for students with considerable self-discipline and ability for sustained inquiry into fundamental questions. Open to sophomores, juniors, seniors, and graduate students. Enrollment limited to approximately 30. Written permission required.

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 man and 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.

118. *Between Man and Man*

Mr. MORGAN.

A study of interhuman relationship and of views concerning this fundamental realm of man's 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. First, 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 from various languages, 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 (communication, morality, responsibility, guilt, solitude, personal identity, community, rational discourse, problems of current techniques for furthering relationship). These explorations will give scope and substance to the understanding sought in the course 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.

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.

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.

137. *Professionalism, Politics, and Social Justice*

MR. BRINTNALL.

Professionalism, Politics, and Social Justice. Professionalism increasingly influences public policy formation and delivery, and defines the character of public life. Social critics both attack many of the ways in which professions operate in society, and point to professionalism as a code of honor and intellectual workmanship with great promise in social reform. This course will explore these and other conceptions of professionalism and their political and social importance. Some of the topics will be the nature of professionalism as a centralizing force in society, as professionals apply expert knowledge to ever wider publics; recruitment to the professions; political manipulation or professional identification; and the possibilities of professionalism in various alternative futures. Outside speakers will be invited. A major research paper is required. A background of a coherent program of several courses in history, social science, or the humanities is recommended, as well as capacity for independent work. Enrollment will be limited to 15 with written permission.

138. *Irish Culture and Society from Swift to Yeats*

Messrs. CURTIS (History) and VANECH (English).

Purpose: To explore the literature — polemical and poetical, ephemeral and enduring, topical and fictional — of Ireland from the 18th to the 20th century. The function of this course is to place this body of literature within an essentially historical framework in order to emphasize the constant as well as creative inter-action between the writer and his or her

times. By integrating the techniques and perspectives of both history and literary criticism, students will be encouraged to take a more holistic or comprehensive approach to literature in general and to Irish culture in particular. Introduction to the riches of Irish civilization during a formative period in the growth of both political consciousness and a sense of nationality. Nature of the Course: Both instructors have taught courses individually on Irish history (Curtis) and literature (Vanech) over the past few years. Two meetings of the class each week, with each meeting running for two-hours. Enrollment limited to 40 students. Students will write essays on selected topics, and there will be no final exam. At the first meeting of each week, the class will consider the historical setting or milieu of a particular piece of work; and the second meeting will be devoted to a close and critical examination of the text in question.

Among the writers and political thinkers to be considered are Swift, Goldsmith, Burke, Wolfe Tone, Maria Edgeworth, Carleton, Lever, Somerville and Ross, Yeats, and Joyce. In addition to studying the "mainstream" of the Anglo-Irish tradition, some of the old Irish or Gaelic components of both the popular and the dominant cultures will be discussed. Prerequisite: a minimum of two courses taken in European or British History, and/or two courses taken in the field of English or Irish literature. Written permission required.

143. *Caught in the Web: or the Form and Fate of Folklore*

Ms. ARANT.

Oral traditional narrative genres (epic, folktale, and ballad) as well as lyric genres (incantation, lament, ritual and lyric song, proverb and riddle) have at one time or another played a vital role in the life of mankind. 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, and probably always will be, even though their modern manifestations might seem somewhat 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 works to be studied will come from Babylonia, Greece, Finland, France, England, Russia, Yugoslavia, the American Indians, all of which may be read in English translation if necessary. The course will be conducted on a lecture and discussion basis. There are no prerequisites. 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*

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. Enrollment limited to 40. S/NC.

149, 150. *Literature and Society I and II*

Mr. VANECH.

This course is concerned with the interpretation of literature taken in a wide sense, and social history and political life from the English and French Revolutions to the present day. Among themes considered are intellectual, ideological, and imaginative reactions to the French Revolution (Blake, the Burke-Paine debate, Buchner's *Danton's Death*, etc), the novel and the bourgeoisie in Western Europe — Stendhal, Balzac, Dickens, Marx, Engels and the second European revolutionary wave, Russian nineteenth-century writers and the incubation of the revolutionary idea, from Pushkin to Tolstoy and Trotsky, reactionary and authoritarian ideas and imaginings in Western literature from the late nineteenth century — Sorel, Nietzsche, Kipling, Yeats, Eliot, Pound, Auden, Orwell and the left-wing writers in the thirties. This series of lectures which spans two semesters, introduces the student to the study of modern social history and literature in an interdisciplinary context, embodying the methods and perspectives of the literary critic and the social historian. We conclude with an analysis of such Third World writers as (Fanon, Achebe, Soyinka, Naipal, etc.). Enrollment limited. Written permission required.

161. *Universities: Their Theory and Practice*

Mr. MORSE.

Universities are complex institutions with functions affecting all aspects of modern life. In addition to teaching, they are institutions for scientific research, for historical and literary scholarship, for social analysis and criticism, and for the preservation of our cultural and intellectual record. Universities regulate recruitment to the professions and largely determine professional standards and values.

Their organizational complexity reflects this variety of functions. In the pursuit of science and scholarship the organizational norms of the modern university resemble those of their medieval ancestors, yet in the delivery of professional services, they are more like a modern industrial corporation.

The purpose of this course is to attempt to understand contemporary American universities — what they are and how they happened to be that way; what they've done well and where they have failed. The course particularly will attempt to compare what universities purport to do with objective evidence, insofar as it exists, of what universities actually do. In short, the myths will be compared with the facts. The subjects to be covered include: the evolution of universities in the United States; the organization and governance of universities; curriculum problems at the undergraduate and professional levels; faculties, academic freedom and tenure; students and their selection; the place of undergraduates in a university; research and scholarship; and the relationship of universities to government and other institutions. In examining such subjects, the intent will not be to determine what policies should guide Brown or any other university. The purpose rather will be to understand the way universities work in order to assess what may or may not be reasonable expectations for them in the future.

Reading assignments will be made from the large literature dealing with universities. A paper will be required on a topic selected by the student. There will be occasional invited participants.

Seminar Courses — 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 or inquiry (Humanities, Social Studies, Natural Sciences, 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 sophomores has consisted of two types of courses: Modes of Thought and Special Themes and Topics/Seminar. Titles of these courses offered in 1978-79 and scheduled to be offered in 1979-80 are listed below. For complete course descriptions, it is necessary to consult the booklet, Freshman Course Guide, for each of these years.

COURSES OFFERED in 1978-79

Modes of Thought

- MT 1. *Children's Literature: A Good Book is Hard to Find?* Ms. ALBERGHENE.
- MT 3. *Invisible Man Turned Inside Out.* Mr. BECKHAM.
- MT 4. *Exploring Mysticism.* Mr. BUCHDAHL.
- MT 5. *Language and Style: Methods of Investigation.* Mr. CATANO.
- MT 7. *The Convergence of Music and Poetry: A Prelude.* Mr. COAKLEY.
- MT 8. *The Cantatas of J. S. Bach.* Mr. ERMEY.
- MT 9. *Women and Scientific Investigation.* Ms. FARNES and Ms. BARKER.
- MT 10. *Historical Development of Some Biochemical Concepts.* Mr. FENTON.
- MT 12. *Projective Geometry.* Mr. HOROWITZ.
- MT 13. *Masculine and Feminine: Roles and Relationships in Ancient Greece.* Ms. KALKE.
- MT 15. *American Military Thought.* Mr. LATIMER.
- MT 17. *The Notion of Motion: A Semiotic Approach to Books, Films, and Still Images.* Ms. LINDERMAN.

- MT 19. *"Time, Myth and History."* Mr. LYONS.
- MT 21. *Literature and Psychology.* Ms. MASSE.
- MT 28. *Technology and Social Change.* Mr. ROTHBERG.
- MT 29. *Origami as an Art Form.* Mr. SAKODA.
- MT 30. *Behavior and Survival.* Ms. SORRENTINO.
- MT 32. *Literature and the Russian Revolution.* Mr. TERRAS.
- MT 34. *Art Patronage of the Early Plantagenets.* Ms. WARD.
- MT 36. *Philosophical Implications of Parapsychology.* Mr. SCHICK.
- MT 37. *The Folklore and Folklife of New England.* Ms. GROCE.
- MT 38. *Fear.* Mr. BLOUGH.
- MT 39. *Children, Family, and Public Life: A Philosophical and Historical Analysis.* Mr. McGRATH.
- MT 40. *The Theory of a Jewish State: Zionist Thought in the Nineteenth and Twentieth Centuries.* Mr. NEUSNER.
- MT 41. *Bertrand Russell – Philosopher, Social Reformer, and Intellectual Gadfly.* Mr. WEGNER.
- MT 42. *Babylon Revisited: Hollywood in Fact, Fiction, and Film.* Mr. LAMSTER.

Special Themes and Topics/Seminars

- ST/S 2. *Seminars on Global Issues.* Mr. BARNES.
- ST/S 6. *The Structure of American Sign Language.* Ms. CHINCHOR.
- ST/S 11. *The Kibbutz.* Mr. GOLDENBERG.
- ST/S 16. *Military Influence in America.* Mr. LATIMER.
- ST/S 18. *Film History: A Semiotic Approach.* Ms. LINDERMAN.
- ST/S 22. *Introduction to Cryptology.* Mr. MATHIESEN.
- ST/S 23. *Perspectives on the Contemporary American Family.* Ms. MICHEL.
- ST/S 24. *Law, Liberty, Morality.* Mr. G. MILLER.
- ST/S 25. *Women and Politics.* Ms. MONIZ.
- ST/S 26. *Cities: Experiences and Images.* Ms. PHILLIPS.
- ST/S 27. *Women and Social Services.* Ms. POTUCHER.
- ST/S 31. *Stocks, Bonds, and Futures: Dollars and Sense on Wall Street.* Mr. STUMPP.
- ST/S 33. *From Continental Drift to Plate Tectonics.* Mr. TULLIS.
- ST/S 35. *Perceptions of Native Americans and Their Social Worlds.* Ms. YENTSCH.

COURSES TO BE OFFERED IN 1979-80

Modes of Thought

- MT 3. *Slavery and the American Mind.* Ms. BASS.
- MT 5. *Exploring Mysticism.* Mr. BUCHDAHL.
- MT 6. *Language and Style: Methods of Investigation.* Mr. CATANO.
- MT 7. *Women as Healers and as Patients: An Historical and Theoretical Approach.* Ms. CAYLEFF.
- MT 9. *Self-Knowledge and Selfhood.* Mr. DEPASCUALE.

- MT 11. *Women and Scientific Investigation*. Ms. FARNES and Ms. BARKER.
- MT 12. *Historical Development of Some Biochemical Concepts*. Mr. FENTON.
- MT 13. *Mathematics as a Historical Creation*. Mr. FULTON.
- MT 16. *Plants and Civilization*. Mr. HEYWOOD.
- MT 17. *American Military Thought*. Mr. LATIMER.
- MT 19. *Music: The Universal Language?* Ms. LEICHTMAN.
- MT 21. *Literature and Psychology*. Ms. MASSE.
- MT 23. *Children, Family, and Public Life: A Philosophical and Historical Analysis*. Mr. McGRATH.
- MT 24. *Generations*. Mr. MEAGHER.
- MT 27. *The Modern Democratic State: Ideas, Institutions, and Ideologies*. Mr. NORDLINGER.
- MT 29. *Women, Social Relationships, and Sexual Symbolism in American Culture*. Ms. PEISS.
- MT 30. *Indian-White Relations in America*. Mr. ROTHBERG.
- MT 32. *Behavior and Survival*. Ms. SORRENTINO.
- MT 33. *Our Microbial Allies (or, the Legacy of Leeuwenhoek)*. Ms. STEWART.
- MT 34. *Literature and the Russian Revolution*. Mr. TERRAS.
- MT 37. *The Gothic Cathedral: An Exploration of its Artistic, Social, and Religious Meanings*. Ms. ZIEGLER.
- MT 39. *The Theory of a Jewish State: Zionist Thought in the Nineteenth and Twentieth Centuries*. Mr. GOODBLATT.

Special Themes and Topics/Seminar

- ST/S 1. *American Culutre in the Depression*. Mr. ABRAHAMS.
- ST/S 2. *Seminars on Global Issues*. Mr. BARNES.
- ST/S 4. *Don't Think Twice: Counter Culture Literature of the 60's*. Ms. BRODSKI.
- ST/S 8. *Feminist Literary Criticism*. Ms. CROSBY.
- ST/S 14. *The Kibbutz*. Mr. GOLDENBERG.
- ST/S 15. *Losers and Winners, Losers as Winners: The Schlemiel in Jewish Literature*. Mr. GREENSPAN.
- ST/S 18. *Military Influence in America*. Mr. LATIMER.
- ST/S 20. *Psychoanalytic Approaches to the Representation of Women in Cinema*. Ms. LINDERMAN.
- ST/S 22. *Introduction to Cryptology*. Mr. MATHIESEN.
- ST/S 25. *Law, Liberty, and Morality*. Mr. MILLER.
- ST/S 26. *The Changing Structor of the Family in Literature and Film*. Ms. MORGAN.
- ST/S 28. *The Development of Early American Science*. Ms. NORMAN.
- ST/S 31. *Philosophical Implications of Parapsychology*. Mr. SHICK, JR.
- ST/S 35. *Relativism and Reality: Is Truth Whatever You Believe It to Be?* Mr. THROOP.
- ST/S 40. *Indians and Englishmen in Colonial New England*. Ms. BRAGDON.

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 his or her 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/F 11. *The Rule of Law*

Messrs. BEISER and FRIEDMAN.

A critical analysis of 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 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.

ST/F 12. *Perspectives of Human Behavior*

Mr SHEPP.

This course will investigate a variety of human behaviors including aggression, sex-roles, and mental disorders. Each will be studied from the point of view of ethnology, psychoanalysis, behaviorism and humanistic psychology. The goal is to determine how each of these alternative views provides perspective in the understanding of human behavior.

ST/F 13, 14. *Ancient World*

The Ancient World is remote, yet close. Many of our own ways of thinking derive from that source, and yet we are not they. Our world view does not include slavery as a natural condition; few of us regard the sun as a divinity; we are more concerned with pollution, public health, equality of opportunity, for reasons that are sometimes no more clear than the ancients' reasons for holding that the earth is the center of the universe or that man is divinely placed at the top of the scale of nature. We also believe that the universe is susceptible to understanding, and that disease can be understood and mastered. Some ancients shared this belief, others did not. In this course we will endeavor to examine what the ancients did and believed, in hopes of providing an introduction to the ancient world which will allow us both better to understand ancient man and to realize, if only by implication, the achievements, opportunities and limitations of our own world views.

This course will treat the ancient Mediterranean world in its entirety, beginning with Egypt, passing to Mesopotamia, Iran and India, and then to the Greek world. The second semester will trace developments up to the end of antiquity, starting with Alexander the Great. Lectures will be given by members of the departments of Classics, History of Mathematics, Religious Studies. Short papers will be required on individual segments of the course; there will be an hour examination and a final. During Reading Period students will be expected to select from reading lists provided a book or topic on which they will be examined on the final examination.

The course is introductory, open to all, and we hope to develop understanding rather than complete mastery of the material covered. Professors Wyatt, Boegehold, Fonara, Raafiaub, and Workman (Classics); Parker (Egyptology); Sachs, Pingree, Toomer (History of Mathematics); Frerichs, Moehring, Neusner, and Sarason (Religious Studies).

ST/F 15. *Intelligence: What is It, Why is It, Where is It?*

Mr. GERRITSEN.

The basic idea of this course is to investigate the nature of intelligence from many points of view. Since intelligence appears to be that ingredient of which one must have a fairly large quantity to be admitted to Brown, either as student or teacher, and which is assumed to be texture that must exist for knowledge to be able to take hold and bloom, its study is certainly relevant for all of us. The three subdivisions form a convenient triple focus around which discussions, readings, and a few experiments will be done.

"What is intelligence" will discuss human, animal and machine intelligence. Questions of intelligent versus rational behavior, logic and logical machines, distinctions between various kinds of intelligence such as scientific, pictorial, musical intelligence, ways to measure intelligence, intelligence and its connection with survival (including sociological), and an attempt at defining intelligence fall under this category.

"Why is intelligence" will discuss the survival value of intelligence, but also its lethal capabilities. Development of intelligent behavior in animal evolution will be treated. The connection between intelligence and information will be studied and the role of entropy, the opposite of information and the great leveller (destroyer of structure). The non-existence of Maxwell's Demon (the latter only if time permits and the class seems well enough prepared) may be touched upon briefly.

"Where is intelligence" will discuss the chances of it existing elsewhere in the universe, the possibilities and consequences of making contact with it and speculations about the reasons why no overt contact has yet been made. Transmission of intelligence and intelligence content of one culture to another in the universe will be studied.

About a dozen exercises are intended to be part of the course, in particular: Psychological experiments: Bentham's top about color coding; Pulfrich's pendulum about stereoscopic information processing; medium term memory by after effects in fixation of geometrical, colored patterns. Reading and study of I.Q. tests. Logical experiments by putting a binary counter (scalar) together. Perhaps a computer simulation experiment in the area of artificial intelligence. Entropy experiments can be several. Certainly a chemical clock reaction will be on the program. Astronomical experiments: some observations and photography of planets, stars, galaxies. Measurement of the distance earth-moon to get a feeling for astronomical distances. Attempt to observe the optical pulses from the Crab Nebula pulsar.

ST/F 16. *Environmental Issues* (Environmental Studies 11)

Interested students should register for 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/F 18. *Foundations of the Theory of Signs* (Semiotics 12)

MESSRS. SCHOLES and SILVERMAN.

Interested students should register for Semiotics 12.

The elements of semiotics for potential concentrators and other interested students. In 1979-80, the course will emphasize visual theory and spectatorial attitudes with particular attention to film.

ST/F 21. *Time and Place: An Inquiry into the Organization of Human Experience*

Mr. CROSSGROVE.

This course will begin by analyzing the different phenomena subsumed under the term time.

The relationship between time as a dimension and spatial dimensions will lead into a discussion of the measurement of time and place, and the representation of time and place in human artifacts. Special emphasis will be placed on showing how time and place are reflected in works of art. The course is intended as an interdisciplinary introduction to some basic questions of human experience, and it will draw from the work of scholars in fields ranging from geography and psychology to philosophy and literature. Discussion will be encouraged whenever possible, but much of the material will be presented in lectures, including some by faculty members with special expertise who will be invited to participate for a short time. Each student will prepare two short papers (five to ten pages) during the semester. The first will summarize the contribution of a particular discipline to the study of one of the issues raised in the lectures, and the second will analyze the use and representation of time and place in a particular aesthetic object. There will be a final examination on the assigned readings and lectures. A more detailed course outline is available from the instructor at 190 Hope Street.

ST/F 47. *Anatomy of the Soul: A reading of Søren Kierkegaard*

Mr. TWISS.

Often regarded as the originator of existential inquiry, Søren Kierkegaard wrote a captivating poetic and philosophical literature concerning human existence. Taking personal despair as his point of departure, Kierkegaard examined the rational and emotional depths of human life in its aesthetic, moral, and religious modes of expression. His writings exhibit a rare combination of poetic artistry and rigorous argument.

In this course we will read a large part of what Kierkegaard called "my authorship" in order to understand his way of doing philosophy by taking examples from life and to examine his portrayal of the spiritual landscape. Kierkegaard's probings into the value dimensions of life — e.g., happiness, pleasure, boredom, despair, choice, duty, commitment, anxiety, guilt, remorse, hope, faith, love — encourage his readers to think about their own lives and their relations with others. This feature of Kierkegaard's work is what makes it so fascinating and absorbing (somewhat like reading a good novel). Through his writings, Kierkegaard sets up a conversation with his readers, in which they are expected to participate. In this course we will enter Kierkegaard's conversation for the purpose of understanding his notion of the self, its faculties, capacities, abilities, and stages of development. As active participants in this conversation, we must press Kierkegaard to explain his views on the central issues of the nature of the self — as knower, as lover, as moral agent, as believer. We must also recognize that through his writings Kierkegaard is indirectly questioning us, his readers (as existing persons), so that we might clarify our own viewpoints and values. Therefore, in examining Kierkegaard's ideas, we must turn our reflection back on ourselves and offer a serious response to his arguments.

By the end of the course, students will have become well acquainted with that ancient and still ongoing philosophical concern called "anatomizing of the soul" (now known as "philosophical psychology") and with an important method of reflective inquiry used by existentialists and phenomenologists in many fields of humanistic study, such as philosophy, religion, psychology, and literary criticism. Readings will concentrate on primary texts selected from Kierkegaard's literature: e.g., *Either/Or*, *Fear and Trembling*, *Philosophical Fragments*, *The Concept of Dread*, *Stages on Life's Way*, *Concluding Unscientific Postscript*, *The Sickness unto Death*. The course will be conducted as a seminar, emphasizing critical writing and discussion, rather than lectures. Enrollment limited to 25 students; written permission required. Spaces will be reserved for freshmen. ABC/NC or S/NC, though the latter grading option conforms with the spirit of the course.

ST/F 50. *Foundations of Political Analysis* (Political Science 50)

MESSRS. ZUCKERMAN and COBB.

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. Permission required.

ST/F 51. *Freedom and Human Behavior*

Mr. BROCK.

It is widely believed that human beings are capable of acting freely or, as it is sometimes put, have free will. Yet behavioral scientists proceed under the assumption that human behavior is causally determined, and have amassed a large body of knowledge concerning what those causes are and how human behavior is controlled. This course will focus on several aspects and implications of the apparent conflict between "free will" and "scientific" views of human behavior. First, what does it mean to claim that human beings have free will and what are the arguments or evidence in support of this view? What are the arguments and evidence supporting the view that all human behavior is causally determined? Is free will incompatible with all human behavior being caused, as is often thought, or are they both possible? In this first part of the course, representative positions in this long-standing philosophical controversy will be critically examined. Second, what are the implications of these "free will" and "scientific" views for such notions as moral responsibility, individual autonomy and self-control or determination, the value of freedom, respect for persons, and so forth? Third, what is the relation of these views of human behavior to different methods of affecting or controlling human behavior, and specifically to what are thought to be the morally significant differences in the various methods? What is the meaning of such notions as coercion, persuasion, manipulation, and indoctrination, must their meanings and the evaluations they imply differ on the "free will" and "scientific" views, and how should these views affect our moral evaluations of such practices as education, operant conditioning, and psychosurgery? Finally, the last part of the course will examine the extent to which some important areas of social life such as the law, criminal punishment, treatment of the mentally ill, etc. presuppose that human beings have free will. Some background in philosophical analysis and/or behavioral science will be helpful but not required. Enrollment limited to 25. Written permission required. Spaces will be reserved for freshmen.

ST/F 62. *The Myth of Reality: Film and Fiction as Means of Revealing and Obscuring Social Reality: The Example of the Soviet Union and the German Democratic Republic*

Mr. SMITH.

This course will explore the ways in which a given society and culture attempts to legitimize its own mode of apprehending and understanding reality as timeless and universal "truth" and to inculcate in its members a system of consciousness which accepts that "truth". Such systems of consciousness characterize all human societies, though each have viewed previous and competing societies' consciousnesses as "nontrue" or as being false consciousnesses. A consciousness revealed as "not true" is frequently referred to as an ideology. Ideology is thus a term used to describe an unmasked consciousness or one which is thought at least to be unmasked. Though it is often a pejorative term, ideology may also be a term used to express an historical process by which change or progress necessarily overcomes a given social consciousness replacing it with another, which deals more comfortably with the newer perceptions of reality gained by a society. Reality is thus itself a relative term and ideology expresses this relativity while consciousness expresses that historical period of an ideology when its supporters perceive a contradictionless and timelessly universal "reality".

The course will meet twice weekly. In addition, students will form small discussion groups to prepare for the regular class meetings and will meet at least once a week in these groups. Each group will prepare a written outline of its discussion and make copies of that outline available to the other groups and to the instructor before the first regular weekly meeting of the class throughout the semester. A final project will also be required. Knowledge of German, Russian, French or other foreign languages is very helpful but not required. Subtitled versions of all films will be used and translated versions of the literary works will also be used. The first part of the course will approach the question of consciousness and ideology. The texts of the literary works will be read and the theory of literature and text which sees text as a vehicle of access to ideology will be presented and discussed. The films will be viewed in the latter part of the course with discussion of film as a textual medium of ideological access. The relationship of film to its fictional sources and the question of distortion by translation from one medium to another will also be examined. The different cultural and social context implied by the study of the society and culture of the USSR and GDR will also promote discussion of useful contrasts and comparisons. The course will be limited to thirty-five students with fifteen places reserved for incoming freshmen. S/NC only. Written permission required.

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.

The University Libraries



University Library

THE UNIVERSITY LIBRARY, containing more than 2,800,000 items, including bound volumes, maps, pieces of sheet music, manuscripts and adding more than 60,000 items each year, includes the John D. Rockefeller, Jr. Library, the John Hay Library, the Sciences Library, and the Pembroke Campus Library.

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 1897, 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. The book collection, reading rooms, conference rooms, and faculty studies for the Social Studies are located on the three floors above the main floor. The staff of the Reserve Book Room administers the microform reading center and map collection on the second floor. A separate microfiche center has been established in the Periodicals Reading Room on the main floor. The Humanities book collection, reading rooms, conference rooms, and faculty 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 Science 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/information 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 Library has received a grant to establish a NASA Space Photolibrary on the eighth floor, with assistance from Thomas A. Mutch, Professor of Geology. 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. The John Hay Library will eventually be remodelled and modernized before the building is completely occupied by the Library's growing Special Collections. 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*. *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.

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 cultural and 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.

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 12,500 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 microfilms 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. Students wishing to make use of this collection should make application to the Librarian.

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 articles, reviews and press notices, proof sheets of his published writings, 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 Carleton 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 available for use in the library or for home circulation.

THE LIBRARY OF AMERICAN CIVILIZATION, a microbook library of 19,000 volumes, is maintained at the Pembroke Campus Library.

John Carter Brown Library

The JOHN CARTER BROWN LIBRARY collects anything printed during the colonial period which in any way reflects what happened as a result of the discovery and settlement of the New World — and has been doing so for almost one hundred and fifty years. 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 colonization 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.

Anyone may use the John Carter Brown Library who needs to do so. It is designed primarily for original research by those who wish to go beyond the secondary literature of 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, which are available in other libraries in the United States and abroad. The

extensive bibliographical reference collection 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 for them upon the extensive collections in the John D. Rockefeller Library.

Located on the College Green, the Library is open to the public and mounts a number of 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 Mediaeval culture. Collected and housed by General Rush Christopher Hawkins, Commander of the Hawkins Zouaves in the Civil War, the books were assembled for the purpose of illustrating the spread of printing from its birthplace in Mainz about the middle of the 15th century. Items in the collection, many of them exceedingly rare if not unique, date between 1460 and 1500. 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.

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 693,433 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. Governments 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 M. 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 the 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.

The 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. The University has since turned it into 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 archaeological 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 in September, October, November, April and May and closed from December through March.

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 homeground 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.

The 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 completed in 1965 and 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, scanning electron microscope-probe, photoelasticity, soil mechanics, dislocation dynamics, dynamic inelasticity, and binocular vision.

Prince Engineering Laboratory—a modern laboratory building adjoining the Barus and Holley Building. Apparatus presently installed includes: subsonic, transonic, 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, an anechoic chamber for investigation of physical phenomena under the influence of high intensity sound fields; a Van de Graff accelerator; a Millimeter Wave Laboratory; 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.

Nuclear Laboratory—an off-campus building. Equipment is designed to carry on work in low-energy nuclear physics, primarily associated with study of nuclear reactions induced by 14-Mev neutrons. A high current accelerator for positive particles is the core of the program, which also includes research with scintillation counters, and proportional counters.

Metcalf Chemistry Laboratories—a quadrangle of connecting buildings. These buildings house research programs in physical, organic, inorganic and biochemistry, and instructional laboratories and classrooms. Facilities include a machine shop, a glassworking shop, and an electronics shop as well as the latest modern instruments for research and instruction in chemistry.

Rhode Island Hall, Wilson Hall, and Lincoln Field Building—these buildings 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 for biology. It now contains modernized facilities for undergraduate and graduate study, the administrative offices and mail room of the Division of Biology and Medicine and several laboratories for research.

J. Walter Wilson Laboratory—a five-story building first occupied in 1962. In addition to seminar rooms and teaching laboratories, the building houses about twelve separate laboratories devoted to research in the areas of molecular biology, microbial genetics, photobiology and plant physiology, developmental biology, and physiological chemistry. It includes environmental chambers, cold and warm rooms, glass washing and sterilization facilities, microbiological preparation rooms. A machine shop, electronic shop, stockroom, and animal facilities are located in the basement.

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 neural sciences (neuroanatomy, neurophysiology and neuropharmacology), cell biology, and physical biochemistry. It includes animal rooms and a glass washing facility.

Bio-Medical Center—a complex of three buildings, completed and dedicated in 1969. The ground-floor facility houses the Multidisciplinary Teaching Laboratory designed for the undergraduate and graduate students enrolled in the Division of Biology and Medicine. This facility includes 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; a teaching laboratory for mammalian physiology. The facility for teaching, demonstrations, and research in human anatomy is also located here. The five-story research tower is devoted to research in the areas of physiology, biophysics and bioengineering; biochemical pharmacology; molecular and cellular pathology; microbiology, virology and immunology. In addition to about twenty independent laboratory suites, this building includes conference rooms, a computing facility, 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. It includes constant temperature rooms for the maintenance of numerous stocks of small mammals and insects.

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, an 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 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 modern building at the corner of Brook and George Streets which houses the University's principal computing facilities, an IBM system/370 Model 158 and an IBM system 370/Model 148. Advice on using these systems can be obtained from a User Services Specialist, also in the building. Computer terminals are located in the Science and Rockefeller libraries 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.

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 390), an annex to the museum in the form of a renovated barn, the Supervisor's Cottage, and an Outing Club House.

University Health Service



Dr. ROSWELL D. JOHNSON, *Director of Health Services*

Dr. FERDINAND JONES, *Clinical Psychologist, Mental Health Coordinator*

DAISY HARRIS, *Administrative Manager*

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 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 two full time physicians, twelve specialty consultants in various fields of medicine and surgery, a physician assistant, a nurse practitioner, a laboratory technician, and registered nurses around the clock. The mental health staff has two clinical psychologists, a psychiatric social worker, and a consulting psychiatrist.

Medical History

Every student new to the Brown campus must have filed with Health Services, our forms which include an accurate past medical history, which should in all cases be checked with parents and past physician where any questions arise. A physical examination is not required.

It may come as a surprise to some that measles and german measles continue to be a significant hazard from time to time. We strongly recommend that all students, particularly women, have evidence of having received immunization against these two conditions or a blood test indicating immunity. Our experience over the past 15 years indicates that the past history of having or not having had the disease is of little practical value. A new Rhode Island law stipulates that all women students (age 15-35) entering a college or university in Rhode Island after January 1, 1980, must present evidence of having been immunized against rubella, or a test showing immunity. A history of having had the disease is not sufficient. Testing and immunization are available at the Health Services. As basic health maintenance 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 surgical 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 \$32.00 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

Although health insurance is not mandatory, WE EMPHASIZE IN STRONGEST POSSIBLE TERMS THAT EVERYONE SHOULD HAVE SOME FORM OF HEALTH INSURANCE. 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. The fee for 1979-80 is \$75.00 and all students will have received a brochure describing the plan in one of their summer mailings. All Foreign 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 interest 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 the Health Services.

Student Life and Organizations



Worship

Brown seeks to provide occasions for public worship for the major religious groups through the Office of the Chaplain. The present schedule of services is as follows:

University Church (Episcopal and Protestant)

11:30 a.m. — Sunday

Manning Chapel

Afro Caucus

1:30 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

6:00 p.m. — Friday (Reform, Conservative, & Orthodox)

9:30 a.m. — Saturday

Hillel House — 80 Brown St.

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*

RICHARD A. DANNENFELSER, *Associate Chaplain*

RICHARD A. MARKER, *Associate Chaplain*

DARRYL SMAW, *Assistant Chaplain*

WILLIAM DINNEEN, *Director of Chapel Music*

DAVID AMES, *Episcopal College Chaplain*

HOWARD O'SHEA, *Roman Catholic Chaplain*

DAVID INMAN, *Roman Catholic Chaplain*

RICHARD MARKER, *Director of Hillel Foundation*

MAXINE KRONISH, *Associate Director of Hillel*

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 Office for Foreign Students and Faculty is located in the International House of Rhode Island at 8 Stimson Avenue.

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, 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.

Students receive a current brochure and other information during the summer to assist in board contract selection for the following academic year. All inquiries should be directed to the office of the Director in Sharpe Refectory.

Student Residences – Undergraduates

Undergraduate Residence Halls are located in the following areas:

MAIN CAMPUS: Caswell Hall, Hegeman Hall, Hope College, Littlefield Hall, Slater Hall, West 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, and new Pembroke dormitories.

EAST CAMPUS: Appleby Hall, Perkins Hall; 74 Charles Field Street, 78 Charles Field Street, 67 Manning Street, 69 Manning Street, King House, Dyer House, and Young Orchard Avenue Apartments.

The Wriston Quad on the Main Campus houses five national fraternities and five local fraternities. The fraternities are: Alpha Delta Phi, Delta Phi Omega, Delta Tau, Kappa Delta Upsilon, Phi Delta Beta, Theta Delta Chi, Zeta Psi, Toad Hall, Sigma Chi, and Alpha Chi Omega.

Plantations House (219 Bowen Street) serves as a day-center for non-resident men who are not married and offers a limited number of accommodations.

West House (91 Brown Street), the campus residence for non-resident women students, serves as a day-center for these students and offers a limited number of overnight accommodations.

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 Housing.

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 for four, suites for three, double rooms and singles. Each student is provided with a bed, including a mattress and pillow, a chest of drawers, a desk, a desk chair, and a bookcase. The apartments also include a complete kitchen, living room furniture, and wall-to-wall carpet throughout. A rental linen service,

including towels, is available through the Brown Student Agencies. 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 this Catalogue.

Student Residences – Graduate Students

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. A rental linen service is available through the Brown Student Agency. Each student is responsible for damage to his 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

Faunce House is the headquarters for the social and recreational activities of undergraduates and for student organizations. The building was erected and equipped by the generous gifts of Mr. John D. Rockefeller, Jr., of the class of 1897 and, at his request, it was named in memory of the late Dr. William Herbert Perry Faunce, President of Brown University. In Faunce House are numerous offices and service facilities; the offices and working quarters of student organizations, fountain service in the Coffee Lounge, the Theater, Central Post Office, and the study of the Chaplain of the University. The immediate administration of Faunce House is delegated to the Director of Faunce House.

The Faunce House Theater offers ample facilities for the dramatic productions of Sock and Buskin and other undergraduate dramatic organizations, and for the showing of motion pictures.

All communications regarding the Faunce House should be addressed to the Office of the Director.

Picture Lending Library

The Picture Lending Library was founded in 1933 and 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 Faunce House. At the beginning of each semester the pictures in the collection are placed on display in the Faunce House Art Gallery.

Brown Resource Center

The Resource Center is an information, counseling, and organizing center. It is located on the second floor of Faunce House (West). The Resource Center was set up to increase support for students who choose to pursue innovative and extradepartmental learning options. Another important concern of the Center is to increase support for students and faculty who wish to work on projects with the Providence and R.I. community. The Center is a good source of information about events and issues on campus and in the community. The staff includes the coordinator, the coordinator for Internships and the College Venture Program, work-study students, and a large staff of student volunteers.

Some of the programs and workshops set up by the Resource Center include GISP workshops, forums and discussions on Independent Concentrations, meetings on community issues, discussions on sex-roles, and meetings with community people involved in alternative vocations. The Resource Center provides information and counseling for students wishing to set up internships in the community for credit. It also provides counseling about the College Venture Program and other leave-taking options. The Center provides periodicals and publications on a variety of topics including educational change, community organizing, alternative lifestyles, labor issues, environmental issues, and Third World issues.

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 Marvel, Sayles, and East Campus gyms, Meehan Skating Rink, Brown Natatorium, weight rooms, bowling alleys, 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, basketball, gymnastics, ice hockey, squash, swimming, lacrosse and softball. Club competition is available in cross-country, sailing, and track.

In addition there is a co-educational volleyball team and a synchronized swim club. 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, basketball, and crew. Varsity and junior varsity opportunities are offered in 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, although informal, squads in rugby, skiing, rifle, sailing, scuba diving, squash, and fencing.

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, dormitories, class 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, the store carries approximately 22,000 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, pocket calculators, stationery, personal sundries, room furnishings, 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 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 free 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.

The School also operates a six-week archaeological study tour of Athens and other sites of interest in Greece. This Summer 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 archeologically related study and research in ASOR programs in Jerusalem, Baghdad, Amman, Cyprus, and Carthage. The programs of the ASOR institutes are centered in Near Eastern studies and in the Phoenician culture of the Mediterranean world. Information concerning ASOR may be obtained from the chairman of the Department of Religious 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 1200 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 are student, faculty, and loan exhibitions of interest to the University and to New England audiences.

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 Satrianum and at Bucino have been published in monograph form. 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 of the Department of Classics.

THE BROWN UNIVERSITY-TOUGALOO COLLEGE COOPERATIVE PROGRAM

Tougaloo College is an 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 compete 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.

Dr. 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. The performing groups are the Brown Chorus, Orchestra, Wind Ensemble, Early Music Group, and the Balinese Gamelan Angklung.

Concerts are given on the large organ in Sayles Hall by the University Organist and by other recitalists in cooperation with the Rhode Island Chapter of the American Guild of Organists. A visiting organist is presented each season on the occasion of the Memory Day for Edgar John Lownes. The Manning Chapel Choirs assist in the services held in Manning Chapel.

The Department of Music makes it possible for selected students to appear in Senior or Honors Recital, and each semester a group of students of the Department is heard in audition-recital as a part of the work in course.

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.

Photographic Laboratory

The University operates a photographic laboratory fully equipped and staffed for the making of microfilms, positives, photoprints, copy negatives, enlargements, black-and-white and color slides and film strips, news and commercial photographs, 16 mm. motion pictures, sound recording, projector rental, photofinishing, photo murals, art work, displays, lettering and dry mounting, portraits, application and passport pictures, diazo prints,

photolithography, picture frames, and photo supplies. The services of the Staff are available to students and to departments for the preparation of teaching materials and the microfilm reproduction of manuscripts, scholarly publications, and other materials. The Laboratory also provides services for scholars outside the University who desire reproductions of materials in the library collections. Among its major projects are the Mathematical Reviews microfilm service and the microfilm collection of books on South American History and Hispanic Culture.

Public Lectures

THE MARSHAL 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 over 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. Therese 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 STEPHEN 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 . . . is to be divided into two 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 P'22 and friends, to be used to provide an annual lecture, paralleling generally the scientific interests of Professor Stuart.

Prizes, Premiums, Honors and Degrees Awarded¹



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 prize scholarship 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 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.

¹For a summary of Degrees awarded, Honorary Degrees Conferred by the University, and Recipients of the Rosenberger Medal, consult the sections which follow.

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 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, in 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 judgment 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 Hattie 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 *Iliad*, 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 PRIZE 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 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 LEMAIRE 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. The competition is restricted to members of the junior class.

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 ISABEL HARRIS METCALF PRIZE was instituted in 1943. It is offered annually for the best paper submitted by a woman student on "some subject connected with Peace or Government."

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 MARIO DI SANDRO PREMIUM IN ITALIAN is paid from an expendable fund donated in 1955 to Brown University by Mario di Sandro, Class of 1958. A premium is awarded to

an undergraduate who in the opinion of the teaching staff has shown most improvement or distinction in a year course in Italian.

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 student of the Senior Class 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 MURIEL PORT STEVENS PREMIUM IN MUSIC, inaugurated in 1944 by annual gift from Mrs. Eli Port in honor of her daughter, of the class of 1940, Pembroke College, is awarded annually for high achievement in composition, performance, historical study, or a combination of these fields.

THE BEATICE H. STONE MEMORIAL PREMIUM IN AMERICAN CIVILIZATION established in 1961 by gift of The Stone Foundation, Inc., is awarded to the most outstanding student of the senior class concentrating in American Civilization.

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, 1887, 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, for teaching, or otherwise.

Honorary Societies

Phi Beta Kappa

OFFICERS, 1977-79

	1975-77	1977-79
<i>President:</i>	ERNEST S. FRERICHS	JOHN M. SAPINSLEY
<i>Vice-President:</i>	JOHN M. SAPINSLEY	LAURA DURAND

<i>Secretary:</i>	JEROME B. GRIEDER (1975-76)	KARL S. WEIMAR
	BARTON L. ST. ARMAND (1976-77)	
<i>Treasurer:</i>	RONALD B. SMITH	GLADYS KAPSTEIN
<i>Historian:</i>	ANDREW J. SABOL	BEVERLY S. RIDGELY
	KARL S. WEIMAR (1976-77)	
<i>Auditor:</i>	VICTOR B. SCHWARTZ	VICTOR B. SCHWARTZ

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 classes.

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 cultures: 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, the social sciences, and the 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 1977-79

	1977-78	1978-79
<i>President:</i>	RICHARD ELLIS	RICHARD ELLIS
<i>Secretary:</i>	BARRETT HAZELTINE	BARRETT HAZELTINE
<i>Board of</i>	DONALD AVERY	STANLEY ARONSON
<i>Governors:</i>	PHILIP E. LEIS	THOMAS BANCHOFF
	THOMAS P. MUTCH	KENNETH CALLAHAN
	ROBERT RIPLEY	JOSEPH KESTIN
	MICHAEL I. ROSEN	LEWIS LIPSITT
		THOMAS P. MUTCH
		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, holds meetings throughout 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, Biological

and Medical Sciences, Chemistry, 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 1979-1980

Co-Presidents: MICHAEL STRICKLAND

ANDREW THOMPSON

Corresponding Secretary: WILLIAM CULLEN

Recording Secretary: PAUL REMEIS

Treasurer: GRAHAM SULLIVAN

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 the 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	WARREN RANDOLPH BURGESS	1953
CHARLES EVANS HUGHES	1928	ROWLAND ROBERTS HUGHES	1955
JOHN DAVISON ROCKEFELLER, JR.	1931	THEODORE FRANCIS GREEN	1956
CHARLES VALUE CHAPIN	1935	ALEXANDER MEIKLEJOHN	1959
MARY EMMA WOOLLEY	1937	WALDO GIFFORD LELAND	1965
FRED TARBELL FIELD	1940	THOMAS JOHN WATSON, JR.	1968
HENRY DEXTER SHARPE	1944	HENRY MERRITT WRISTON	1976
ZECHARIAH CHAFEE, JR.	1947		

Summary of Degrees

As of June 1979, there were enrolled the names of 55,659 graduates, both men and women. Of this number 44,530 had received the Bachelor's degree; 9,489 had received advanced degrees; 371 had received the degree of Doctor of Medicine; 1,269 had received honorary degrees.

Honorary Degrees Conferred by the University

Special Concert of Brown University Orchestra, April 30, 1978

ISAAC STERN, *Doctor of Music*

Commencement, June 5, 1978

ELIZABETH FLORENCE COLSON, *Doctor of Laws*

HENRY MAURICE GOLDMAN, *Doctor of Science*

ROBERT BRUCE LINDSAY, *Doctor of Science*

GEORGE WILLIAM MILLER, *Doctor of Laws*

EDMUND SEARS MORGAN, *Doctor of Letters*

LOUISE NEVELSON, *Doctor of Fine Arts*

ELEANOR HOLMES NORTON, *Doctor of Laws*

MERTON PHILIP STOLTZ, *Doctor of Laws*

Dedication of Performing Arts Complex, April 22, 1979

SAMUEL BARBER, *Doctor of Music*

Commencement, June 4, 1979

NEIL ALDEN ARMSTRONG, *Doctor of Science*

RICHARD REEVE BAXTER, *Doctor of Laws*

FOSTER BARKER DAVIS, JR., *Doctor of Laws*

KATHERINE DUNHAM, *Doctor of Fine Arts*

HANNA HOLBORN GRAY, *Doctor of Laws*

JUAN LOPEZ-MORRILLAS, *Doctor of Humane Letters*

JAKOB JOSEF PETUCHOWSKI, *Doctor of Letters*

JAMES BOND STOCKDALE, *Doctor of Laws*

The Associated Alumni of Brown University



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*DIANE SCOLA DOWNES '59	*DEBORAH KARP POLONSKY '58
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*ANN McGEENEY HARTY '53	*RALPH H. SEIFERT '50
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Brown Alumni Monthly

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Summary of Enrollment



THE COLLEGE SEPTEMBER, 1978¹

	Men	Women	Total
Freshmen	660	740	1400
Sophmores	784	679	1463
Juniors	711	568	1279
Seniors	716	450	1166
Special Students	119	165	284
Total	2990	2602	5592

SEPTEMBER, 1979²

	Men	Women	Total
Freshmen	700	655	1355
Sophmores	662	753	1415
Juniors	772	663	1435
Seniors	606	433	1039
Special Students	101	142	243
Total	2841	2646	5487

GRADUATE SCHOOL SEPTEMBER, 1978

	Men	Women	Total
Full time	632	352	984
Part time	88	87	175
Total	720	439	1159

SEPTEMBER, 1979

	Men	Women	Total
Full time	677	379	1056
Part time	66	63	129
Total	743	442	1185

PROGRAM IN MEDICINE SEPTEMBER, 1978

	Men	Women	Total
Full time	170	83	253

SEPTEMBER, 1979

	Men	Women	Total
Full time	172	85	257

¹ Figures do not include 27 seniors (21 men and 6 women) who were enrolled in the Medical Education Program.

² Figures do not include 35 seniors (22 men and 13 women) who were enrolled in the Medical Education Program.

GENERAL SUMMARY
SEPTEMBER, 1978

	Men	Women	Total
The College	2990	2602	5592
Graduate School	720	439	1159
Program in Medicine	170	83	253
Total	3880	3124	7004

SEPTEMBER, 1979

The College	2841	2646	5487
Graduate School	743	442	1185
Program in Medicine	172	85	257
Total	3756	3173	6929

Geographical Distribution



United States	The College	
	September 1978	September 1979
Alabama	9	9
Alaska	6	5
Arizona	25	21
Arkansas	5	6
California	207	224
Colorado	18	23
Connecticut	448	430
Delaware	27	25
District of Columbia	68	69
Florida	108	107
Georgia	32	35
Hawaii	14	24
Idaho	1	0
Illinois	130	132
Indiana	35	37
Iowa	11	12
Kansas	16	11
Kentucky	12	17
Louisiana	24	24
Maine	38	49
Maryland	139	144
Massachusetts	755	767
Michigan	79	76
Minnesota	43	45
Mississippi	4	2
Missouri	63	64
Montana	0	1
Nebraska	6	6
Nevada	3	5
New Hampshire	44	49
New Jersey	418	417
New Mexico	6	5
New York	1337	1264
North Carolina	25	26
North Dakota	0	0
Ohio	133	117
Oklahoma	12	14
Oregon	12	17
Pennsylvania	236	211
Rhode Island	617	600
South Carolina	5	4

422 / Geographical Distribution

South Dakota	3	3
Tennessee	37	32
Texas	70	67
Utah	2	2
Vermont	17	18
Virginia	68	76
Washington	25	28
West Virginia	6	5
Wisconsin	48	41
Wyoming	1	2
FOREIGN	144	159

Faculty and Administration



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The following is a list of Officers of Administration appointed by the Corporation of Brown University. Titles given are those held as of September, 1979.

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Relating to America, John Carter Brown Library*
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WINIFRED R. BARTON, *Administrative Assistant, History*
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JACOBUS D. BREETVELD, B.S., *Supervisor of Instructional Laboratories*
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Imprints Relating to America, John Carter Brown Library*
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RUSSELL W. BURNS, B.A., *Systems Programmer II, Computer Center*
BONNIE G. BUZZELL, M.L.S., *Acquisitions Librarian, University Library*
STEVEN T. CARMODY, A.B., *Manager of Systems Programming, Computer Center*
NORINE D. CASHMAN, M.L.S., *Curator, Slides and Photographs*
DALE CAVANAUGH, *Administrative Assistant, Mathematics*
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BRUCE B. CHICK, SC.M., *Senior Research Engineer*
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JOHN A. DAVIS, M.A., *Managing Director, Afro-American Studies*
DOROTHY DAY, B.L.S., *Reference Librarian, University Library*
JUDITH C. DELMONICO, *Library Supervisor - Bindery, University Library*
CLEMENT A. DELUCIA, *Technical Assistant II, Psychology*
PATRICIA E. DEVINE, *Administrative Supervisor II, Psychology*

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 VINCENT ZECCHINO, M.D., *Clinical Instructor in Surgery (Orthopedic Surgery)*
 CATHERINE ZERNER, PH.D., *Associate Professor of Art*
 BASIL G. ZIMMER, PH.D., *Professor of Sociology*
 STANLEY ZIMMERING, PH.D., *Professor of Biology*
 STEPHEN H. ZINNER, M.D., *Associate Professor of Medicine*
 JOSEPH M. ZUCKER, M.D., *Clinical Assistant Professor of Psychiatry and Human Behavior*
 ALAN S. ZUCKERMAN, PH.D., *Associate Professor of Political Science*

List of Officers of Instruction who did not appear in 1977-1979 Catalogue

WINSLOW AMES, M.A., *Visiting Associate Professor of Art, January 1, 1978-June 30, 1979*
 DAVID H. ANDERSON, PH.D., *Visiting Associate Professor of Applied Mathematics (Research), February 1, 1979-May 31, 1979*
 GORDON F. ANDERSON, PH.D., *Visiting Professor of Neurosciences, April 1, 1978-March 31, 1979*
 STUART S. ANTMAN, PH.D., *Visiting Professor of Applied Mathematics, September 1, 1978-May 31, 1979*
 HELEN ASTIN, PH.D., *Nancy Duke Lewis Professor and Visiting Professor of Psychology, September 1, 1977-June 30, 1978*
 ADELINE BECKER, M.A., *Lecturer in Portuguese, September 1, 1978-January 31, 1979*
 HANS J. BERNHARD, PH.D., *Visiting Professor of German, January 1, 1978-May 31, 1978*
 DINESH V. BHAT, M.D., *Adjunct Clinical Instructor in Surgery, November 1, 1977-June 30, 1978*
 EVE M. BLAU, PH.D., *Visiting Assistant Professor of Art, July 1, 1978-June 30, 1979*
 MICHELE BONNET, PH.D., *Visiting Assistant Professor of French, July 1, 1977-June 30, 1978*
 LAWRENCE P. BOWEN, M.D., *Clinical Assistant Instructor in Surgery, July 1, 1977-June 30, 1978*
 BEVERLY L. BROWN, PH.D., *Visiting Assistant Professor of Art, July 1, 1978-June 30, 1979*
 STAVROS N. BUSENBERG, PH.D., *Visiting Associate Professor of Applied Mathematics, June 15, 1979-August 15, 1979*
 HOWARD W. BUTLER, PH.D., *Adjunct Professor of Engineering, February 1, 1978-May 31, 1978*
 MOUNIRA CHARRAD, PH.D., *Visiting Assistant Professor of Sociology, January 1, 1978-June 30, 1978*
 ANNE M. CHASE, PH.D., *Lecturer in Medical Science, February 1, 1978-June 30, 1978*
 BENIGNA CHILLA, PH.D., *Visiting Assistant Professor of Art, July 1, 1978-June 30, 1979*
 JOHN W. CIPOLLA, PH.D., *Visiting Associate Professor of Engineering (Research), August 1, 1978-May 31, 1979*

- KENNETH L. COOKE, PH.D., *Visiting Professor of Applied Mathematics, September 1, 1978-May 31, 1979*
- TIMOTHY J. COWLES, PH.D., *Visiting Assistant Professor of Geological Sciences, September 1, 1978-January 31, 1979*
- NORMAN DANIELS, PH.D., *Visiting Associate Professor of Biomedical Ethics, February 1, 1979-May 31, 1979*
- JOSE DANTAS, PH.D., *Visiting Professor of Portuguese and Brazilian Studies, February 1, 1978-June 30, 1978*
- GEORGE DASSIOS, PH.D., *Visiting Assistant Professor of Applied Mathematics, September 1, 1978-January 31, 1979*
- PIERRE G. DAUNIC, M.A., *Visiting Lecturer in French, October 1, 1978-January 31, 1979*
- FREEMAN K. DONKOR, M.A., *Visiting Lecturer in Dance, February 1, 1978-May 31, 1978*
- EDWARD DONOGHUE, PH.D., *Assistant Professor of Chemistry (Research), July 1, 1978-August 31, 1979*
- CAROL L. DOW, PH.D., *Visiting Assistant Professor in Brazilian Studies, February 1, 1979-June 30, 1979*
- KATHY EBERSTADT, A.B., *Visiting Lecturer in Dance, February 1, 1979-June 30, 1979*
- HOWARD ELLIOTT, PH.D., *Visiting Assistant Professor of Engineering (Research), May 25, 1979-June 8, 1979*
- ROBERT J. ELLIOTT, PH.D., *Visiting Professor of Engineering, May 1, 1978-July 31, 1978*
- WILLIAM S. GLAUNSINGER, PH.D., *Visiting Associate Professor of Chemistry (Research), September 1, 1978-January 31, 1979*
- BARBARA B. GOULD, PH.D., *Adjunct Instructor in Human Morphology, September 15, 1977-January 31, 1978*
- ALAN S. GREENGLASS, M.D., *Clinical Assistant Instructor in Medicine, July 1, 1978-June 30, 1979*
- LUC GUEN, PH.D., *Visiting Assistant Professor of Chemistry, July 1, 1978-December 31, 1978*
- LINDA R. HAY, PH.D., *Instructor in Psychiatry and Human Behavior (Research), July 1, 1978-December 31, 1979*
- WILLIAM M. HAY, PH.D., *Assistant Professor of Psychiatry and Human Behavior, July 1, 1978-June 30, 1979*
- ERIC G. HEINEMANN, PH.D., *Visiting Professor of Psychology, September 1, 1977-August 31, 1978*
- REUBEN HERSH, PH.D., *Visiting Professor of Applied Mathematics, February 1, 1979-May 31, 1979*
- ROSLYN HIRSCH, B.A., *Lecturer in German, February 1, 1978-May 31, 1979*
- SHUNG PUN. HO, PH.D., *Visiting Assistant Professor of Applied Mathematics, September 1, 1978-June 30, 1979*
- JUOZO K. JARASHIUNAS, PH.D., *Visiting Associate Professor of Physics (Research), September 1, 1977-May 31, 1978*
- LAZAR M. KACHANOV, D.Sc., *Visiting Professor of Engineering, July 1, 1978-June 30, 1979*
- MICHAEL C. KALTON, M.A., *Visiting Assistant Professor of Religious Studies, February 1, 1978-June 30, 1978*
- JOHN W. KANWISHER, PH.D., *Adjunct Professor of Physiology, February 1, 1978-June 30, 1978*
- FRANS P. KOFFYBERG, *Visiting Professor Chemistry (Research), July 1, 1978-June 30, 1979*

- CRAIG C. MALBON, PH.D., *Assistant Professor of Medical Science, September 1, 1978-December 31, 1978*
- JOHN B. MARTIN, PH.D., *Visiting Professor of Engineering, February 2, 1978-March 31, 1978*
- SATORU MASHIMO, PH.D., *Visiting Assistant Professor of Chemistry, September 1, 1978-August 31, 1979*
- RICHARD P. MCGINNIS, PH.D., *Visiting Professor of Chemistry, February 2, 1978-May 30, 1978*
- MASATOSHI NAKAYAMA, PH.D., *Visiting Professor of Physics (Research), October 1, 1977-September 30, 1978*
- ROBERT NEUMAN, M.F.A., *Visiting Assistant Professor of Art, January 1, 1978-June 30, 1978*
- ZBIENIEW NITECKI, PH.D., *Visiting Associate Professor of Applied Mathematics, September 1, 1978-January 31, 1979*
- TAKAYUKI NONO, PH.D., *Visiting Professor of Economics, February 1, 1979-June 30, 1979*
- RAFAEL PANZONE, PH.D., *Visiting Professor of Applied Mathematics, February 1, 1979-May 31, 1979*
- JOHN L. PELLEGRINI, M.D., *Clinical Assistant Instructor in Surgery, July 1, 1977-June 30, 1978*
- FRANCISCO R. PEREZ, PH.D., *Visiting Assistant Professor of Hispanic & Italian Studies, February 1, 1978-June 30, 1978*
- DENNIS J. PILLION, PH.D., *Assistant Professor of Medical Science (Research), January 1, 1979-December 31, 1979*
- HERMANN RIEDEL, PH.D., *Visiting Assistant Professor of Engineering (Research), September 1, 1978-August 31, 1979*
- LORNA RITZ, PH.D., *Visiting Assistant Professor of Art, January 1, 1978-June 30, 1978*
- ROBERT E. ROBSON, PH.D., *Visiting Assistant Professor of Chemistry, January 1, 1978-March 31, 1978*
- JOHN H. ROWLAND, PH.D., *Visiting Professor of Applied Mathematics, September 1, 1978-May 31, 1979*
- JIRI J. RUZICKA, PH.D., *Visiting Assistant Professor of Applied Mathematics (Research), April 1, 1978-June 30, 1978*
- DENIS J. RYLEY, PH.D., *Visiting Professor of Engineering (Research), November 28, 1977-July 31, 1978*
- HOLLY L. SCHANZ, PH.D., *Visiting Assistant Professor of Art, July 1, 1977-June 30, 1978*
- ANNE M. SCHULZ, PH.D., *Visiting Assistant Professor of Art, July 1, 1978-June 30, 1979*
- TIMOTHY P. SCHWARTZ, PH.D., *Visiting Assistant Professor of Sociology, January 1, 1978-June 30, 1979*
- KATHLEEN M. SCOTT, B.A., *Adjunct Instructor in Human Morphology, September 15, 1977-January 31, 1978*
- ANN W. SEIDMAN, PH.D., *Nancy Duke Lewis Professor and Visiting Professor of Sociology, July 1, 1978-June 30, 1979*
- CARL A. SHEINGOLD, PH.D., *Visiting Assistant Professor of Sociology, September 1, 1977-June 30, 1978*
- LESLIE SILLS, PH.D., *Research Associate in Engineering, September 1, 1977-August 31, 1978*
- RICHARD SKALAK, PH.D., *Visiting Professor of Engineering, January 15, 1979-May 31, 1979*
- AVIA SPIVAK, PH.D., *Visiting Assistant Professor of Economics, July 1, 1977-August 31, 1978*

- KATHLEEN M. SWAIM, PH.D., *Visiting Professor of English, January 1, 1978-June 30, 1978*
- CAROLYN SWAN, PH.D., *Visiting Assistant Professor of French Studies, July 1, 1978-June 30, 1979*
- TAKUJI TAKEUCHI, D.S., *Visiting Assistant Professor of Biology, March 17, 1978-March 1, 1979*
- ROGER I. TANNER, PH.D., *Visiting Professor of Engineering (Research), November 1, 1978-February 28, 1979*
- CARL L. TOMMASO, M.D., *Clinical Assistant Instructor in Medicine, July 1, 1977-June 30, 1978*
- PHYLLIS TRIBLE, PH.D., *Adjunct Professor of Religious Studies, September 1, 1978-January 31, 1979*
- NIKOLAY D. VERVEYKO, PH.D., *Visiting Associate Professor of Engineering (Research), September 1, 1977-May 31, 1978*
- GIANFRANCO VITALE, PH.D., *Visiting Professor of Engineering (Research), December 15, 1977-November 30, 1978*
- JOHN A. WALKER, PH.D., *Visiting Professor of Applied Mathematics (Research), August 1, 1977, September 1, 1977*
- JOSEPH A. WITTEICH, JR., PH.D., *Visiting Professor of English, January 1, 1978-June 30, 1978*

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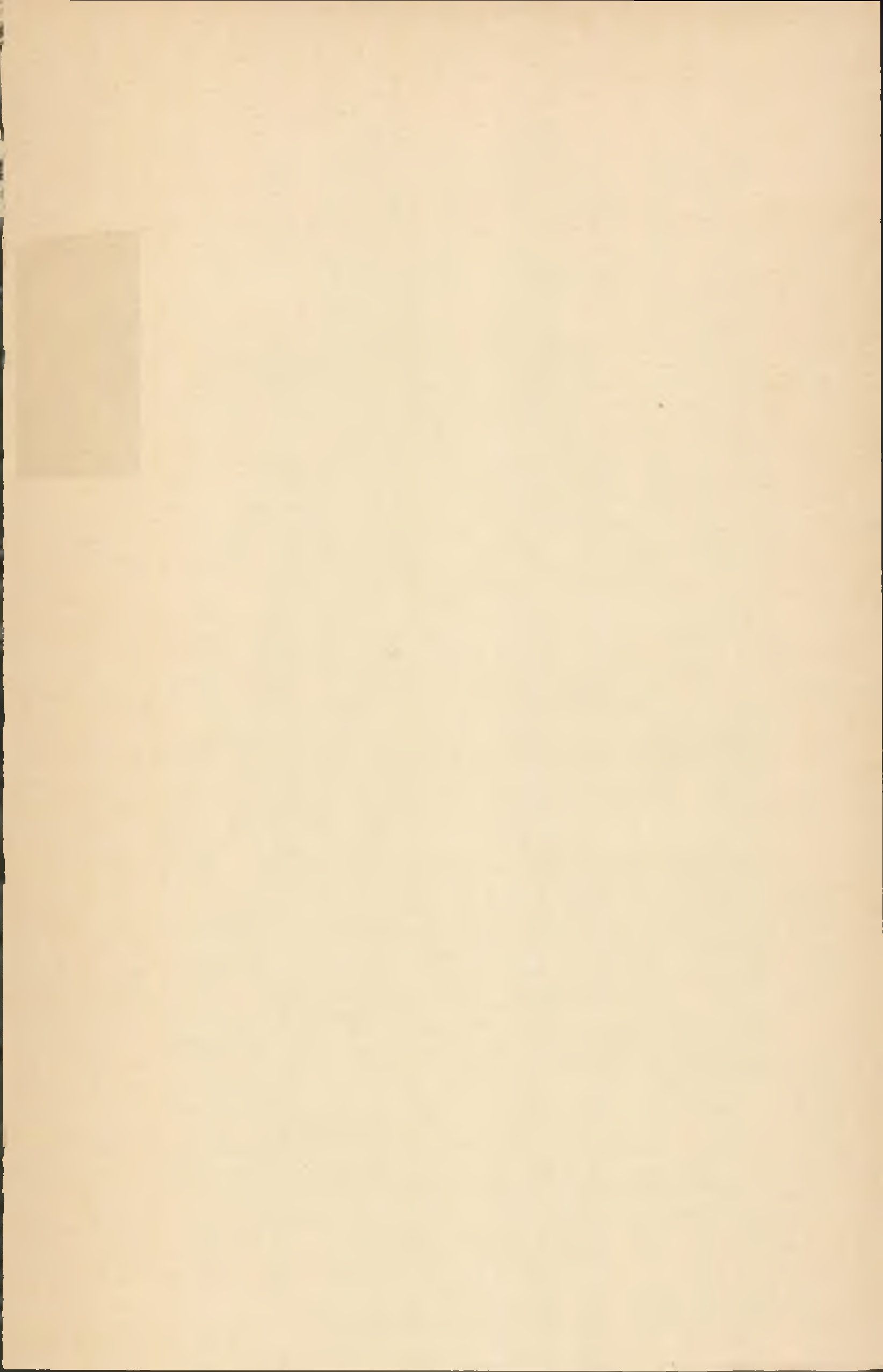
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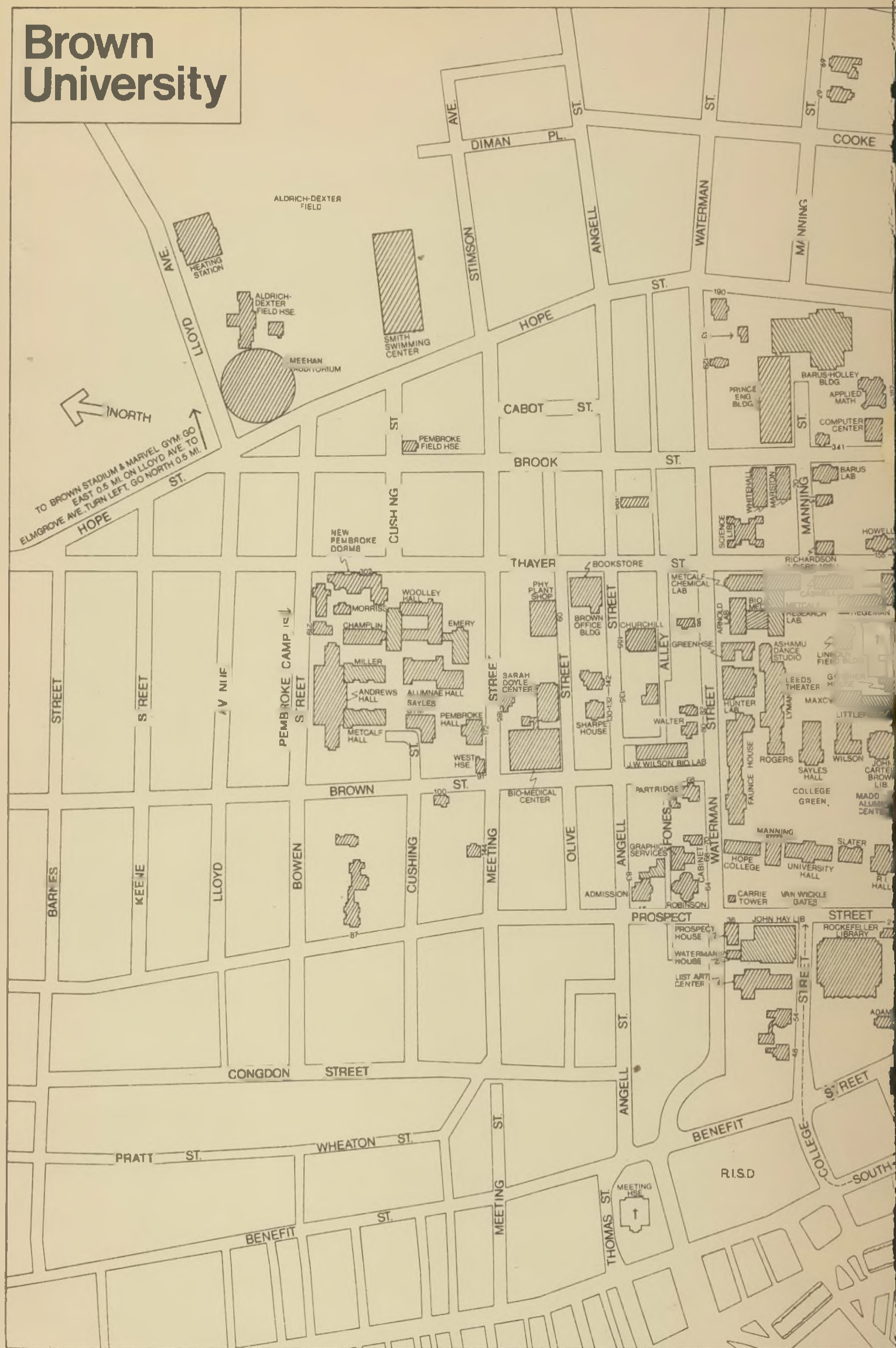
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Brown University





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THE COLLEGE. An undergraduate college for men and women, with courses leading to the degrees of Bachelor of Arts and Bachelor of Science.

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