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CATALOGUE ISSUE 1967-1968

SWARTHMORE  
COLLEGE  
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# SWARTHMORE COLLEGE BULLETIN



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SWARTHMORE, PENNSYLVANIA

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*(Printed in U. S. A.)*



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COLLEGE  
BULLETIN

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Volume LXV ■ Number 1 ■ September 1967

## DIRECTIONS FOR CORRESPONDENCE

### *For Information About:*

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G. Caroline Shero, *Associate Controller*

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Virginia Bullitt, *Director*

ALUMNI AFFAIRS AND PUBLIC RELATIONS

Joseph B. Shane, *Vice-President*

GENERAL INFORMATION

Maralyn Orbison Gillespie, *Director of News Office*

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## The Rhodes Scholarship Trust

The Rhodes Scholarship Trust maintains an office in this country for the purpose of administering the selection of American Rhodes Scholars and conducting the affairs of the Rhodes Scholarships in the United States. This office was located at Swarthmore College during the presidency of Dr. Frank Aydelotte, who served as the first American Secretary. On the occasion of the appointment of Courtney Smith to the American Secretaryship this office was located in Princeton, N. J., and returned to Swarthmore when Dr. Smith took up his duties as president of the College in September 1953.

*American Secretary of the Rhodes Scholarships, Courtney Smith*  
*Deputy American Secretary, Gilmore Stott*  
*Secretary, Elsa Palmer Jenkins*

*Swarthmoreana*  
LD 5186

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1967/70  
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## COLLEGE CALENDAR

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### Fall Semester

1967

September 20-23	Freshman placement days
September 22	Meeting of honors students
September 23	Registration
September 25	Classes and honors seminars begin
October 3	Meeting of the Board of Managers
November 7	Executive Committee of the Board of Managers
November 23-25	Thanksgiving recess
December 5	Annual Meeting of the Board of Managers
December 19	Christmas recess begins, 6:00 p.m.

1968

January 3	Christmas recess ends, 8:00 a.m.
January 3-16	Reading period for course students (at the option of the instructor)
January 16	Classes and seminars end
January 17	Meeting of honors students
January 19	Registration for spring semester
January 22	Honors seminars begin for spring semester
January 22	Mid-year examinations begin
February 1	Mid-year examinations end

### Spring Semester

February 5	Classes begin
February 6	Executive Committee of the Board of Managers
March 5	Executive Committee of the Board of Managers
March 23	Spring recess begins, 12:00 noon
April 1	Spring recess ends, 8:00 a.m.
April 2	Meeting of the Board of Managers
May 4	Honors seminars end
May 7	Executive Committee of the Board of Managers
May 6-18	Reading period for course students (at the option of the instructor)
May 13	Written honors examinations begin
May 18	Classes end
May 20	Enrollment in classes for fall semester
May 22	Course examinations begin
May 25	Written honors examinations end
May 30-June 1	Oral honors examinations
June 1	Course examinations end
June 3-5	Senior comprehensive examinations
June 7	Meeting of the Board of Managers
June 8	Alumni Day
June 9	Baccalaureate Day
June 10	Commencement Day

## COLLEGE CALENDAR (Tentative)

### Fall Semester

1968

September 18	Freshman placement days
September 21	Registration
September 20	Meeting of honors students
September 23	Classes and honors seminars begin
October 1	Meeting of the Board of Managers
November 5	Executive Committee of the Board of Managers
November 28-30	Thanksgiving recess
December 3	Annual Meeting of the Board of Managers
December 21	Christmas recess begins, 12:00 noon.

1969

January 6	Christmas recess ends, 8:00 a.m.
January 6-14	Reading period for course students (at the option of the instructor)
January 14	Classes and seminars end
January 15	Meeting of honors students
January 17	Registration for spring semester
January 20	Honors seminars begin for spring semester
January 20	Mid-year examinations begin
January 31	Mid-year examinations end

### Spring Semester

February 3	Classes begin
February 4	Executive Committee of the Board of Managers
March 4	Executive Committee of the Board of Managers
March 22	Spring recess begins, 12:00 noon
March 31	Spring recess ends, 8:00 a.m.
April 1	Meeting of the Board of Managers
May 3	Honors seminars end
May 6	Executive Committee of the Board of Managers
May 5-17	Reading period for course students (at the option of the instructor)
May 12	Written honors examinations begin
May 17	Classes end
May 19	Enrollment in classes for fall semester
May 21	Course examinations begin
May 24	Written honors examinations end
May 29-31	Oral honors examinations
May 31	Course examinations end
June 2-4	Senior comprehensive examinations
June 6	Meeting of the Board of Managers
June 7	Alumni Day
June 8	Baccalaureate Day
June 9	Commencement Day



*Philip T. Sharples Dining Hall*

PERSONNEL OF

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SWARTHMORE  
COLLEGE

## THE CORPORATION

- ROBERT M. BROWNING, *Chairman*  
7305 Emlen Street, Philadelphia, Pa. 19119.
- PHILIP T. SHARPLES, *Vice-Chairman*  
The Fidelity Bank Bldg., Suite 2532, 123 South Broad Street,  
Philadelphia, Pa. 19109.
- ELEANOR STABLER CLARKE, *Secretary*  
Crumwald Farm, 401 Rogers Lane, Wallingford, Pa. 19086.
- JOSEPH B. SHANE, *Assistant Secretary*  
Swarthmore College, Swarthmore, Pa. 19081.
- RICHARD B. WILLIS, *Treasurer*  
Provident National Bank, 17th and Chestnut Streets,  
Philadelphia, Pa. 19103.
- EDWARD K. CRATSLEY, *Assistant Treasurer*  
Swarthmore College, Swarthmore, Pa. 19081.

## BOARD OF MANAGERS

### *Ex officio*

COURTNEY SMITH, President of Swarthmore College, Swarthmore, Pa. 19081.

### *Emeriti*

- ELISABETH HALLOWELL BARTLETT, 100 West University Parkway, Baltimore, Md.  
21210.
- ISABEL JENKINS BOOTH, Jefferson House, The Strand, New Castle, Del. 19720.
- BARCLAY WHITE, 3337 Market Street, Philadelphia, Pa. 19104.
- ALFRED H. WILLIAMS, 216 N. Providence Road, Wallingford, Pa. 19086.
- JOSEPH H. WILLITS, Box 441A, Bridgetown Pike, R. D. 1, Langhorne, Pa. 19047.

### *Life Members*

- ELEANOR STABLER CLARKE, Crumwald Farm, 401 Rogers Lane, Wallingford, Pa.  
19086.
- HADASSAH M. L. HOLCOMBE, 1025 Westview Street, Philadelphia, Pa. 19119.
- CLAUDE C. SMITH, 1617 Land Title Building, Philadelphia, Pa. 19110.
- HELEN GAWTHROP WORTH, 805 Augusta Road, Westover Hills, Wilmington, Del.  
19806.

### *Term Expires December, 1967*

- CLEMENT M. BIDDLE, 230 Oak Ridge Avenue, Summit, N. J. 07901.
- GEORGE B. CLOTHIER, 1418 Packard Building, Philadelphia, Pa. 19102.
- CARL K. DELLMUTH, The Fidelity Bank, Philadelphia, Pa. 19109.
- WILLIAM POOLE, 350 Delaware Trust Bldg., Wilmington, Del. 19801.
- ELIZABETH CARVER PRESTON, 60 Dogwood Lane, Swarthmore, Pa. 19081.
- \*THOMAS MCP. BROWN, 814 26th Place South, Arlington, Va. 22200.
- \*ISABEL LOGAN LYON, 70 East 90th St., New York, N. Y. 10028.

\* Nominated by the Alumni Association.



*Term Expires December, 1968*

- BOYD T. BARNARD, 914 Philadelphia National Bank Building, Philadelphia, Pa. 19107.  
KERMIT GORDON, 2202 Wyoming Ave. N.W., Washington, D. C. 20008.  
H. THOMAS HALLOWELL, JR., The Benson East, Jenkintown, Pa. 19046.  
THOMAS B. McCABE, Tincicum Island Rd. and Industrial Highway, Philadelphia, Pa. 19113.  
\*ESTHER RIDPATH DELAPLAINE, 6402 West Halbert Rd., Bethesda, Md. 20034.  
\*WALTER O. SIMON, 15 Granite Road, Alapocas, Wilmington, Del. 19803.

*Term Expires December, 1969*

- WILLIAM F. LEE, 5 Guernsey Road, Swarthmore, Pa. 19081.  
KATHRYN SONNEBORN READ, 5407 Atlantic Avenue, Ventnor, N. J. 08406.  
PHILIP T. SHARPLES, The Fidelity Bank Bldg., Suite 2532, 123 South Broad Street, Philadelphia, Pa. 19109.  
SUE THOMAS TURNER, Cook Road, Alfred Station, New York 14803.  
RICHARD B. WILLIS, Provident National Bank, 17th and Chestnut Streets, Philadelphia, Pa. 19103.  
\*HELEN SHILCOCK POST, 312 Whitemarsh Rd., Fort Washington, Pa. 19034.  
\*ROBERT H. WILSON, 403 Cedar Lane, Swarthmore, Pa. 19081.

*Term Expires December, 1970*

- CHARLES F. BARBER, 120 Broadway, New York, N. Y. 10005.  
CARROLL G. BOWEN, M. I. T. Press, Cambridge, Mass. 02142.  
ROBERT M. BROWNING, 7305 Emlen Street, Philadelphia, Pa. 19119.  
VIRGINIA STRATTON CORNELL, Central Valley, N. Y. 10917.  
DOROTHY SHOEMAKER McDIARMID, 390 Maple Ave., East Vienna, Va. 22180.  
CHARLES C. PRICE, III, 118 Hilledale Road, Lansdowne, Pa. 19050.  
\*EDWIN M. BUSH, JR., 120 S. La Salle, Chicago, Illinois 60603  
\*MARY B. NEWMAN, 5 Willard Street, Cambridge, Mass. 02138.

COMMITTEES OF THE BOARD

*The Chairman of the Board is ex officio a member of every Committee*

*Executive*

- |                          |                          |
|--------------------------|--------------------------|
| BOYD T. BARNARD          | THOMAS B. McCABE         |
| CLEMENT M. BIDDLE        | ELIZABETH CARVER PRESTON |
| ELEANOR STABLER CLARKE   | KATHRYN SONNEBORN READ   |
| GEORGE B. CLOTHIER       | PHILIP T. SHARPLES       |
| CARL K. DELLMUTH         | CLAUDE C. SMITH          |
| H. THOMAS HALLOWELL, JR. | RICHARD B. WILLIS        |
| WILLIAM F. LEE           | HELEN GAWTHROP WORTH     |

*Finance and Trusts Administration*

- |                    |                          |
|--------------------|--------------------------|
| RICHARD B. WILLIS  | H. THOMAS HALLOWELL, JR. |
| GEORGE B. CLOTHIER | THOMAS B. McCABE         |
| CARL K. DELLMUTH   | CLAUDE C. SMITH          |

*Instruction and Libraries*

- |                         |                       |
|-------------------------|-----------------------|
| CLEMENT M. BIDDLE       | WILLIAM POOLE         |
| CHARLES F. BARBER       | CHARLES C. PRICE, III |
| CARROLL G. BOWEN        | CLAUDE C. SMITH       |
| THOMAS MCP. BROWN       | SUE THOMAS TURNER     |
| KERMIT GORDON           | HELEN GAWTHROP WORTH  |
| HADASSAH M. L. HOLCOMBE |                       |

\* Nominated by the Alumni Association.

*Investment*

THOMAS B. McCABE  
BOYD T. BARNARD  
RICHARD C. BOND

H. THOMAS HALLOWELL, JR.  
PHILIP T. SHARPLES  
RICHARD B. WILLIS

*Property*

WILLIAM F. LEE  
BOYD T. BARNARD  
VIRGINIA STRATTON CORNELL  
MARY B. NEWMAN

KATHRYN SONNEBORN READ  
WALTER O. SIMON  
ROBERT H. WILSON

*Student Activities*

ELIZABETH CARVER PRESTON  
CARROLL G. BOWEN  
THOMAS MCP. BROWN  
EDWIN M. BUSH, JR.  
ELEANOR STABLER CLARKE  
ESTHER RIDPATH DELAPLAINE

ISABEL LOGAN LYON  
DOROTHY SHOEMAKER MCDIARMID  
HELEN SHILCOCK POST  
CHARLES C. PRICE, III  
CLAUDE C. SMITH  
SUE THOMAS TURNER

*Nominating*

CHARLES C. PRICE, III  
VIRGINIA STRATTON CORNELL  
CARL K. DELLMUTH

HELEN SHILCOCK POST  
KATHRYN SONNEBORN READ  
RICHARD B. WILLIS

*Development*

CARL K. DELLMUTH  
GEORGE B. CLOTHIER  
VIRGINIA STRATTON CORNELL  
H. THOMAS HALLOWELL, JR.  
WILLIAM F. LEE

ISABEL LOGAN LYON  
WILLIAM POOLE  
PHILIP T. SHARPLES  
WALTER O. SIMON  
ROBERT H. WILSON

## ALUMNI ASSOCIATION OFFICERS

1967-1969

- President*, THOMAS B. DARLINGTON '45, Box 156, New Lisbon, N. J. 08046.  
*Vice-President for Men*, JOHN L. DUGAN, JR. '43, 5 Hillside Ave., Short Hills, N. J. 07078.  
*Vice-President for Women*, CORNELIA CLARKE SCHMIDT '46, 147 Brookstone Rd., Princeton, N. J. 08540.  
*Secretary*, NANCY ROBINSON POSEL '51, 1060 Mill Rd. Cr., Jenkintown, Pa. 19046.

## ALUMNI COUNCIL

TERM EXPIRES  
JUNE

### *Zone A*

- 1968 FREDERICK S. DONNELLY, JR. '41, 615 N. School Lane, Lancaster, Pa. 17603.  
FRANK H. ERDMAN '41, Lawrenceville Road, Princeton, N. J. 08540.  
1969 PETER W. KAISER '43, 921 Winding Lane, Media, Pa. 19063.  
J. LAWRENCE SHANE '56, 201 Harvard Avenue, Swarthmore, Pa. 19081.  
LAWRENCE A. YEARSLEY '48, R. D. 3, Coatesville, Pa. 19320.  
1970 HENRY J. BODE '55, 1004 Bent Road, Media, Pa. 19063.  
THOMAS D. JONES, JR. '53, 212 Herrontown Rd., Princeton, N. J. 08540.  
1968 NANCY RITSCHARD HALL '51, 1010 Cedar Street, Riverton, N. J. 08077.  
PATRICIA LUM TAYLOR '44, 525 Old Middletown Road, Lima, Pa. 19060.  
1969 ELIZABETH DOBSON BROOMELL '37, Bethlehem Pike, Spring House, Pa. 19477.  
BOLLING BYRD CLARKE '49, 430 Strath Haven Ave., Swarthmore, Pa. 19081.  
YVONNE MOTLEY MCCABE '50, 412 Rogers Lane, Wallingford, Pa. 19086.  
1970 ESTHER JONES BISSELL '50, 634 W. Cliveden St., Philadelphia, Pa. 19119.  
MARGERY PAXSON JONES '56, 308 Woodbridge Lane, Media, Pa. 19063.

### *Zone B*

- 1968 ALDEN S. BENNETT '40, 139 Lakeview Drive, Media, Pa. 19063.  
DONALD J. LLOYD-JONES '52, 230 Villard Ave., Hastings-on-Hudson, N. Y. 10706.  
1969 JAMES H. BEARDSLEY '38, Pine Hill Drive, R. F. D. 1, Katonah, N. Y. 10536.  
1970 JEROME KOHLBERG, JR. '46, 4 Quarry Rd., Larchmont, N. Y. 10538.  
CHARLES N. STABLER '50, Box 306, Rocky Hill, New Jersey 08553.  
1968 CHRISTINE ROSENBLATT DOWNING '52, Skyline Drive, Martinsville, N. J. 08836.  
JANET McCLOSKEY ROBBINS '43, 160 E. 89th Street, New York, N. Y. 10028.  
1969 MURIEL ECKES ZACHARIAS '37, 433 Ridgefield Rd., Wilton, Conn. 06897.  
1970 GLORIA EVANS DILLENBECK '47, 236 Highland Ave., Upper Montclair, N. J. 07043.  
BARBARA MULLER ORNSTEIN '49, 1099 King Street, Greenwich, Conn. 06830.

### *Zone C*

- 1969 THOMAS A. KERSHAW, II '60, 25 Chestnut Sreet, Boston, Mass. 02108.  
ELINOR JONES CLAPP '46, 309 Olney Street, Providence, R. I. 02906.

### *Zone D*

- 1968 DANIEL H. WINGERD '45, 13 Briar Road, Wilmington, Del. 19803.  
1970 CHARLES A. CALDWELL '38, 1118 Basil Road, McLean, Va. 22101.  
1968 NANCY EBERLE VALTIN '47, 1319 Woodside Drive, McLean, Va. 22101.  
1970 SALLY MACLELLAN COUNCILL '46, 5604 Newington Rd., Washington, D. C. 20016.

*Zone E*

- 1969 W. DEAN TRAUTMAN '42, 12 Pepperwood Lane, Cleveland, Ohio 44124.  
MARIANNE LEAS WOLFE '50, 766 Woodland Road, Ben Avon, Pittsburgh  
Pa. 15202.

*Zone F*

- 1970 JOSEPH P. BAKER '59, 1311 Edgewater Court, Orlando, Fla. 32804.  
ROBIN COOLEY KRIVANEK, 2802 Gaines Street, Tampa, Fla. 33618.

*Zone G*

- 1968 PAUL A. DEWALD '42, 60 Conway Lane, La Due, Mo. 63124.  
1970 GEOFFREY C. HAZARD, JR. '53, 4808 Kimbark Ave., Chicago, Ill. 60615.  
1968 JOAN BUESCHING MCNAGNY '46, 4621 Crestwood Drive, Fort Wayne, Ind  
46807.  
1970 ELIZABETH DARBISHIRE MCNEILL '33, 5327 S. University Ave., Chicago, Ill  
60615.

*Zone H*

- 1968 GEORGE C. BOND '42, 1419 Wellington Avenue, Pasadena, Calif. 91103.  
1969 WALTER M. DICKEY '61, 1749 Valpico Drive, San Jose, Calif. 95124.  
1968 SUE DAVISON COOLEY '44, 01734 S.W. Riverdale Road, Portland, Or  
97219.  
1969 ALICE RICKEY JAKLE '39, 11634 Winding Way, Los Altos, Calif. 94022.

## THE FACULTY

- COURTNEY SMITH, *President* ..... 324 Cedar Lane  
B.A., M.A. and Ph.D., Harvard University; LL.D., L.H.D., and Litt.D.
- EDWARD K. CRATSLY, *Vice-President (Finance), Controller, and Professor of Economics* ..... 741 Harvard Avenue  
B.A., College of Wooster; M.B.A. and D.C.S., Harvard University.
- JOSEPH B. SHANE, *Vice-President (Public Relations and Alumni Affairs) and Professor of Education* ..... 550 Elm Avenue  
B.A., Swarthmore College; M.A., University of Pennsylvania.
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*Parrish Hall*

## INTRODUCTION TO

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# SWARTHMORE COLLEGE

## INTRODUCTION TO SWARTHMORE COLLEGE

Swarthmore College, founded in 1864 by members of the Religious Society of Friends, is a co-educational college occupying a campus of about 300 acres of rolling wooded land in and adjacent to the borough of Swarthmore in Delaware County, Pennsylvania. It is a small college by deliberate policy. Its present enrollment is about 1025 students, of whom 477 are women and 550 are men. The borough of Swarthmore is a residential suburb within half an hour's commuting distance of Philadelphia. Because of its location, Swarthmore College students are able to combine the advantages of a semi-rural setting with the opportunities offered by Philadelphia. Especially valuable is the cooperation made possible with three other nearby institutions, Bryn Mawr and Haverford Colleges and the University of Pennsylvania.

### OBJECTIVES AND PURPOSES

In accordance with the traditions of its Quaker background, Swarthmore students are expected to prepare themselves for full, balanced lives as individuals and as responsible citizens through exacting intellectual studies supplemented by a varied program of sports and other extra-curricular activities.

The purpose of Swarthmore College is to make its students more valuable human beings and more useful members of society. It shares this purpose with other educational institutions, for American education is its direct outgrowth of our democratic principles. While a common purpose underlies all American education, each school and college and university seeks to realize that purpose in its own way. Each must select those tasks it can do best. Only by such selection can it contribute to the diversity and richness of educational opportunity which is part of the American heritage and the American strength.

### ACADEMIC COMPETENCE

Democracy demands a broad base of intelligent understanding of issues. It also necessitates a high order of excellence in those who are destined to become its leaders. Swarthmore can best serve society by the maintenance of high standards. It is peculiarly fitted by tradition and performance for this essential role, and it is precisely this readiness to do a particular job well that gives the College its value in the educational pattern of American democracy.

Education is largely an individual matter, for no two students are exactly alike. Some need detailed help, while others profit from considerable freedom. The program of Honors study, in which Swarthmore pioneered, is designed to give recognition to this fact. It is the most distinctive feature of the College's educational program. For many students, it provides an enriching and exciting intellectual experience.

has as its main ingredients freedom from ordinary classroom routine and close association with faculty members in small seminars, concentrated work in broad fields of study, and maximum latitude for the development of individual responsibility. The Honors program and the Course program are alternative systems of instruction for students during their last two years. Both are designed to evoke the maximum effort and development from each student, the choice of method being determined by individual need and capacity.

### THE RELIGIOUS TRADITION

Swarthmore College was founded by members of the Religious Society of Friends, and it seeks to illuminate the life of its students with the spiritual principles of that Society. Although it has been non-sectarian in control since the beginning of the present century, and although the children of Friends compose a minority of the student body, the College seeks to preserve the religious traditions out of which it sprang.

The essence of Quakerism is the individual's responsibility for seeking truth and for applying whatever truth he believes he has found. As a way of life, it emphasizes hard work, simple living, and generous giving; personal integrity, social justice, and the peaceful settlement of disputes. The College does not seek to impose on its students this Quaker view of life, or any other specific set of convictions about the nature of things and the duty of man. It does, however, have the two-fold aim of encouraging conscious concern about such questions and unceasing re-examination of any view which may be held regarding them. That is the kind of ethical and religious character which Swarthmore seeks to develop.

A college is never static. Its purposes and policies are always changing to meet new demands and new conditions. The founders of Swarthmore would find in it today many features which they never contemplated when they shaped the College in the middle of the nineteenth century. Swarthmore, if it is to remain effective, must be forever changing. The goal is to achieve for each generation, by means appropriate to the times, that unique contribution and that standard of excellence which have been the guiding ideals of Swarthmore from its founding.



## ADMISSION

Inquiries concerning admission and applications should be addressed to the Dean of Admissions, Swarthmore College, Swarthmore, Pennsylvania.

### GENERAL STATEMENT

In the selection of students the college seeks those qualities of character, social responsibility, and intellectual capacity which it is primarily concerned to develop. It seeks them, not in isolation, but as essential elements in the whole personality of candidates for admission.

It is the policy of the college to have the student body represent not only different parts of the United States but many foreign countries, both public and private secondary schools, and various economic, social, religious, and racial groups. The college is also concerned to include each class sons and daughters of alumni and of members of the Society of Friends.

Selection is important and difficult. No simple formula will be effective. The task is to choose those who give promise of distinction in the quality of their personal lives, in service to the community, or in leadership in their chosen fields. Swarthmore College must choose its students on the basis of their individual future worth to society and of their collective realization of the purpose of the college.

Admission to the freshman class is normally based upon the satisfactory completion of a four-year secondary school program preparatory to advanced liberal study. Under exceptional circumstances, students who have virtually completed the normal four-year program in three years will be considered for admission, provided they meet the competition of other candidates in general maturity as well as readiness for a rigorous academic program.

All applicants are selected on the following evidence:

1. Record in secondary school.
2. Recommendations from the school principal, headmaster, or guidance counselor and from two teachers.
3. Rating in the Scholastic Aptitude Test and in three Achievement Tests of the College Entrance Examination Board.
4. Personal interview with one of the Deans or an appointed representative.
5. Reading and experience, both in school and out.

Applicants must have satisfactory standing in school, and in aptitude and achievement tests, and should show strong intellectual interests. They should also give evidence of sturdiness of character, promise of growth, initiative, seriousness of purpose, and a sense of social responsibility. As future members of the college community, they should represent various interests and backgrounds.



## PREPARATION

The College does not require a set plan of secondary school courses as preparation for its program. The election of specific subjects is left to the student and his school advisers. In general, preparation should include:

1. *Skills*: The following skills are essential to success in college work and should be brought to a high level by study and practice throughout the preparatory period.
  - a. The use of the English language with accuracy and effectiveness in reading, writing, and speaking.
  - b. The use of the principles of mathematics.
  - c. The use of one, or two, foreign languages to the point of reading prose of average difficulty.
2. *Subjects*: All, or almost all, of the preparatory course should be composed of the subjects listed in the following four groups. Variations of choice and emphasis are acceptable although some work should be taken in each group.

*History and Social Studies*: American, English, European, and ancient history; political, social, and economic problems of modern society.

*Literature and Art*: American, English, and foreign literature; music; art.

*Natural Science and Mathematics*: chemistry, physics, biology, astronomy; algebra, geometry, trigonometry. Those planning to major in engineering should present work in chemistry, physics, and four years of mathematics including algebra, geometry and trigonometry.

*Languages*: English, Latin, Greek, German, French, Spanish, Russian, other European or Oriental languages. Applicants who expect to major in science are strongly advised to include German and, if possible, French in their school programs.

## APPLICATIONS AND EXAMINATIONS

The closing date for applications is February 1. A preliminary application card will be sent upon request, and this card should be returned promptly, together with the (non-refundable) application fee of \$15.00. A complete set of application papers is then sent. Applicants are encouraged to send their completed applications to the College as early in the fall of their senior year as possible. Although Swarthmore does not have an "early decision" program, preliminary readings of completed applications are made at an early date to determine regional and national award winners.

All applicants for admission are required to take the Scholastic Aptitude

Test and three Achievement Tests given by the College Entrance Examination Board. The Scholastic Aptitude Test should normally be taken in December or January of the senior year. Residents of California, Georgia, Illinois, Indiana, Michigan, Missouri, Ohio, Oregon and Texas may wish to take the Scholastic Aptitude Test on November 4, 1967, an additional testing date in those states.

Achievement Tests must be taken not later than January of the senior year. English Composition is required and the other two Achievement Tests should be chosen by the candidate from two different fields. Applicants for Engineering must take one achievement test in Mathematics. The Writing Sample will not be accepted as one of the three examinations.

Candidates who take Achievement Tests in May of the junior year in subjects completed by that time may submit the results to the Admission Office, but it is strongly recommended that the English Composition and at least one other Achievement Test be taken in December or January of the senior year.

In 1967-68 these tests will be given in various centers throughout this country and abroad on December 2, January 13, March 2, May 4, and July 13. Application to take these tests should be made directly to the College Entrance Examination Board, Box 592, Princeton, New Jersey. A bulletin of information may be obtained without charge from the Board. Students who wish to be examined in any of the following western states, provinces, and Pacific areas—Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, Alberta, British Columbia, Manitoba, Saskatchewan, Mexico, Australia, and all Pacific Islands including Formosa and Japan—should address their inquiries and send their applications to the College Entrance Examination Board, Box 1025, Berkeley, California. Application should be made to the Board at least a month before the date on which the test will be taken.

No additional tests are required of candidates for scholarships. All applicants who would like to be considered for any of our scholarships should complete their applications at the earliest possible date. Information concerning financial aid will be found on pages 37-46.

## THE INTERVIEW

An admissions interview with a representative of the College is a requirement in making application to Swarthmore. Applicants are expected to take the initiative in arranging for this interview. Those who can reach Swarthmore with no more than a half day's trip are urged to make an appointment to visit the College for this purpose.\* Other applicants

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\* To reach the College from the New Jersey Turnpike, motorists should leave by Exit 4 (Camden-Philadelphia Interchange). Turn right on Route 73. In about one hundred feet turn right for Interstate Route 295 South, and follow signs for Walt Whitman Bridge. After crossing Bridge follow signs for Philadelphia International Airport, Route 291. Follow Route 291 past Airport to 420. Turn right on 420 to Baltimore Pike, turn left and proceed to intersection with Route 320. Turn left and follow signs to the College. From the Pennsylvania Turnpike, take Exit 24 (Valley Forge) and take second right (sign says Ardmore, Chester) off Route 43 on to Route 23. Turn right on Route 320 and follow it to the campus.

should request the Office of Admissions to arrange a meeting with an alumni representative in their own area. Interviews should be completed before March 1 of the senior year. Scholarship applicants should make an effort to have their interviews by January 15. Candidates are not interviewed until the latter part of the junior year. Candidates will not be able to have campus interviews from March 15 to May 1 but a tour of the campus may be arranged during this period. Appointments at the College can be made by calling or writing the Office of Admissions, KI 3-0200, Ext. 445.

#### ADMISSION DECISIONS

Notices of the action of the Admissions Committees will be mailed about April 15.

#### ADVANCED PLACEMENT

Freshmen may apply for advanced standing or placement in particular courses if they have taken college level courses and the Advanced Placement Tests of the College Entrance Examination Board. Decisions are made by the departments concerned. Every effort is made to place students in the most advanced courses for which they are qualified.

#### APPLICATIONS FOR TRANSFER

The college accepts a very limited number of transfer students. For favorable consideration, applicants for transfer must have had a good scholastic record in the institution attended and must present full credentials for both college and preparatory work, including a statement of honorable dismissal. They must take the Scholastic Aptitude Test given by the College Entrance Examination Board if this test has not been taken previously.

As a general practice, transfer students are not admitted to advanced standing later than the beginning of the sophomore year. Four semesters of study at Swarthmore College constitute the minimum requirement for a degree, two of which must be those of the senior year. Applications for transfer must be filed by March 15 of the year in which entrance is desired. Decisions on these applications are announced early in June. Students admitted by transfer are not eligible for financial assistance during their first year at Swarthmore.

## EXPENSES

Charges for the academic year 1967-68 (two semesters):

Tuition .....	\$1,875
General Fee .....	190
Board and Room .....	985

Total Resident Charges .....	\$3,050
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While a general charge for board and room is made, this may be divided into \$565 for board and \$420 for room. The general fee of \$190 covers the cost of student health services, library and laboratory fees, athletic fees, attendance at all campus social and cultural events, and the support of most other extra-curricular activities.

One half of the total sum is due not later than Registration Day at the beginning of the fall semester. Bills are mailed before the opening of the current term. Payments should be made by check or draft to the order of SWARTHMORE COLLEGE. A student is not a registered student at Swarthmore College, nor on any class roll, until his bill is paid. Correspondence about financial matters should be addressed to Miss G. Caroline Sherwood, Associate Controller.

Students who wish to charge Book Store purchases, laboratory breakage fees, etc., may do so by maintaining a student deposit account at the Business Office against which charge checks may be drawn. Cash withdrawals may also be made. Students will be notified when overdrafts occur and no cash withdrawals may be made unless a cash balance is maintained. A minimum deposit of \$100.00 in September is suggested and all students are urged to maintain such an account for their convenience.

No reduction or refunding of tuition can be made on account of absence, illness, voluntary withdrawal, or dismissal from college. No reduction or refund will be made for failure to occupy the room assigned for a given term, nor is the general fee refundable. In case of absence or withdrawal from the college and provided due notice has been given in advance to the Business Office, there will be a refund of two-thirds of the board charge for any time in excess of two weeks. Exceptions will be made for students who are required by the draft to leave during the course of the academic year. In these cases tuition, general fee, board and room charges will be refunded on a pro rata basis.

### TUITION PAYMENT PLANS

Many of the parents of students may wish to pay all tuition, fees, and residence charges on a monthly basis. It is possible to arrange this under certain alternative plans. The cost is  $2\frac{3}{4}\%$  to 6% greater than when payments are made in cash in advance. Details of the plans will be

\* An advance deposit of \$25 is required of all new students in order to reserve a place in college for the coming year. A similar deposit of \$15 is required of returning students. These deposits are credited against the bill for tuition, board, and room.

furnished by the College prior to issuance of the first semester's bill in September.

#### ACCIDENT AND SICKNESS INSURANCE

The college makes available both accident and accident and sickness insurance to students through John C. Paige & Company of Boston, Massachusetts. Accident coverage alone costs \$12.00 per year (12 months) for women, and \$18.00 for men. The combined accident and sickness policy is available at an annual cost of \$32.50 for women and \$36.00 for men. At least accident coverage is required of all students who participate in intercollegiate athletic activities and the combined accident and sickness policy is particularly recommended. Application forms are mailed to all students during the summer.

#### FINANCIAL AID

The college assigns scholarships to a substantial number of students each year. These awards are normally made to entering freshman students and are renewable for four years. About one hundred freshman scholarships are awarded carrying stipends varying from \$100 to \$3,200 annually. Approximately thirty per cent of the total student body are currently receiving scholarship aid from the College, with stipends averaging about \$1,200 annually. Another ten to fifteen per cent are being assisted from sources outside the College.

All grants are based upon school or college record, and upon financial need as revealed in confidential statements to the Scholarship Committee through the agency of the College Scholarship Service. Entering students seeking financial assistance are required to submit a Parents Confidential Statement to the Service. This form may be obtained from a secondary school or from the College Scholarship Service, P. O. Box 176, Princeton, New Jersey 08540, Box 881, Evanston, Illinois 60204, or P. O. Box 1025, Berkeley, California 94701. The Scholarship Committee reviews the financial situation and academic progress of every scholarship holder at the end of each academic year before renewing the awards. In computing stipends the committee takes into account an expected family contribution from income and assets, the student's savings and summer earnings. These are budgeted against a normal total expense of \$3,500 for the college year. This allows \$450 for incidental expenses exclusive of travel and for the total college charge of \$3,050, which includes tuition, board and room, and a very comprehensive college fee which covers not only the usual student services (health, library, laboratory) but also attendance at all campus social, cultural and athletic events, and support of most club activities. The College reserves the right to adjust college stipends in the event the student receives scholarship assistance from other sources. First year transfer students are not eligible for scholarship aid.

Candidates wishing to apply for scholarships should make the usual application for admission. All applicants for admission are given the

opportunity to apply for scholarship aid. The candidate's status with respect to need for scholarship is not considered to be a relevant factor in the matter of reaching decisions concerning admission to the college.

For the academic year 1967-68 the college has granted approximately \$450,000 in scholarships. About two-thirds of that sum was provided by special gifts and the endowed scholarships listed below. Funds from the federal government are administered for needy students who are eligible for Educational Opportunity Grants and those who wish to take part in the Work-Study program. Applicants are not required to apply for specific scholarships but will be considered for all scholarship opportunities either from endowed scholarships or from general college scholarship funds. *Financial need is a requirement for all scholarships listed below unless otherwise indicated.*

### SWARTHMORE COLLEGE NATIONAL SCHOLARSHIPS

Swarthmore College awards each year a number of four-year National Scholarships to the men and women entering the freshman class. All candidates for admission to the College may be considered for these scholarships. Based on the general plan of the Rhodes Scholarships, the awards are made to those candidates who, in the opinion of the Committee of Award, rank highest in scholarship, character and personality. Whenever feasible, finalists for National Scholarships will be interviewed by the Committee of Award.

The amount of the annual award varies from \$100 to \$3,200 according to the financial need of the winner. In those cases where there is no financial need, National Scholarships will be awarded on an honorary basis and carry an annual stipend of \$100.

### OTHER SCHOLARSHIPS OPEN TO MEN AND WOMEN

THE FRANK AND MARIE AYDELOTTE SCHOLARSHIP is awarded biennially to a new student who shows promise of distinguished intellectual attainment based upon sound character and effective personality. The award is made in honor of Frank Aydelotte, President of the College from 1921-1940, and originator of the Honors program at Swarthmore, and of Marie Osgood Aydelotte, his wife.

The CURTIS BOK SCHOLARSHIP was established in the College's Centennial Year 1964 in honor of the late Philadelphia attorney, author and jurist, who was a Quaker and honorary alumnus of Swarthmore. The scholarship is assigned annually to a junior or senior man or woman whose qualities of mind and character indicate a potential for humanitarian service such as Curtis Bok himself rendered and would have wished to develop in young people. Students in any field of study, and from any part of this country or from abroad, are eligible. The scholarship is renewable until graduation.



The EDNA POWNALL BUFFINGTON FUND was established during the College's Centennial Year of 1964. The income from this Fund is used to provide scholarships for a student or students attending Swarthmore College who are concentrating their studies in the field of the social sciences and who indicate an interest in the objects or purposes of the American Friends Service Committee and a desire following their graduation and post-graduate work to serve in those fields. Awards are made to students in any of the four classes.

The KATHARINE SCHERMAN SCHOLARSHIP, is awarded to a student with a primary interest in the arts and the humanities, having special talents in these fields. Students with other special interests, however, will not be excluded from consideration. Awarded in honor of Katharine Scherman, of the Class of 1938, it is renewable for the full period of undergraduate study.

The SCOTT AWARD AT SWARTHMORE. A scholarship established by the Scott Paper Co. of Chester, Pa., in honor of its former president, Arthur Hoyt Scott of the Class of 1895. Given for the first time in 1953, it is awarded annually to an outstanding sophomore who plans to enter business after graduation and who demonstrates the qualities of scholarship, character, personality, leadership, and physical vigor. The award provides the recipient with \$1,500 for each of his last two years in college, regardless of financial need.

The FRANCIS W. D'OLIER SCHOLARSHIP, in memory of Francis W. D'Olier of the Class of 1907, is awarded to a freshman man or woman. In making selections, the committee will place emphasis on character, personality and ability.

The STELLA AND CHARLES GUTTMAN FOUNDATION SCHOLARSHIPS were established in 1964 by a grant from the Foundation to provide scholarships to defray all or part of the cost of tuition and fees for students who require financial assistance. Preference is given to students of recognized ability who have completed two academic years of college and who are contemplating graduate or professional study. The scholarships are renewable for a second year.

The IDA AND DANIEL LANG SCHOLARSHIP established by their son, Eugene M. Lang of the Class of 1938, provides financial assistance for a man or woman who ranks high in scholarship, character and personality.

The ADELE MILLS RILEY MEMORIAL SCHOLARSHIP, founded by her husband, John R. Riley, was awarded for the first time for the academic year 1964-65. Under the provisions of this scholarship, an annual award subject to renewal is made to a deserving student, man or woman. Selection stresses the candidate's capacity for significant development of his or her interests and talents during the college years. Qualities of intellectual promise as well as potential for service are sought in making this appointment.



The ROBERT C. BROOKS SCHOLARSHIP was established as a memorial to Professor Brooks by a number of his former students. It is available to a major in Political Science in the junior or senior year.

The LOUIS N. ROBINSON SCHOLARSHIP was established during the College's Centennial year by the family and friends of Louis N. Robinson. Mr. Robinson was for many years a member of the Swarthmore College faculty and founder of the Economics Discussion Group. A member of the junior or senior class who has demonstrated interest and ability in the study of Economics is chosen for this award.

The AUDREY FRIEDMAN TROY SCHOLARSHIP, established by her husband, Melvin B. Troy '48, is awarded to a freshman man or woman with preference given to residents of the town of North Hempstead, Nassau County, New York. The scholarship is renewable for four years at the discretion of the College. In awarding the scholarship, prime consideration is given to the ability of the prospective scholar to profit from Swarthmore education, and to be a contributor to the College and ultimately to society.

The GENERAL MOTORS SCHOLARSHIP is awarded by the Scholarship Committee to an incoming freshman man or woman who is a citizen of the United States. Selection is made on the basis of the high school academic record, participation in extracurricular activities, and evidence of leadership qualities. It is renewable for the full period of undergraduate study.

The MIDWEST SCHOLARSHIPS are awarded each year to one man and one woman applicant who resides in Illinois, Indiana, Michigan or Wisconsin. Winners will be selected on the basis of their potential contribution to the academic and extracurricular life of the College.

The MARSHALL P. SULLIVAN SCHOLARSHIP FUND was established by Creth and Sullivan, Inc. in memory of Marshall P. Sullivan of the Class of 1897. Preference will be given to graduates of George School, but if no suitable candidate applies from this school, graduates of other Friends schools or other persons will be eligible.

The RCA SCHOLARSHIP, provided by the Radio Corporation of America, is awarded to a young man or woman who is making a creditable academic record in the field of science or engineering at the undergraduate level. The appointment is usually made for the junior or senior year.

The E. HIBBERD LAWRENCE SCHOLARSHIP provides for a scholarship to an incoming freshman man or woman who ranks high in scholarship character, and personality.

The EDWARD S. BOWER MEMORIAL SCHOLARSHIP, established by Mr. and Mrs. Ward T. Bower in memory of their son, Class of '42, is awarded annually to a man or woman student who ranks high in scholarship, character, and personality.

The CORNELIA CHAPMAN PITTINGER SCHOLARSHIP established by her family and friends is awarded to an incoming freshman man or woman who ranks high in scholarship, character and personality and who has need for financial assistance.

The DANIEL UNDERHILL SCHOLARSHIP was given by Daniel Underhill '94, in memory of his grandfather, Daniel Underhill, member of the first Board of Managers.

The EDWARD CLARKSON WILSON AND ELIZABETH T. WILSON SCHOLARSHIP provides financial aid for a deserving student.

The RACHEL W. HILLBORN SCHOLARSHIP was founded by Anne Hillborn Philips of the Class of 1892 in memory of her mother, with the stipulation that the income shall go to a student in the junior or senior class who is studying for service in the international field. Preference will be given to a Friend or to one who intends to contribute to world understanding through diplomatic service, participation in some international government agency, the American Friends Service Committee, or similar activities.

The JONATHAN K. TAYLOR SCHOLARSHIP, in accordance with the donor's will, is awarded by the Board of Trustees of the Baltimore Monthly Meeting of Friends. The scholarship is first open to descendants of the late Jonathan K. Taylor. Then, while preference is to be given to members of the Baltimore Yearly Meetings of Friends, it is not to be confined to them when suitable persons in membership cannot be found.

The PHEBE ANNA THORNE FUND provides an income for scholarships for students whose previous work has demonstrated their earnestness and their ability. This gift includes a clause of preference to those students who are members of the New York Monthly Meeting of Friends.

THE WESTBURY QUARTERLY MEETING, N. Y., SCHOLARSHIP, is awarded annually by a committee of that Quarterly Meeting.

The SARAH ANTRIM COLE SCHOLARSHIP was founded by her parents in memory of Sarah Antrim Cole of the Class of 1934. It is awarded to a graduate of the Worthington High School, Worthington, Ohio.

The LAFORE SCHOLARSHIP is awarded in memory of John A. Lafore of the Class of 1895. The college in granting this scholarship will give preference to qualified candidates who are descendants of Amand and Margaret White Lafore.

The JAMES E. MILLER SCHOLARSHIP. Under the will of Arabella M. Miller funds are available annually for students from Delaware County (with preference for residents of Nether Providence Township).

The EDWARD CLARKSON WILSON SCHOLARSHIP has been established at Swarthmore by friends of Edward Clarkson Wilson, '91, formerly Principal of the Baltimore Friends School. It will be awarded each year to a former student of the Baltimore Friends School, who has been ap-

proved by the faculty of the school, on the basis of high character and high standing in scholarship.

The CHI OMEGA SCHOLARSHIP provides an award annually to a member of the freshman class. Preference is given to daughters or sons of members of the fraternity.

The DELTA GAMMA SCHOLARSHIP is to be awarded to a blind student at Swarthmore College. In any year in which there is no such candidate the fund may be awarded to a freshman woman.

The KAPPA KAPPA GAMMA SCHOLARSHIP provides an award to a member of the freshman class. Preference is given to relatives of members of the fraternity.

The SAMUEL WILLETS FUND. This fund provides an annual income for scholarships. A portion of the fund is assigned for scholarships in the name of Mrs. Willets' children, Frederick Willets, Edward Willets, Walter Willets, and Caroline W. Frame.

The I. V. WILLIAMSON SCHOLARSHIP. Preference is given to graduates of Friends Central, George School, New York Friends Seminary, Baltimore Friends School, Wilmington Friends School, Moorestown Friends School, Friends Academy at Locust Valley, Sidwell Friends School and Brooklyn Friends School.

The ROBERT PYLE SCHOLARSHIP was established by his sisters, Marger Pyle and Ellen Pyle Groff, in memory of Robert Pyle of the Class of 1897 and for many years a member of the Board of Managers. Applicants who show promise of intellectual attainment based upon sound character and effective personality and who reside in Chester County are given preference.

The income from each of the following funds is awarded at the discretion of the college.

The BARCLAY G. ATKINSON SCHOLARSHIP FUND.

The REBECCA M. ATKINSON SCHOLARSHIP FUND.

The CLASS OF 1913 SCHOLARSHIP FUND.

The CLASS OF 1914 SCHOLARSHIP FUND.

The CLASS OF 1915 SCHOLARSHIP FUND.

The CLASS OF 1917 SCHOLARSHIP FUND.

The WILLIAM DORSEY SCHOLARSHIP FUND.

The GEORGE ELLSLER SCHOLARSHIP FUND.

The JOSEPH E. GILLINGHAM FUND.

The THOMAS L. LEEDOM SCHOLARSHIP FUND.

The SARAH E. LIPPINCOTT SCHOLARSHIP FUND.

The READER'S DIGEST FUND.

The MARK E. REEVES SCHOLARSHIP FUND.

The FRANK SOLOMEN MEMORIAL SCHOLARSHIP FUND.

The MARY SPROUL SCHOLARSHIP FUND.

The HELEN SQUIER SCHOLARSHIP FUND.

The FRANCIS HOLMES STROZIER MEMORIAL SCHOLARSHIP FUND.

The JOSEPH T. SULLIVAN SCHOLARSHIP FUND.  
The DEBORAH F. WHARTON SCHOLARSHIP FUND.  
The THOMAS WOODNUTT SCHOLARSHIP FUND.

#### SCHOLARSHIPS FOR MEN

The THOMAS B. MCCABE ACHIEVEMENT AWARDS, established by Thomas B. McCabe '15, are awarded to freshman men from the Delmarva Peninsula and Northern New England (Maine, New Hampshire, or Vermont) who give promise of leadership. In making selections, the Committee will place emphasis on ability, character, personality, and service to school and community. Two awards, providing a minimum annual grant of \$1,875 (tuition) or up to \$3,200 depending on need, will be made to residents of Delaware or the Eastern Shore counties of Maryland or Virginia. One award, providing an annual grant of up to \$3,200 depending on need, will be made to a resident of Maine, New Hampshire, or Vermont.

The PHILIP T. SHARPLES SCHOLARSHIP, a four-year scholarship open to entering freshmen, is designed to honor and encourage young men in engineering or physical science. The committee, in making its selections, will have regard for candidates who rank highest in scholarship, character, personality, leadership, and physical vigor. At least one scholarship will be given each year.

The SCOTT B. LILLY SCHOLARSHIP, endowed by Jacob T. Schless of the Class of 1914 at Swarthmore College, was offered for the first time in 1950. This scholarship is in honor of a former distinguished Professor of Engineering and, therefore, students who plan to major in engineering will be given preference. An award is made annually.

The NEWTON E. TARBLE AWARD, established by Newton E. Tarble of the Class of 1913, is granted to a freshman man who gives promise of leadership, ranks high in scholarship, character and personality, and resides west of the Mississippi River or south of Springfield in the State of Illinois.

The BOOK AND KEY SCHOLARSHIP, established by the Book and Key men's senior honorary society in 1965 when the Society dissolved itself, is awarded each year to a senior man who has shown quality of leadership and has demonstrated through past performance his eagerness to give service to college and community. He should rank high in scholarship, character and personality.

The AARON B. IVINS SCHOLARSHIP is awarded annually to a young man of the graduating class of Friends Central School, Overbrook, Philadelphia. This scholarship is awarded by the faculty of Friends Central School, and is subject to the approval of Swarthmore College.

The HOWARD COOPER JOHNSON SCHOLARSHIP, established by Howard Cooper Johnson '96, is awarded on the basis of all-around achievement to a male undergraduate who is a member of the Society of Friends.

The T. H. DUDLEY PERKINS MEMORIAL SCHOLARSHIP is awarded annually to an entering freshman on the basis of qualities of manhood, force of character and leadership; literary and scholastic ability; physical vigor as shown by participation in out-of-doors sports or in other ways.

The CHRISTIAN R. AND MARY F. LINDBACK FOUNDATION SCHOLARSHIP is awarded to deserving students from the States of Pennsylvania, New Jersey, Delaware or Maryland.

The WILLIAM G. AND MARY N. SERRILL HONORS SCHOLARSHIP is a competitive Scholarship for Men, awarded to a candidate for admission to the college, based upon the general plan of the Rhodes Scholarships. Preference will be given to men who are residents of Abington Township, including Jenkintown and Glenside, Montgomery County, Pa.

The SARAH KAIGHN COOPER SCHOLARSHIP, founded by Sallie K. Johnson in memory of her grandparents, Sarah Kaighn and Sarah Cooper, is awarded to a man in the Junior Class who is judged by the faculty to have had, since entering College, the best record for scholarship, character, and influence.

The DONALD RENWICK FERGUSON SCHOLARSHIP, established by Mrs. Amy Baker Ferguson, in memory of her husband, Donald Renwick Ferguson, M.D., of the Class of 1912, is awarded to a young man who is looking forward to the study of medicine.

The PETER MERTZ SCHOLARSHIP is awarded to an entering freshman outstanding in mental and physical vigor, who shows promise of spending these talents for the good of the college community and of the larger community outside. The award was established in 1955 by Harold, LuEsther and Joyce Mertz in memory of Peter Mertz, who was a member of the class of 1957. It is renewable for all four undergraduate years.

The ANTHONY BEEKMAN POOL SCHOLARSHIP. This scholarship is awarded to an incoming freshman man of promise and intellectual curiosity. It is given in memory of Tony Pool of the Class of 1959.

The WALTER W. KRIDER SCHOLARSHIP was established by his wife and daughter for a young man who ranks high in scholarship, character and personality.

The HOWARD S. EVANS 1903 SCHOLARSHIP provides scholarships for worthy male students. The awards are made to those who stand high in scholarship, character, and personality. Preference is given first to applicants preparing for the ministry of the Episcopal Church, second, to that of other protestant denominations; and third, to those interested in Engineering or Economics.

#### SCHOLARSHIPS FOR WOMEN

The ALUMNAE SCHOLARSHIP, established by the Philadelphia and New York Alumnae Clubs, is awarded to a young woman who ranks high in scholarship, character and personality. It is awarded for one year.

The ANNIE SHOEMAKER SCHOLARSHIP is granted annually to a young woman of the graduating class of Friends Central School, Overbrook, Philadelphia. This scholarship is awarded by the faculty of Friends Central School, and is subject to the approval of Swarthmore College.

The CLARA B. MARSHALL SCHOLARSHIP, established by the will of Dr. Clara B. Marshall, is awarded to a woman at Swarthmore College with preference given to descendants of her grandfathers, Abram Marshall or Mahlon Phillips.

The GEORGE K. AND SALLIE K. JOHNSON FUND provides financial aid during the senior year for young women who are fitted to become desirable teachers.

The MARY COATES PRESTON SCHOLARSHIP FUND. A sum of money has been left by will of Elizabeth Coates, the annual interest of which provides a scholarship to a young woman student in Swarthmore College. Preference is given to a relative of the donor.

The HARRIET W. PAISTE FUND provides a scholarship for a young woman who is a member of the Society of Friends (Philadelphia Yearly Meeting).

The MARY T. LONGSTRETH SCHOLARSHIP was founded by Rebecca C. Longstreth in memory of her mother and is to be awarded annually to assist a young woman student to pursue her studies in the College.

The LILY TILY RICHARDS SCHOLARSHIP, established by Peirce L. Richards, Jr., in memory of his wife, Lily Tily Richards '29, is awarded to a woman distinguished for high scholarship, character, personality and physical vigor.

The SARAH W. SHREINER SCHOLARSHIP given in loving memory by her daughter, Leah S. Leeds of the Class of 1927, is awarded annually to a woman who ranks high in scholarship, character and personality.

The TITUS SCHOLARSHIPS established by the will of Georgiana Titus of the Class of 1898 are awarded to young women in order that they may pursue their studies in the College.

The JESSIE STEVENSON KOVALENKO SCHOLARSHIP FUND is the gift of Michel Kovalenko in memory of his wife. This scholarship is to be awarded to a student, preferably a woman, who is in her junior or senior year and who is a major in astronomy, or to a graduate of the college, preferably a woman, for graduate work in astronomy at Swarthmore or elsewhere.

The income of the KAPPA ALPHA THETA SCHOLARSHIP FUND, given by members and friends of the Kappa Alpha Theta Fraternity at Swarthmore, is awarded annually to a woman student.

The MARY WOOD FUND provides a scholarship which may be awarded to a young woman who is preparing to become a teacher.



## LOAN FUNDS

Swarthmore participates in the federal loan program established under the National Defense Education Act. The College also maintains special loan funds which are listed below. Repayment of college loans begins nine months after the student completes his higher education and are repayable within the next eleven years. The loans bear annual interest of 3% on the unpaid balance beginning with the date on which repayment is to begin. Amounts vary according to need, although the College believes that students should avoid heavy indebtedness which might prove detrimental to their own plans. The amount of a loan may not exceed \$1,000 annually. For the year 1967-68 the College has made approximately 150 loans in amounts averaging about \$375.

The JOSEPH W. CONARD MEMORIAL FUND, established by friends of the late Professor Conard, is available for loans to worthy students in financial difficulty.

### OTHER SPECIAL LOAN FUNDS

The CLASS OF 1916 LOAN FUND.

The CLASS OF 1920 LOAN FUND.

The CLASS OF 1936 LOAN FUND.

The JOHN A. MILLER LOAN FUND.

The PAUL M. PEARSON LOAN FUND.

The ELLIS D. WILLIAMS FUND.

The SWARTHMORE COLLEGE STUDENT LOAN FUND.

STUDENT EMPLOYMENT affords opportunity to earn money by regular work at current wage rates in the dining room, offices, laboratories or libraries. A student may hold a college job in addition to a scholarship or a grant-in-aid. The distribution of jobs among those authorized to hold them is made by the Student Employment office. Residents of the borough of Swarthmore often send requests for services to the college, which cooperates in making these opportunities known to students. About one-third of the students enrolled in college obtain employment regularly through the office. Earnings are restricted by the time a student can spend, though many students earn as much as \$200-\$300 during the college year, and some earn up to \$500.



## EDUCATIONAL RESOURCES

The primary educational resources of any college are the quality of its faculty and the spirit of the institution. Second to these are the physical facilities, in particular the libraries, laboratories and equipment.

Laboratories, well equipped for undergraduate instruction and in some cases for research, exist in physics, chemistry, zoology, botany, psychology, astronomy, and in civil, mechanical and electrical engineering. The Sproul Observatory, with its 24-inch visual refracting telescope, is the center of much fundamental research in multiple star systems. The Edward Martin Biological Laboratory provides facilities for work in psychology, zoology, botany, and premedical studies. The Pierre S. du Pont Science Building, completed in 1960, provides accommodations for chemistry, mathematics, and physics. Beardsley and Hicks Halls contain the engineering laboratories. The Bartol Research Foundation of the Franklin Institute, which is also located on the campus, enjoys an international reputation for its basic research activities in physics, particularly in the fields of nuclear physics, cosmic radiation, and solid state physics.

The THOMAS B. AND JEANNETTE E. L. MCCABE LIBRARY contains reading rooms, offices and a collection of 295,000 volumes. Some 12,000 volumes are added annually. About 1,400 periodicals are received regularly. The general collection, including all but the scientific and technical books and journals, is housed in the library building, situated on the front campus. The Du Pont Science Library, new in 1960, houses some 21,000 books and journals in chemistry, engineering, mathematics and physics. The library is definitely a collection of books and journals for undergraduate use. The demands of Honors work, however, make necessary the provision of large quantities of source material not usually found in collections maintained for undergraduates. It is a point of library policy to try to supply, either by purchase or through inter-library loan, the books needed by students or members of the faculty for their individual research.

In addition, the library contains certain special collections—the British Americana collection, the Wells Wordsworth and Thomson collections, and a collection of the issuances of 561 private presses.

A number of special features enrich the academic background of the college. Among these are the following:

The FRIENDS HISTORICAL LIBRARY, founded in 1871 by Anson Lapham, is one of the outstanding collections in the United States of manuscripts, books, pamphlets, and pictures relating to the history of the Society of Friends. The library is a depository for records of Friends Meetings belonging to Philadelphia and other Yearly Meetings. More than 2,000 record books have been deposited; many of them have been reproduced on microfilm, for which four reading machines are available. The William Wade Hinshaw Index to Quaker Meeting Records indexes the material of genealogical interest in the records of 307 meetings in various parts of

the United States. Notable among the other holdings are the Whittier Collection (first editions and manuscripts of John Greenleaf Whittier, the Quaker poet), the Mott Manuscripts (over 400 autograph letters of Lucretia Mott, antislavery and women's rights leader), and the Hicks Manuscripts (more than 300 letters of Elias Hicks, a famous Quaker minister). The Library's collection of books and pamphlets by and about Friends numbers approximately 30,000 volumes. About 73 Quaker periodicals are currently received. There is also an extensive collection of photographs of meetinghouses and pictures of representative Friends as well as a number of oil paintings, including two versions of "The Peaceable Kingdom" by Edward Hicks. It is hoped that Friends and others will consider the advantages of giving to this Library any books and family papers which may throw light on the history of the Society of Friends.

The SWARTHMORE COLLEGE PEACE COLLECTION is of special interest to research students and others seeking the records of the Peace Movement. The personal papers of Jane Addams of Hull House, Chicago (approximately 10,000 items) formed the original nucleus of the Collection, which now contains documentation on the history of the organized peace movement from its beginnings *circa* 1815 to the present time, as well as correspondence and writings of many workers for international peace and arbitration. The Collection includes files of some 1,200 peace periodicals published in the United States and abroad over the past 150 years; approximately 154 such periodicals in eleven languages are currently received from twenty-one countries. This collection is the official depository for the archives of leading peace organizations in the United States. A more nearly complete description of the Collection will be found in the *Guide to the Swarthmore College Peace Collection*, published by the College, and available on request.

The WILLIAM J. COOPER FOUNDATION provides a varied program of lectures and concerts which enriches the academic work of the college. The Foundation was established by William J. Cooper, a devoted friend of the college, whose wife, Emma McIlvain Cooper, served as a member of the Board of Managers from 1882 to 1923. Mr. Cooper bequeathed to the college the sum of \$100,000 and provided that the income should be used "in bringing to the college from time to time eminent citizens of this and other countries who are leaders in statesmanship, education, the arts, sciences, learned professions and business, in order that the faculty, students and the college community may be broadened by a close acquaintance with matters of world interest." Admission to all programs is without charge.

The Cooper Foundation Committee works with the departments and with student organizations in arranging single lectures and concerts, and also in bringing to the college speakers of note who remain in residence for a long enough period to enter into the life of the community. Some

of these speakers have been invited with the understanding that their lectures should be published under the auspices of the Foundation. This arrangement has so far produced sixteen volumes:

Lindsay, Alexander Dunlop. *The Essentials of Democracy*. Philadelphia, University of Pennsylvania Press, 1929.

Lowes, John Livingston. *Geoffrey Chaucer and the Development of His Genius*. New York, Houghton Mifflin Co., 1934.

Weyl, Hermann. *Mind and Nature*. Philadelphia, University of Pennsylvania Press, 1934.

*America's Recovery Program*, by A. A. Berle, Jr., John Dickinson, A. Heath Onthank . . . and others . . . London, New York, etc., Oxford University Press, 1934.

Salter, Arthur S. baron. *World Trade and Its Future*. Philadelphia, University of Pennsylvania Press, 1936.

Madariaga, Salvador de. *Theory and Practice in International Relations*. Philadelphia, University of Pennsylvania Press, 1937.

Streit, Clarence Kirshman. *Union Now; a Proposal for a Federal Union of the Democracies of the North Atlantic*. New York, Harper, 1939.

Krogh, August. *The Comparative Physiology of Respiratory Mechanisms*. Philadelphia, University of Pennsylvania Press, 1941.

Griffith, Ernest Stacey. *The Modern Government in Action*. New York, Columbia University Press, 1942.

Linton, Ralph. *The Cultural Background of Personality*. New York, London, D. Appleton-Century Co., 1945.

Wilcox, Clair, Editor. *Civil Liberties Under Attack*. A series of lectures given in 1950-51. Philadelphia, University of Pennsylvania Press, 1951.

Redfield, Robert. *Peasant Society and Culture; an Anthropological Approach to Civilization*. Chicago, The University of Chicago Press, 1956.

Weatherford, Willis D., Jr., Editor. *The Goals of Higher Education*. A series of lectures given in the spring of 1958. Cambridge: Harvard University Press, 1960.

Lovejoy, Arthur Oncken. *Reflections on Human Nature*. Baltimore: Johns Hopkins University Press, 1961.

Rhys, Hedley H., Editor. *Seventeenth Century Science and the Arts*, Princeton: Princeton University Press, 1962.

Brandt, Richard B., Editor. *Social Justice*. Englewood Cliffs: Prentice-Hall, 1962.

Pennock, James Roland, Editor. *Self-government in Modernizing Nations*. Englewood Cliffs: Prentice-Hall, 1965.

The ARTHUR HOYT SCOTT HORTICULTURAL FOUNDATION. About three hundred acres are contained in the College property, including a large tract of woodland and the valley of Crum Creek. Much of this tract has been developed as an horticultural and botanical collection of trees, shrubs and herbaceous plants through the provisions of the Arthur Hoyt Scott

Horticultural Foundation, established in 1929 by Mrs. Arthur Hoyt Scott and Owen and Margaret Moon as a memorial to Arthur Hoyt Scott of the Class of 1895. The plant collections are designed both to afford examples of the better kinds of trees, shrubs and herbaceous plants which are hardy in the climate of Eastern Pennsylvania and suitable for planting by the average gardener, and to beautify the campus. There are exceptionally fine displays of Japanese cherries, flowering crab apples, magnolias and tree peonies, and a great variety of lilacs, rhododendrons, azaleas, daffodils, irises, herbaceous peonies, and hemerocallis. Many donors have contributed generously to the collections. (For full information see *Bulletin of Swarthmore College*, Vol. xxxvii, No. 5.)

The ARTS CENTER, opened in 1961, contains the Paul M. Pearson Experimental Theater, the Florence Wilcox Lobby for art exhibitions, the Dorothy Hunt Music Room, and studios for various arts and crafts. The Class of 1910 Room provides suitable quarters for student government, and other rooms are provided for student publications and other extra-curricular activities.

The COMPUTER CENTER, located in Beardsley Hall, is equipped with an I.B.M. 1620 Computer. It is available to the faculty members and students for research and instruction.

A new LANGUAGE LABORATORY, made possible by a contribution from the James Foundation of New York, was installed in 1964. It provides stations for 35 students and has the equipment for effective use in language teaching.

The BRONSON M. CUTTING MEMORIAL COLLECTION OF RECORDED MUSIC was established at Swarthmore College in 1936 by a gift of approximately four thousand phonograph records, a radio-phonograph, books and musical scores, from the family of Bronson Murray Cutting, late Senator from New Mexico. Its object is to make the best recorded music available to the undergraduates, faculty, and friends of Swarthmore College, in cooperation with the work of the college Department of Music. The collection is kept up to date with current additions.

The BENJAMIN WEST LECTURE, made possible by gifts from members of the class of 1905 and other friends of the College, is given annually on some phase of art. It is the outgrowth of the Benjamin West Society which built up a collection of paintings, drawings, and prints, which are exhibited, as space permits, in the college buildings. The lecture owes its name to the American artist, who was born in a house which stands on the campus and who became president of the Royal Academy.

The POTTER COLLECTION OF RECORDED LITERATURE, established in 1950 with accumulated income from the William Plumer Potter Public Speaking Fund, includes a wide variety of recorded poetry, drama and prose. Among the 700 titles on disc and tape are contemporary writers reading from and discussing their works; full length versions of Shake-

spearean plays and other dramatic repertoire; the literature of earlier periods read both in modern English and in the pronunciation of the time; British and American ballads; lyrical verse in musical settings; and recordings of literary programs held at Swarthmore. These materials are used as adjuncts to the study of literature. The collection is housed in Beardsley Hall and students are admitted on application to the Secretary of the Language Laboratory. The Department of English Literature is in charge of the collection and selects current additions.

The BETTY DOUGHERTY SPOCK MEMORIAL FUND, established through the generosity of friends of the late member of the Class of 1952, provides income for the purchase of dramatic recordings. These are kept with the Potter Collection.

THE BOYD AND RUTH BARNARD FUND FOR THE ADVANCEMENT OF MUSIC AT SWARTHMORE was established in 1964 by two graduates of the College, Mr. and Mrs. Boyd T. Barnard of Rosemont, Pennsylvania. The income from the fund may be used for any activity that contributes to the advancement of music at the college. It has been used, for example, for concerts on the campus, for the purchase of vocal and orchestral scores and other musical literature, and to provide scholarships for students who show unusual promise as instrumentalists or vocalists. In the year 1967-68 part of the fund is being used to bring to the campus two visiting Associates in Performance for weekly concerts of chamber music and for instruction for instrumentalists in the College Orchestra.

The GENE D. OVERSTREET MEMORIAL FUND, given by friends in memory of Gene D. Overstreet (1924-1965), a member of the Political Science Department, 1957-1964, provides income to bring a visiting expert to the campus to discuss problems of developing or modernizing nations and cultures.

## COLLEGE LIFE

### HOUSING

Swarthmore is primarily a residential college, conducted on the assumption that an important element in education comes from close association of students and instructors. Most students live in dormitories. Many members of the faculty live on or near the campus.

#### *Residence Halls*

There are eight dormitories for men: Wharton Hall, named in honor of its donor, Joseph Wharton, at one time President of the Board of Managers, Palmer, Pittenger and Roberts Halls on South Chester Road, two buildings on the former Mary Lyon School property, and two new dormitories, Hallowell and Dana, which were opened in September of 1967.

The women's dormitories include the upper floors in the wings of Parrish Hall; Worth Hall, the gift of William P. Worth, '76, and J. Sharples Worth, ex-'73, as a memorial to their parents; Robinson House; Woolman House; Ashton House; and Willets Hall, largely made possible by a bequest from Phebe Seaman, '19, and named in honor of her mother and aunts.

All freshmen are assigned to rooms by the Deans. Other students choose their rooms in an order determined by lot. Special permission must be obtained to room outside the dormitories.

Students may occupy college rooms during vacations only by special arrangements with the Deans and payment of the required fee. Freshmen, sophomores and juniors are asked to leave college immediately after their last examination in the spring so that their rooms may be used by Commencement visitors.

The insurance program for the College is designed to provide protection for College property and does not include the property of students or others. It is therefore suggested that students and their parents should review their insurance program in order to be sure that coverage is extended to include personal effects while at college.

#### *Dining Hall*

All students, both men and women, have their meals in the Philip T. Sharples Dining Hall. The dining hall is ordinarily closed during vacations.

### RELIGIOUS LIFE

The religious life of the college is founded on the Quaker principle that the seat of spiritual authority lies in the Inner Light of each individual. The Society of Friends is committed to the belief that religion is best expressed in the quality of everyday living. There are accordingly no compulsory religious exercises, save in so far as the brief devotionals



element in Collection may be so considered. Students are encouraged to attend the churches of their choice. Episcopal, Presbyterian, Methodist, and Christian Science churches are located in the borough of Swarthmore; other churches and synagogues in the nearby towns of Morton, Media, Chester, and Springfield. The Swarthmore Meeting House is located on the campus. Students are cordially invited to attend its meeting for worship on Sunday. Extracurricular groups with faculty cooperation exist for the study of the Bible and the exploration of common concerns in religion.

### COLLECTION

An assembly of the college, called Collection, is held at 10:00 a.m. on alternate Thursdays in Clothier Memorial; attendance of students is required. There is regularly a period of silence according to the Friendly tradition and a reading. Lasting about three-quarters of an hour, Collection normally includes an address; but this is varied by the occasional introduction of musical, dramatic, and other programs.

### STUDENT WELFARE

#### *Health*

The college physicians hold daily office hours at the college, where students may consult them without charge. A student must report any illness to the college physicians, but is free to go for treatment to another doctor if he prefers to do so.

At the time of admission each student must present a brief medical history and health certificate, prepared by the family physician on a form supplied by the college. Pertinent information about such matters as physical reserve, unusual medical episodes, severe allergies, or psychiatric disturbances will be especially valuable to the college Health Service. All new students must have been successfully vaccinated against smallpox within five years, in accordance with Pennsylvania State law.

The college physician gives physical examinations to all students at the beginning of each year. There is close cooperation with the Departments of Physical Education. Recommendations for limited activity are made for those students with physical handicaps. In some cases a student may be excused entirely from the requirements of the Physical Education Department.

The Worth Health Center, a gift of the Worth family in memory of William Penn Worth '76 and Caroline Hallowell Worth '79, was opened in September of 1965. It houses offices for the college physicians and nurses, out-patient treatment facilities and rooms for men and women who must remain as in-patients. Registered nurses are on duty under the direction of the college physicians.

Each student is allowed ten days care in the Health Center per term without charge unless the services of a special nurse are required. After ten days, a charge of \$5.00 per day is made. Students suffering from a



communicable disease or from illness which makes it necessary for them to remain in bed must stay in the Health Center for the period of their illness. Ordinary medicines are furnished without cost, but a charge is made for special medicines, certain immunization procedures, and transportation.

The medical facilities of the college are available to students injured in athletic activities or otherwise, but the college cannot assume additional financial responsibility for medical and surgical expenses arising from accidents. Accident insurance coverage is, therefore, required for all students participating in athletics and is recommended for all others. (For details see page 37.)

The college psychiatric consultants hold office hours by appointment each week. The purpose of this service is to be of help in all types of emotional problems and three visits are offered without charge. The consulting psychiatrists have an office in the Worth Health Center.

### *Vocational Advising*

The college provides vocational information and advice to assist students in their choice of a career. Conferences and field trips are planned periodically and interviews are arranged with prospective employers. Help is offered to students in finding employment. In addition, summer work opportunities are made known to students.

### *Alumni Office*

The Alumni Office keeps records of the addresses of all living graduates and alumni of the college. It helps edit the Swarthmore alumni magazine and acts as liaison for the college with all alumni and alumni groups interpreting to them the present plans and policies of the college.

### *News Office*

The News Office does a two-fold job. It helps prepare the several publications put out by the college known as Swarthmore College Bulletins. These include the alumni magazine, the President's Report, the Catalogue, the Student Handbook, and other miscellaneous issues. In addition to this, the News Office, through the largely student operated News Bureau, works with the press and other communications media in publicizing news that is of interest to the general public.

### *Student Advising*

The Deans and their assistants hold the primary responsibility for advising all students. However, there are many other advisers available.

Each freshman is assigned to a faculty member who acts as his course adviser until this responsibility falls to the chairman of the student's major department at the end of his sophomore year. Faculty members have also been appointed as advisers for each of the men's varsity athletic teams. They work closely with the team, attending practices and many of the scheduled contests.

Mrs. Helen Hall and Mrs. Gloria Evans are experienced counselors who are glad to assist students with problems of academic adjustment, study skills and reading proficiency. They also can give aptitude and interest tests on request. Appointments may be made at their offices in Parrish Hall.

Each women's dormitory has a head resident. In Parrish and Willets, the head resident is assisted by student residents who are members of the senior class.

A group of upperclass women, under the direction of the Women's Student Government Association, serve as counselors for all freshman women, several counselors being assigned to each hall. There are also student proctors in each of the men's dormitory sections. A group of students assist the Deans with the orientation program conducted during the freshman week.

## THE STUDENT COMMUNITY

### *Student Conduct*

The Society of Friends has historically been conservative in social matters, and its influence within the College community is one of the important factors in making Swarthmore what it is. Students who choose Swarthmore as their college should recognize that they are selecting a set of social and academic standards that are intrinsic to the history and point of view of this institution. In general, the life of students is to be governed by good taste and accepted practice rather than by elaborate rules. Certain rules, however, are of sufficient importance to deserve attention here:

1. The men's and women's dormitories are not to be visited by members of the opposite sex except under the following conditions: Visiting is permitted in the public parlors between certain specified hours; open houses on certain afternoons and evenings may be scheduled according to the rules established by the Student Affairs Committee.
2. The possession and use of alcoholic beverages on the campus is forbidden, as is disorderly conduct.
3. The use or possession of firearms or other dangerous weapons is not permitted. Firecrackers or other explosives are prohibited. Tampering with fire alarm or prevention equipment is a serious offense.
4. No undergraduate may maintain an automobile while enrolled at the College without the permission of the Dean of Men. This permission is not extended to freshmen. The administration of this rule is in the hands of a Student-Faculty committee. Day students may use cars for commuting to College, but special arrangements for stickers must be made for campus parking. More detailed information may be had from the Office of the Deans.
5. At evening concerts, dramatic performances, and public lectures men will wear coats and ties and women dresses or skirts. At evening meals in the dining room the same standards will apply except that it is

recommended that the men wear coats and ties but not required so long as the dress is in other respects consistent with the spirit of these regulations.

6. It is a college policy to discourage premature marriages. Undergraduates who wish to marry and remain at Swarthmore must request permission to do so from the Deans. If two students are married without this permission, one of them must withdraw from the College.

College rules which affect the entire student community are discussed and formulated for the approval of the Administration by the Student Affairs Committee, which is composed of Deans and Faculty members appointed by the President and students elected by the student body. This Committee delegates to student government agencies as much authority in the administration of rules as they responsibly accept.

### *Student Council*

The semi-annually elected Student Council represents the entire undergraduate community and is the chief body of student government. Its efforts are directed toward coordination of student activities and the expression of student opinion.

Committees of the Council include the Budget Committee, which regulates distribution of funds to student groups; the Elections Committee, which supervises procedure in campus elections; and the Social Committee, see below. The Curriculum Committee cooperates with a similar committee of the faculty in the discussion of matters relating to the academic program of the college. In addition to these, there are several joint Faculty-Student Committees, whose student membership is appointed by the President of the College and the President of Student Council: Collection, Cooper Foundation, Men's Athletics, Schedule of Classes, Computer, and Library.

### *Judicial Bodies*

Where infractions of college rules have occurred, decisions about responsibility and about penalties are made by elected committees. Four such committees have different jurisdictions. The *Women's Judiciary Committee* is a branch of WSGA and is elected by the women of the student body. It sits in all cases of violations of WSGA rules or of violations of women of general campus regulations except as they fall in the sphere of the Student Judiciary Committee (see below). The *Men's Judiciary Committee* is elected by the male students and sits in all cases of violations of college rules by male students except in the kinds of cases indicated below coming under the jurisdiction of the Student Judiciary Committee. The *Student Judiciary Committee*, elected by the entire student body, acts in cases involving the car rule, dress rule, on cases involving both men and women, and on others that may require joint action. The *College Judiciary Committee* is composed of student and faculty members and the Deans. It deals with cases referred or appealed from the other Committees with any violations that involve penalties of suspension or expulsion.

### *Women's Student Government*

All women students are members of the Women's Student Government Association, headed by an Executive Board elected to promote a great variety of women's interests. This board includes the officers of the Association, the hall presidents and the chairman of the Women's Judiciary Committee, which maintains social regulations.

### *Newton E. Tarble Student Center*

Through the generosity of Newton E. Tarble of the Class of 1913, the building which formerly housed the College Library is being completely renovated and will serve as the College's Social Center. It should be ready for use in 1967-68. The Center includes recreational facilities, lounges, meeting rooms, and a snack bar.

### *Social Committee*

An extensive program of social activities is managed by the Social Committee appointed by the Student Council. The program is designed to appeal to a wide variety of interests, and is open to all students. At no time is there any charge for college social functions.

## EXTRA-CURRICULAR ACTIVITIES

In addition to the foregoing organizations, Swarthmore students have an opportunity to participate in a program of extra-curricular activities wide enough to meet every kind of interest. There are more than thirty-five organized activities, not including departmental clubs or political organizations. They vary as greatly as the interests of the students vary, from the Flying Club to the Chess Club, from the Creative Writing Group to the Co-ed Dance Group. No credit is given for work in such varied fields as sculpture, acting, publishing the college newspaper or playing in the orchestra. The College, however, encourages a student to participate in whatever activity best fits his personal talents and inclinations, believing that satisfactory avocations are a necessary part of life.

### *The Studio Arts Program*

The Director of Studio Arts, Harriet Shorr Baguskas, arranges for classes in applied arts and for exhibits in the Arts Center and acts as an adviser to other organizations.

In the academic year 1967-68 instruction will be given on a regular basis both semesters in drawing, painting, print-making, pottery, and jewelry, and in the spring semester in photography and film-making.

The Wilcox Gallery provides ten to twelve exhibitions a year, which are a direct complement to the program. The works of nationally known painters as well as those of younger artists are exhibited in group and one man shows.

### *The Marjorie Heilman Visiting Artist Program*

Each year a committee of students and faculty members selects an artist to be invited to spend a week at the College. The work of the invited artist is exhibited in the Wilcox Gallery, and he meets and talks with students on an informal basis. In the past, film maker Rudy Burckhardt, painter Neil Welliver, and potter Toshiko Takaezu have been the invited artists.

### *Music*

The Department of Music administers and staffs three performing organizations on an extra-curricular basis. The College Chorus, directed by Professor Swing, rehearses twice per week for a total of three hours. (The College Singers, a select small chorus drawn from the membership of the Chorus, rehearses an additional hour per week.) The College Orchestra, directed by Professor Spies, rehearses twice per week: a two-hour rehearsal for full orchestra and a one-hour rehearsal for strings. Members of the orchestra, other instrumentalists and solo singers can participate in the chamber music coaching program directed by Mr. Kalish and Mr. Zukofsky.

The Chorus and Orchestra give several public concerts per year at the College and at other schools. Selected members of the chamber music coaching program give a public concert in the spring.

All three organizations require auditions for membership.

The Bond Concert Committee, a student organization working with the Department of Music, plans a series of informal Sunday afternoon concerts to accommodate students interested in preparing solo and chamber music performances. These concerts also provide an opportunity for student composers to get public performances.

The College Band meets once a week to prepare for a spring concert, and for playing at fall athletic events.

There are facilities for private practice, and an excellent college record collection. The Cooper Foundation presents a distinguished group of concerts each year on the campus, and student tickets are available for concerts of the Philadelphia Orchestra in the Academy of Music.

### *Drama*

A supervisor of dramatic activities coordinates the program, which consists of student-produced workshop productions, a bill of student-written one-act plays, and two major productions directed by a visiting director from New York City.

### *Athletics*

Swarthmore's athletic policy is based on the premise that any intercollegiate program must be justified by the contribution which it can make to the educational development of the individual student who chooses to participate. In keeping with this fundamental policy, Swarthmore's

athletic program is varied and extensive, offering every student a chance to take part in a wide range of sports. The College feels that it is desirable to have as many students as possible competing on its inter-collegiate teams.

*Fraternities*

There are five fraternities at Swarthmore; Delta Upsilon and Phi Sigma Kappa are affiliated with national organizations while Kappa Sigma Pi, Tau Alpha Omicron and Phi Omicron Psi are local associations. Fraternities are adjuncts to the college social program and maintain separate lodges on the campus. The lodges do not contain dormitory accommodations or eating facilities. New members are pledged during the late fall of their first year at the college. In recent years about 40% of the freshman men have decided to affiliate with one of the five fraternities.

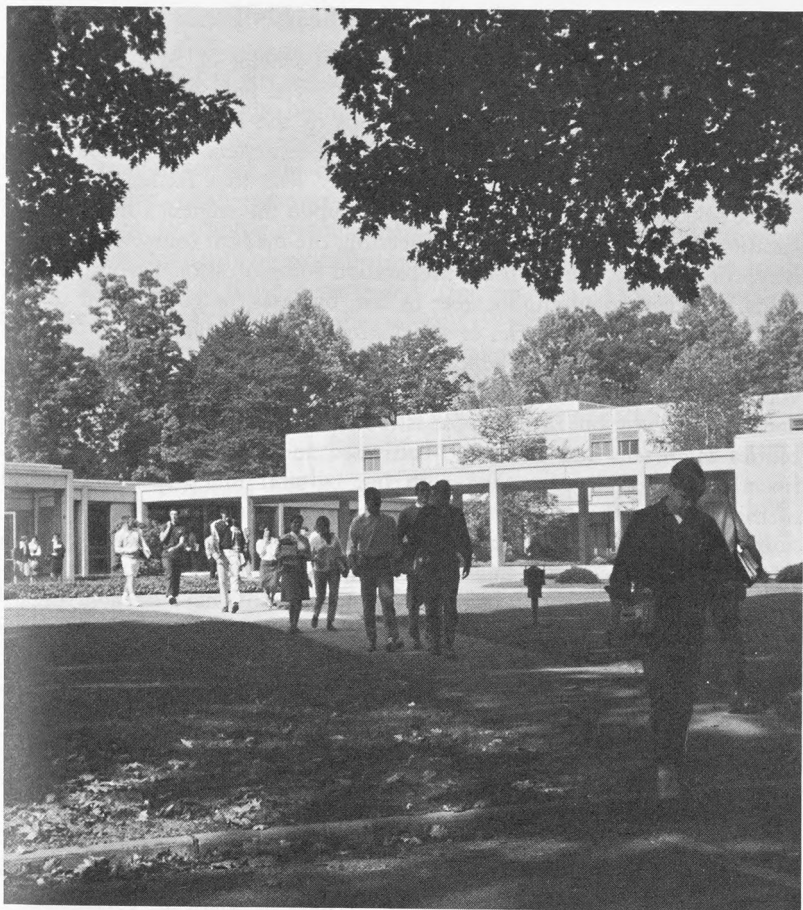
*Student Activities Bulletin*

A booklet describing more fully all these activities and many others can be had upon request from the Office of Admissions.

THE EDUCATIONAL PROGRAM OF  
SWARTHMORE  
COLLEGE







*Pierre S. du Pont Science Building*

THE EDUCATIONAL PROGRAM OF

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SWARTHMORE  
COLLEGE

## GENERAL STATEMENT

Swarthmore College offers the degree of Bachelor of Arts and the degree of Bachelor of Science. The latter is given only in the Division of Engineering; the former, in the Divisions of the Humanities, the Social Sciences, and the Natural Sciences.\* Eight semesters of resident study which are normally completed in four years, lead to a Bachelor's degree.

The selection of a program will depend upon the student's interests and vocational plans. Programs in engineering, pre-medical courses, and chemistry, for example, are the usual preparation for professional work in these fields. Students planning a career in law, business, or government service find majors in the humanities or social sciences of great value.

The purpose of a liberal education, however, is not primarily to provide vocational instruction, even though it provides the best foundation for one's future vocation. Its purpose is to help students fulfill their responsibilities as citizens and grow into cultivated and versatile individuals. A liberal education is concerned with our cultural inheritance, the world of thought, and the development of aesthetic, moral, and spiritual values.

It is necessary for most students to concern themselves with the problem of making a living. But this concern should not lead them to a specialization that is too early and too narrow. They still have need of broadening the scope of their experience. Particular skills may afford ready access to routine employment, but positions of greater responsibility will be occupied by those who are equipped to think their way through new problems and to conceive of their functions in a larger context of time and place. Liberal education and vocational training may be the joint products of a common process, and the courses here offered should be selected with this large purpose in view.

All students during the first half of their college program are expected to complete the general college requirements, to choose their major and minor subjects, and to prepare for advanced work in these subjects by taking certain prerequisites. The normal program consists of five courses each semester during the freshman and sophomore years, chosen by the student in consultation with his course adviser. A student is permitted to take four instead of five courses, however, during two of the four semesters, or to withdraw from one course before the middle of the semester (if he is taking five) with the approval of his course adviser. He will therefore complete from eighteen to twenty half courses (semester courses) during his first two years.

The program for upper class students affords a choice between two methods of study: Honors Work, leading to a degree *with Honors*, and General Courses. An Honors student concentrates on three related subjects which he normally studies by the seminar method. At the end of his senior year he must take a battery of eight examinations on the work of his seminars, set by outside examiners. (The system will be explained more fully below.)

\* For groupings of departments, see page 21.

A student in general courses has a somewhat wider freedom of election and takes four full courses or their equivalent in each of the last two years. At the end of his senior year he is required to pass a comprehensive examination given by his major department.

The program for engineering students follows a similar basic plan, with certain variations which are explained on page 99. Courses outside the technical fields are spread over all four years.

In addition to scholastic requirements for graduation, all students must meet certain standards of participation in Physical Education as set forth in the statement of those departments (see pp. 151-153) and must attend the Collection exercises of the college (see p. 53).

The course advisers of freshmen and sophomores are members of the faculty appointed by the Dean. For juniors and seniors the advisers are the chairmen of their major departments or their representatives.

### Program for Freshmen and Sophomores

The curriculum of the first two years introduces a student to the methods and content of a variety of fields important to a liberal education. To this end the student chooses a part of his program in each of four groups of courses and in addition meets a specified standard in a foreign language.

I. From the four groups listed below, and from Mathematics, the student chooses work in at least six departments. At least two half-courses (or one full course) must be taken from each group.

1. Astronomy 1-2; Biology 1-2; Chemistry 1,2; Engineering 7-8; Physics 1,2; Physics 7-8 (Concepts and Theories in Physical Science). See note below.
2. English Literature 1 which may be followed by another course in English Literature; all literature courses numbered 11,12 in classical or modern foreign languages; Fine Arts 1,2; Music 1,15,16.
3. History 1-2; History 5,6; Philosophy 1 which may be followed by another course in Philosophy or Religion; Psychology 3.
4. Economics 1-2; Political Science 1-2; Sociology-Anthropology 1-2.

II. Languages. All students except those majoring in Engineering must include in their programs sufficient work in a modern or classical language to complete course 4 or its equivalent. The language requirement may be met in whole or in part by secondary school preparation as measured by the appropriate achievement test of the College Entrance Examination Board, or by a placement examination given at the college by the appropriate department. The desired standard is normally met on

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Note: Full courses the numbers of which are joined by a hyphen (e.g., 1-2) must be continued for the entire year, credit is not given for the first semester's work only. Those whose numbers are separated by a comma (e.g., 1, 2) may be divided. (Credit is given separately for each half of the course.)

the basis of four years work in high school, or of three or two years work in high school followed by one or two semesters in college.

At the discretion of the department concerned, a student may be permitted to substitute an advanced course for the introductory course in meeting one of the distribution requirements. Students entering college with special preparation in any of the subjects included in the distribution requirements may apply to the Committee on Academic Requirements for exemption from that requirement.

A student who majors in the Natural Sciences, Mathematics, or Engineering will take an appropriate mathematics course in the freshman year.

No student may take more than four half-courses (or two year-courses) in any one department during the first two years. Applications for exceptions in unusual cases may be made to the Committee on Academic Requirements.

In addition to the requirements listed above, prerequisites must be completed for the work of the last two years in major and minor subjects, and sufficient additional electives must be taken to make up a full program.

It is expected that, after satisfying the requirements in the general program of the first two years, the student will devote the remainder of his sophomore year to preparing himself for more advanced study of those subjects which have most interested him and to other courses which will increase the range of his knowledge. He should decide, as early in his sophomore year as possible, upon two or three subjects in which he might like to major and should consult the statements of the departments concerned as to required and recommended courses and supporting subjects.

Physical education is required of all students (except veterans) in the first two years. The requirements are stated in full on page 72 and in the statements of the departments of Physical Education.

## Program for Juniors and Seniors

### WORK IN COURSE

The work of juniors and seniors in Course includes some intensive specialized study within a general area of interest. This comprises enough work in a single department (designated as a "major") to make an equivalent of four full courses. Work taken during the first two years may be counted toward fulfillment of the major requirements but not more than six full courses or twelve half courses may be taken in the major field. Before graduation the student must pass a comprehensive examination in his major subject.

A student must choose his major subject at the end of the sophomore year, and apply formally through the Registrar to be accepted by the division concerned. The decision will be based on an estimate of his ability in his major subject as well as on his record. If a student does not secure divisional approval, he cannot be admitted to the junior class.

A student's course adviser during his junior and senior years is the chairman of his major department (or a member of the department designated by the chairman) whose approval he must secure for his choice of courses each semester.

In addition to major and recommended supporting subjects, juniors and seniors usually have room for at least one elective a year.

The faculty may award the bachelor's degree with Distinction to students who have done distinguished work in the course program.

#### READING FOR HONORS

The Honors Program, initiated in 1922 by President Frank Aydelotte, is a distinctive part of Swarthmore's educational life. It seeks to free from the limitations of classroom routine those students whose maturity, interest, and capacity suit them for independent work. While the program is designedly flexible and responsive to new needs, it has been characterized from the beginning by three basic elements, which taken together may be said to be the essence of the system.

(1) Honors work involves a concentration of the student's attention during his last two years upon a limited and integrated field of studies. He pursues only two subjects during a semester, thereby avoiding the fragmentation of interest that may result from a program of four or more courses with their daily assignments and frequent examinations. The content of the subject matter field is correspondingly broader, permitting a wide range of reading and investigation and demanding of the student correlations of an independent and searching nature.

(2) Honors work frees the student from periodic examinations, since his thinking is under continual scrutiny by his classmates and instructors. By this program he undertakes to subject himself at the end of two years of Honors work to examinations in all of the eight fields studied. In these he is expected to demonstrate his competence in a field of knowledge rather than simply his mastery of those facts and interpretations which his instructor has seen fit to present. These examinations, consisting of a three-hour paper in each field, are set by examiners from other institutions who read the papers and then come to the campus to conduct an oral examination of each student, in order to clarify and enlarge the basis of their judgment of his command of his material.

(3) Honors work is customarily carried on in seminars of seven students or less or in independent projects leading to a thesis. Seminars meet once a week, in many cases in the home of the instructor, for sessions lasting three hours or more. The exact technique of the seminar varies with the subject matter, but its essence is a cooperative search for truth, whether it be by papers, discussion, or laboratory experiment. Each student has an equal responsibility for the assimilation of the whole of the material and is correspondingly searching in his scrutiny of ideas presented

by his fellows or by his instructor. The student is expected to devote half of his working time during a semester to each of his fields of study.

In practice three avenues toward an Honors degree are open:

(1) The standard program consists of eight subjects studied during the last four semesters leading to examinations by the visiting examiners. In the Division of the Natural Sciences where there is a heavy burden of prerequisite courses, the student may offer as few as six fields for examination, subject to the approval of the division. The Divisions of the Humanities and of the Social Sciences allow seven examinations instead of eight only in cases of clear hardship (as in the case of some transferred students); they do not allow such remission in order to permit the student to pursue work of elementary or intermediate level in Course or to accommodate some unrelated subject in his program.

(2) Students who have a special reason to study for one or two semesters abroad or in another American institution must take the normal number of examinations prescribed by their divisions. Such programs must be worked out in advance, since it may not be possible to provide visiting examiners for work offered elsewhere and since instruction in some fields of the student's choice may not be available in the other institution. In general the student following this avenue to an Honors degree must weigh carefully the advantage of working independently or under tutorial guidance against the loss he incurs by missing both the stimulus and the criticism provided by his fellows in seminar.

(3) Students who at the end of the sophomore year did not elect to read for Honors, but whose work has subsequently shown distinction may be encouraged to take the regular Honors examinations so that they may receive the degree of Honors recommended by the visiting examiners. They shall receive no remission of the number of examinations by reason of their preparation in Course but shall be subject to the regulations governing Honors programs of the division concerned. Such students must before the end of the seventh semester petition the division for permission to take the Honors examinations and must submit an acceptable list of examinations which they are prepared to take.

The normal pattern in Honors programs is four seminars (or examinations) in the major department and two in each of two minor departments. No student is allowed more than four seminars in his major; in those cases where he offers three seminars in each of two fields, one must be designated as his major. While there is a general belief that two seminars in a minor field are desirable because of the mutual reinforcement they provide, there are by custom certain seminars which are allowed to stand alone. Thus there is a considerable flexibility in Honors programs, each being subject to the scrutiny of the departments and divisions in which the work is done.

A candidate for admission to Honors should consult the chairmen of his prospective major and minor departments during the second semester.



of his sophomore year and work out a program for the junior and senior years. This proposed program must be filed in the office of the Registrar who will forward it to the divisions concerned. The acceptance of the candidate by the divisions depends in part upon the quality of his previous work as indicated by the grades he has received but mainly upon his apparent capacity for assuming the responsibility of Honors work. The names of the accepted candidates are announced later in the spring. The major department is responsible for the original plan of work and for keeping in touch with the candidate's progress from semester to semester. The division is responsible for approval of the original program and of any later changes in that program.

At the end of the junior year Honors students are required to take the Honors examinations set at that time for the fields they have studied. These trial papers, however, are read by their instructors, not by the visiting examiners. On the basis of the showing made in these examinations, the student may be advised or even required to return to Course, or he may be warned that he continues in Honors at his own risk. Those students who return to Course under these circumstances or for other reasons will receive grades for the work they have done while reading for Honors, but in no case without taking examinations over the field covered.

At the end of the senior year the reading of the examinations and the decision of the degree of Honors to be awarded the candidates is entirely in the hands of the visiting examiners. Upon their recommendation, successful candidates are awarded the Bachelor's Degree with Honors, with High Honors, or with Highest Honors. When the work of a candidate does not in the opinion of the examiners merit Honors of any grade, his papers are returned to his instructors, who decide, under rules of the Faculty, whether he shall be given a degree in Course.

#### PRE-MEDICAL PROGRAM

Students who are considering the possibility of attending medical (or dental) school after graduation from Swarthmore should plan their academic programs carefully to meet the pre-medical requirements, listed below, as well as the general College requirements. Specific requirements of the various medical schools, as well as basic information on other aspects of pre-medical and medical training, can be found in "Admission Requirements of American Medical Colleges" published by the Association of American Medical Colleges. Recent editions of this book are available in the various libraries on the campus. All students planning a medical career should be familiar with this book.

Sophomores, juniors, and seniors will be in contact with the Faculty Committee on the Pre-Medical Program for special advising. It is the function of this committee to prepare a statement of evaluation and its recommendation to each medical school to which the student may apply, basing this statement on all information available to it, including the student's record and faculty evaluations.



In conference with the student, the course adviser maps out a program based on requirements listed below, the college's general requirements, and the particular needs and interests of the student. Beyond these considerations the need for understanding basic social problems, the cultivation of sensitiveness to cultural values, and the values of intensive work in at least one field is kept in mind in mapping an individual program.

The following courses are among the minimum requirements of most medical schools: Biology 1-2, Chemistry 1-2, Chemistry 28-29, Mathematics 3-4 or 5-6, Physics 1-2, English (two semester courses; literature courses in foreign languages do not meet medical school requirements). The foreign language requirements of medical schools are automatically met when the student has satisfied the college language requirement, which includes language course 4 or its equivalent. In addition, some medical schools require quantitative analysis (Chemistry 26) or vertebrate morphology (Zoology 14). Advanced work in biology, chemistry and mathematics is recommended where the student's program and interests permit. The student is urged to familiarize himself with the specific requirements of those medical schools in which he is interested in planning his program.

The work of the junior and senior year may be done either in the honors program or in course. Intensive work of the major may be carried out in any department of the student's choice, or major requirements may be met by completing three full courses in each of two related departments in the Division of the Natural Sciences. In the latter case the comprehensive examination will be jointly arranged by the departments concerned.

Although some students have been admitted to medical schools upon the completion of three years of college work, most medical schools strongly advise completion of four years of college, and in practice admit very few with less.

#### WRITING AND SPEAKING

Students deficient in the mechanics of composition will be required to take tutorial work before entering the junior year. Expert assistance is also available to increase efficiency in reading.

A special course in English for foreign students is provided when necessary.

#### COOPERATION WITH NEIGHBORING INSTITUTIONS

With the approval of their course adviser and the Dean, students may take courses offered by Bryn Mawr or Haverford Colleges or the University of Pennsylvania without the payment of extra tuition. This arrangement does not apply to the summer session of the University of Pennsylvania.

#### EDUCATION ABROAD

The College recognizes the general educational value of travel and study abroad and cooperates as far as possible in enabling interested stu-

dents to take advantage of such opportunities. It distinguishes, however, between those foreign study plans which may be taken for credit as part of a Swarthmore educational program, and those which must be regarded as supplementary. To be acceptable for credit, foreign study must meet Swarthmore academic standards, and must form a coherent part of the student's four-year plan of study. The Honors Program in particular demands a concentration of study which is not easily adapted to the very different educational systems of foreign universities. Therefore, while some of the approved programs listed below may normally be taken as substitutes for a semester or a year of work at Swarthmore, each case is judged individually, and the college may withhold its approval of a particular program, or may insist that the program be carried out as an extra college year.

Plans for study abroad must be approved in advance by the Dean and by the Chairmen of departments concerned, if credit is to be given for courses taken, and students may be asked to take examinations upon their return to the College.

1. *Established Programs.* Students who wish to study abroad under formal academic conditions may apply to one of the programs administered by other American colleges and universities; for example, those of Hamilton College, Smith College, or Sweet Briar College. These are full-year programs of study at foreign universities, under the supervision of American college personnel. Interested students should consult the Dean for details.

2. *Direct Enrollment.* Application may also be made directly to foreign institutions for admission as a special student. This should be done only after consultation with the Dean and the appropriate department head, and care must be taken to assure in advance that courses taken abroad will be acceptable for Swarthmore credit. Most foreign universities severely limit the number of students they accept for short periods, however, and anyone who applies for admission directly must be prepared to be refused.

3. *University of Keele.* For a number of years Swarthmore College and the University of Keele, Staffordshire, England, have had a student exchange each year. A student from Swarthmore is selected for study at Keele by a committee which interviews the applicants. The year at Keele may take the place of the junior year at Swarthmore, though it is often taken as an extra year.

4. *Peaslee Scholarships.* These scholarships, the gifts of Amos Peaslee (Class of '07) were instituted in 1953 and are normally awarded each year, preferably to sophomores and juniors, for language study abroad. The scholarships are for a minimum of one semester plus a summer; course credit is given for the work done upon approval of the department concerned.

5. *International Association for the Exchange of Students for Technical Experience.* This program, administered by the Engineers' Joint Council,

provides opportunities for engineering and science students to work for engineering firms and laboratories in Europe during summer vacations. Students are paid living expenses by the employing firm in the currency of the country in which they work; they pay their own travel costs. Applications must be made by January 1 for work the following summer, and students are notified of the Association's decision by March 31. For further information, students should consult the chairman of the Department of Engineering.

6. *University of Warwick, England.* A fall semester exchange program for members of the Swarthmore junior class majoring in History and second year students in the School of History at Warwick was inaugurated in 1966.

## FACULTY REGULATIONS

### ATTENDANCE AT CLASSES AND COLLECTION

Members of the faculty will hold students responsible for regular attendance at classes and will report to the Deans the name of any student whose repeated absence is in their opinion impairing the student's work. The number of cuts allowed in a given course is not specified, a fact which places a heavy responsibility on all students to make sure that their work is not suffering as a result of absences. Since freshmen must exercise particular care in this respect and since the faculty recognizes its greater responsibility toward freshmen in the matter of class attendance, it is expected that freshmen, especially, will attend *all* their classes.

When illness necessitates absence from classes the student should report at once to the nurses or to the college physician.

The last meeting before vacation and the first meeting after vacation in each course must be attended. The minimum penalty for violation of this rule is probation.

Absences from Collection are acted upon by the Deans as instructed by the faculty. All students are allowed two absences from Collection each term.

### GRADES

Instructors report to the Deans' office at intervals during the year upon the work of students in courses. Informal reports during the semester take the form of comments on unsatisfactory work. At the end of each semester formal grades are given in each course under the letter system, by which *A* means excellent work, *B* good work, *C* satisfactory work, *D* passing but below the average required for graduation, and *E* failure. *W* signifies that the student has been permitted to withdraw from the course by the Committee on Academic Requirements. *X* designates a condition; this means that a student has done unsatisfactory work in the first half of a year course, but by creditable work during the second half may earn a passing grade for the full course and thereby remove

his condition. *R* is used to designate an auditor or in cases when the work of a foreign student cannot be evaluated because of deficiencies in English.

*Inc.* means that a student's work is incomplete with respect to specific assignments or examinations. The Faculty has voted that the grade given in a course should incorporate a zero for any part of the course not complete by the date of the final examination. The grade *Incomplete* should be given only after consultation with the Registrar and only in cases in which it can be shown that illness, military service, or the like made it impossible for the student to complete his work before the deadline, or in cases in which the instructor wishes to insist on the completion of the work before giving a grade with penalties. If an *Inc.* is received, it must normally be made up in the term immediately following that in which it was incurred. A date is set at the end of the first six weeks of each term when make-up examinations must be taken and late papers submitted. Under special circumstances involving the use of laboratories or attendance at courses not immediately available, a student must secure permission to extend the time for making up an incomplete until the second term following. This permission must be given in writing and filed in the Office of the Registrar. Any not made up within a year from the time it was imposed shall be recorded as *E*, a failure which cannot be made up.

Reports are sent to parents and to students at the end of each semester.

For graduation in general courses, a *C* average is required; for graduation in honors work, the recommendation of the visiting examiners.

#### REGISTRATION

All students are required to register at the time specified in official announcements and to file programs of courses or seminars approved by their course advisers. Fines are imposed for late or incomplete registration.

A regular student is expected to take the prescribed number of courses in each semester. If more or fewer courses seem desirable, he should consult his course adviser and file a petition with the Committee on Academic Requirements. A student who wishes to take fewer than the normal number of courses should register for the regular program and file a petition to drop one or more courses.

Applications involving the late entrance into a course must be received within the first two weeks of the semester. Applications involving withdrawal from a course must be received not later than the middle of the semester.

#### EXAMINATIONS

Any student who is absent from an examination, announcement of which was made in advance, shall be given an examination at another hour only by special arrangement with the instructor in charge of the course.

No examination *in absentia* shall be permitted. This rule shall be interpreted to mean that instructors shall give examinations only at the college and under direct departmental supervision.

#### SUMMER SCHOOL WORK

Students desiring to transfer credit from a summer school are required to obtain the endorsement of the chairman of the department concerned before entering upon the work, and after completing the work are required to pass an examination set by the Swarthmore department.

#### PHYSICAL EDUCATION

Physical education is required of all women and non-veteran men in the freshman and sophomore years, unless an excuse is granted by the college physician. A minimum of three periods per week shall be required. If any semester's work of the first two years is failed, it shall be repeated in the junior year. No student shall be permitted to enter his senior year with a deficiency in physical education.

#### EXCLUSION FROM COLLEGE

The college reserves the right to exclude at any time students whose conduct or academic standing it regards as undesirable, and without assigning any further reason therefor; in such cases fees will not be refunded or remitted, in whole or in part, and neither the college nor any of its officers shall be under any liability whatsoever for such exclusion.

#### Requirements for Graduation

##### BACHELOR OF ARTS AND BACHELOR OF SCIENCE

The degree of Bachelor of Arts and Bachelor of Science are conferred upon students who have met the following requirements for graduation:

1. The candidate must have completed eighteen to twenty half courses in the first two years and sixteen half courses or eight seminars in the last two years.
2. He must have an average grade of *C* on the courses counted for graduation.
3. He must have complied with the course requirements for the first two years.
4. He must have met the requirements in the major and supporting fields during the last two years.
5. He must have passed satisfactorily the comprehensive examinations in his major field or met the standards set by visiting examiners for a degree with honors.

6. He must have completed four terms of study at Swarthmore College, two of which have been those of the senior year.

7. He must have completed the physical education requirement set forth on page 72 and in statements of the Physical Education Departments.

8. He must have paid all outstanding bills and returned all equipment and library books.

## Advanced Degrees

### MASTER OF ARTS AND MASTER OF SCIENCE

The degree of Master of Arts or Master of Science may be conferred subject to the following requirements:

Only students who have completed the work for the Bachelor's degree with some distinction, either at Swarthmore or at another institution of satisfactory standing, shall be admitted as candidates for the Master's degree at Swarthmore.

The candidate's record and a detailed program setting forth the aim of the work to be pursued shall be submitted, with a recommendation from the department or departments concerned, to the Committee on the Master's Degree. If accepted by the Committee, the candidate's name shall be reported to the faculty at or before the first faculty meeting of the year in which the candidate is to begin his work.

The requirements for the Master's degree shall include the equivalent of a full year's work of graduate character. This work may be done in courses, seminars, reading courses, regular conferences with members of the faculty, or research. The work may be done in one department or in two related departments. The catalogue statements of departments which offer graduate work indicate the courses or seminars which may be taken for this purpose.

A candidate for the Master's degree shall be required to pass an examination conducted by the department or departments in which his work was done. He shall be examined by outside examiners, provided that where this procedure is not practicable, exceptions may be made by the Committee on the Master's Degree. The department or departments concerned, on the basis of the reports of the outside examiners, together with the reports of the student's resident instructors, shall make recommendations to the faculty for the award of the degree.

At the option of the department or departments concerned, a thesis may be required as part of the work for the degree.

A candidate for the Master's degree will be expected to show before admission to candidacy a competence in those languages deemed by his department or departments most essential for his field of research. Detailed language requirements will be indicated in the announcements of departments which admit candidates for the degree.



The tuition fee for graduate students who are candidates for the Master's degree is \$1,600 per year, and the general fee for these students is \$25 per semester.

### ADVANCED ENGINEERING DEGREES

The advanced degrees of Mechanical Engineer (M.E.), Electrical Engineer (E.E.), and Civil Engineer (C.E.), may be obtained by graduates who have received their Bachelor's degree in Engineering upon fulfilling the requirements given below:

1. The candidate must have been engaged in engineering work for five years since receiving his first degree.
2. He must have had charge of engineering work and must be in a position of responsibility and trust at the time of application.
3. He must make application and submit an outline of the thesis he expects to present, one full year before the advanced degree is to be conferred.
4. The thesis must be submitted for approval one calendar month before the time of granting the degree.
5. Every candidate shall pay a registration fee of \$5 and an additional fee of \$20 when the degree is conferred.

### AWARDS AND PRIZES

The IVY AWARD FUND was created by a gift from Owen Moon, '94. The income of the fund is placed in the hands of the faculty for award on Commencement Day to a male member of the graduating class. The qualifications for the Ivy Award are similar to those for the Rhodes Scholarships and include (a) qualities of manhood, force of character, and leadership; (b) literary and scholastic ability and attainments. These have been phrased by the donor in the words "leadership based upon character and scholarship."

THE OAK LEAF AWARD was established by David Dwight Rowlands of the Class of 1909. It was later permanently endowed in memory of him by Hazel C. Rowlands, '07, and Caroline A. Lukens, '98. The award is made by the faculty each year to the woman member of the Senior Class who is outstanding for loyalty, scholarship and service.

THE MCCABE ENGINEERING AWARD, founded by Thomas B. McCabe, 1915, is to be presented each year to the outstanding engineering student in the Senior Class. The recipient is chosen by a committee of the faculty of the division of Engineering.

THE PHI BETA KAPPA PRIZE is awarded by the Swarthmore Chapter to the member of the junior class who had the best academic record for the first two years. The value of the prize is \$40.



The BRAND BLANSHARD PRIZE, honoring Brand Blandshard, professor of philosophy at Swarthmore from 1925 to 1945, has been established by David H. Scull, of the Class of 1936. The award of \$50 is presented annually to the student who, in the opinion of the department, submits the best essay on any philosophical topic.

The A. EDWARD NEWTON LIBRARY PRIZE of \$50, endowed by A. Edward Newton, to make permanent the Library Prize first established by W. W. Thayer, is awarded annually to that undergraduate who, in the opinion of the Committee of Award, shows the best and most intelligently chosen collection of books upon any subject. Particular emphasis is laid in the award not merely upon the size of the collection but also upon the skill with which the books are selected and upon the owner's knowledge of their subject-matter.

The KATHERINE B. SICARD PRIZE of \$5, endowed by the Delta Gamma Fraternity in memory of Katherine B. Sicard, '34, is awarded annually to the freshman woman who, in the opinion of the department, shows greatest proficiency in English.

PUBLIC SPEAKING CONTESTS. Prizes for contests in public speaking are provided as follows: The ELLA FRANCES BUNTING EXTEMPORARY SPEAKING FUND awards prizes for the best extemporaneous short speeches. The OWEN MOON FUND provides the Delta Upsilon Speaking Contests awards for the best prepared speeches on topics of current interest. The WILLIAM PLUMER POTTER PUBLIC SPEAKING FUND, established in 1927, sponsors a contest in the reading of poetry as well as providing funds for other contests described below and for the collection of recorded literature described on page 50.

Three prizes for the best student-written one-act plays are provided by the WILLIAM PLUMER POTTER FUND. The winning plays are usually produced during the fall semester by the Little Theater Club.

Prizes for the best student short stories are also awarded from the WILLIAM PLUMER POTTER FUND.

The LOIS MORRELL POETRY AWARD, given by her parents in memory of Lois Morrell of the Class of 1946, goes to that student who, in the opinion of the faculty, submits the best original poem in the annual competition for the award. The award, consisting of \$100, is made in the spring of the year. All entries should be submitted by April 1.

The JOHN RUSSELL HAYES POETRY PRIZES, of approximately \$25 for a first prize and \$15 for a second prize, are offered for the best original poem or for a translation from any language. Manuscripts should be ready by April 1 of each year.

The MAY E. PARRY MEMORIAL AWARD, given by the Class of 1925 of which she was a member, is presented each year to the senior woman who by her loyalty, sportsmanship, and skill in athletics has made a valuable

contribution to Swarthmore College. The recipient is chosen by the faculty of the Department of Physical Education for Women.

## FELLOWSHIPS

Three fellowships are awarded annually by the faculty, on recommendation of the Committee on Fellowships, to seniors or graduates of the college for the pursuit of advanced work. The proposed program of study must have the approval of the faculty. Applications for fellowships must be in the hands of the committee by April 15. Applicants for any one of these fellowships will be considered for the others as well.

These three fellowships are:

The HANNAH A. LEEDOM FELLOWSHIP of \$900, founded by the bequest of Hannah A. Leedom.

The JOSHUA LIPPINCOTT FELLOWSHIP of \$1,100, founded by Howard W. Lippincott, of the Class of 1875, in memory of his father.

The JOHN LOCKWOOD MEMORIAL FELLOWSHIP of \$1,100, founded by the bequest of Lydia A. Lockwood, New York, in memory of her brother, John Lockwood. It was the wish of the donor that the fellowship be awarded to a member of the Society of Friends.

Four other fellowships are open to graduates of Swarthmore College under the conditions described below:

The LUCRETIA MOTT FELLOWSHIP, founded by the Somerville Literary Society and sustained by the contribution of its life members, has yielded an annual income since its foundation of \$525 or more. It is awarded each year by a committee of the faculty to a woman graduate of that year who is to pursue advanced study at some other institution approved by this committee.

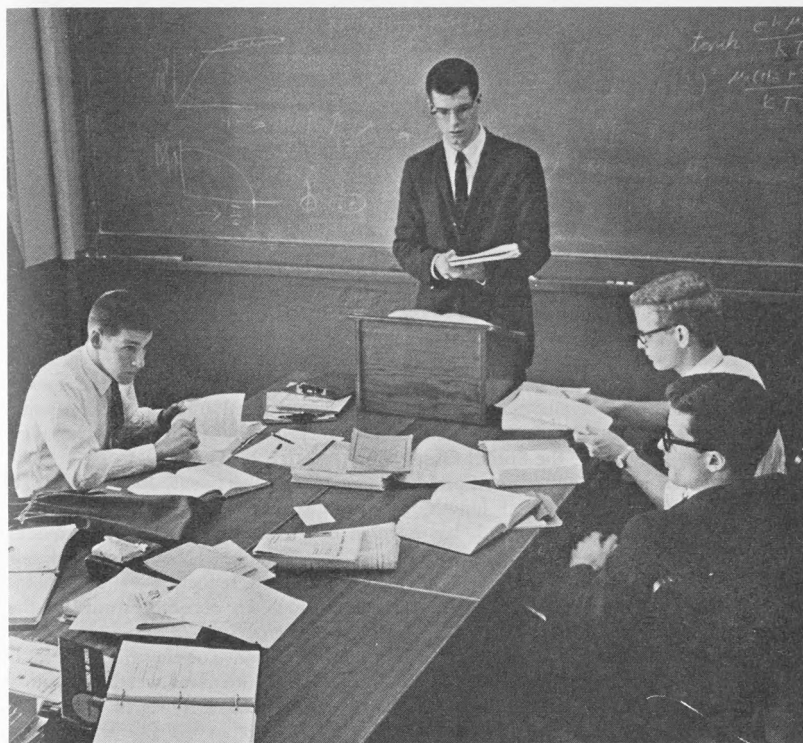
The MARTHA E. TYSON FELLOWSHIP, founded by the Somerville Literary Society in 1913, is sustained by the contributions of life members of the society and yields an income of \$500 or more. It is awarded biennially by a committee of the faculty to a woman graduate of that year who plans to enter elementary or secondary school work. The recipient of the award is to pursue a course of study in an institution approved by the Committee of Award.

SIGMA XI RESEARCH FELLOWSHIP. The Swarthmore Chapter of Sigma Xi appoints, from time to time, as funds are available, Fellows with research grants with a maximum value of \$1,000. The holders of this fellowship are usually associates of the chapter who have shown conspicuous ability in graduate studies. The purpose of the chapter in awarding these fellowships is to relieve worthy students from teaching and other distracting duties so that they may concentrate as much as possible upon their research. Applications for these fellowships should be made

to the secretary of the chapter not later than the middle of March. Appointments will be announced about the middle of April.

The PHI BETA KAPPA FELLOWSHIP of \$250, founded by the Swarthmore Chapter of the national honor fraternity, is awarded each year at the discretion of the Committee on Fellowships on the basis of intellectual distinction to a member of the senior class who has been elected to Phi Beta Kappa and who proposes to pursue graduate study and scholarly work.





*An Honors Seminar in Engineering*

## COURSES OF INSTRUCTION

### *Numbering of Courses and Seminars*

A system of uniform numbering is used in all departments. Courses are numbered as follows:

- 1 to 9—introductory courses
- 11 to 49—other courses open to students of all classes
- 51 to 69—advanced courses limited to Juniors and Seniors.
- 101 to 199—seminars for honors students and graduate students

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Full courses the numbers of which are joined by a hyphen (e.g., 1-2) must be continued for the entire year; credit is not given for the first semester's work only.

## ASTRONOMY

PROFESSOR: PETER VAN DE KAMP, *Chairman and Director of  
Sproul Observatory*

RESEARCH ASSOCIATES AND LECTURERS: WULFF D. HEINTZ  
SARAH LEE LIPPINCOTT

RESEARCH ASSISTANTS: BARRY H. FEIERMAN  
PIERRE MOREL  
J. FRANCISCO VILLAMEDIANA

Astronomy deals with the nature of the universe about us and the methods employed to discover the laws underlying the observed phenomena. The elementary courses present the problems in broad outlines and trace the growth of our knowledge of the facts and development of theories. The advanced courses consider some of these problems in detail. The seminars deal primarily with the techniques, methods and problems of the Sproul Observatory research program.

The principal instrument of the Sproul Observatory is the twenty-four-inch visual refractor of thirty-six-foot focal length, used almost exclusively for photography. The instrument, recently renovated, has been in operation since 1912 and provides a valuable and steadily expanding collection of photographs. Measuring and calculating machines are available for the measurement and reduction of the photographs. The principal program of the Observatory is an accurate study of the distances, motions and masses of the nearer stellar systems.

The Sproul Observatory is open to visitors on the second Tuesday night of each month during the college year—October through May. With clear weather, visitors have the opportunity of seeing many celestial objects of various types in the course of a year. The visiting hours are from 7:00 to 8:30 p.m. in the fall and winter, but are set later during the spring.

### REQUIREMENTS FOR MAJORS

Prerequisites for an Astronomy major, in course, are Astronomy 1-2, or 1-15, advanced courses and seminars (taken as double courses) in Astronomy, combined with work in mathematics and physics.

Prerequisites for admission to the honors program in Astronomy, either as a major or a minor, are Mathematics 11-12, Astronomy 1-2, or 1-15, Physics 1-2, and a reading knowledge of French, German or Russian.

### COURSES

1-2. DESCRIPTIVE ASTRONOMY. Mr. van de Kamp. *Full course*

These courses provide an introduction to the methods and results of astronomy. Fundamental notions of physics are studied as they are needed to provide an adequate scientific basis for the course. Three class periods each week, practical work to be arranged.

13. INTRODUCTION TO MATHEMATICAL ASTRONOMY. Mr. van de Kamp.

Spherical astronomy; celestial navigation; the two body problem; energy concepts.

14. PROBLEMS OF GALACTIC STRUCTURE. Miss Lippincott.

Stellar motions, magnitudes and spectra. Unstable stars. Stellar populations. Star clusters and associations.

15. INTERMEDIATE ASTRONOMY. Mr. Heintz, Miss Lippincott and Mr. van de Kamp.

Survey of observational data. Variable and double stars. Stellar spectra and stellar structure. Spectrum-luminosity diagram. Evolution of stars and clusters; galactic structure.

Prerequisites: Mathematics 3-4 or equivalent; Physics 1-2, or equivalent, may be taken concurrently with consent of instructors.

### HONORS SEMINARS

101. ASTROMETRY. Mr. van de Kamp.

Spherical trigonometry, celestial sphere. Stellar positions and their changes. Precession, proper motion, parallax and aberration. Solar motion, galactic rotation. Relation between sphere and plane. Long-focus photographic astrometry, technique and methods. Analysis of stellar paths for proper motion and parallax; secular acceleration. Visual binaries; analysis for mass-ratio; perturbations. Star fields; clusters and multiple stars. Theory of errors, method of least squares.

103. COSMIC MATTER, RADIATION, AND FIELDS.

Phenomena in the upper atmosphere. Solar-terrestrial relationships. Cosmic rays. Radiation belts. Radio astronomy. Meteors and meteorites. Studies with rockets, artificial satellites and space probes.

Not offered in 1967-68.

110. RESEARCH PROJECT. Staff.

### GRADUATE WORK

In conformity with the general regulations for work leading to the Master's degree (see page 73), this department offers the possibility for graduate work.

Candidates for the Master's degree will normally take four honors seminars, selected from those listed in astronomy, mathematics or physics, in consultation with the faculty member under whose direction the work is to be done. A thesis may be substituted for one of the seminars.

Candidates for the Master's degree must have a good reading knowledge of two modern languages.



## BIOLOGY

PROFESSORS: ROBERT K. ENDERS  
LAUNCE J. FLEMISTER  
LUZERNE G. LIVINGSTON  
NORMAN A. MEINKOTH, *Chairman*  
NEAL A. WEBER

ASSOCIATE PROFESSOR: KENNETH S. RAWSON \*

ASSISTANT PROFESSOR: ROBERT E. SAVAGE

VISITING LECTURERS: EILEEN S. GERSH  
GEORGE T. RUDKIN

ASSISTANTS: EDITH TWOMBLY  
JEAN D. TOMESKO

Through its elementary course the Department of Biology introduces the student to a comprehensive view of those principles, problems and phenomena common to all organisms, with plants and animals interpreted on a comparative basis. Advanced courses are listed under three categories: those dealing specifically with plant biology (Botany), or animal biology (Zoology), and those whose subject matter deals with phenomena common to all living organisms (Biology).

Following the broad review of the plant and animal kingdoms as given in the course in general biology, advanced work is taken up in two different ways: first, specific aspects of the broad subjects are treated in a comparative manner as in anatomy and physiology; second, broader aspects of a specific subject are treated as in entomology, parasitology, embryology, genetics and developmental plant anatomy. The structural and functional consideration is extended to include problems of interdependence of organisms in the structure and function of plant and animal societies and the influence of physical, chemical and biological factors in the survival of those societies.

### REQUIREMENTS FOR MAJORS IN COURSE

A student may elect to major in biology, botany or zoology. Students in course should include the following supporting subjects in addition to the eight half courses in their major subject: chemistry, including at least one semester in organic chemistry, one course in physics and one in mathematics. These courses are required for majors in botany or zoology, and should be completed by the end of the junior year. The program for biology majors may be modified in respect to outside requirements when the department considers cause for such modification to be sufficient.

### HONORS WORK

Requirements for admission to Honors with major work in the department include: Biology 1-2, another half course in the department, chemistry through organic chemistry, physics, and first year mathematics. It should be noted that certain seminars likely to be chosen as minors in other departments require a second year of mathematics.

Honors students may major in biology, botany, or zoology, normally with two minors in relevant fields. Some freedom is accorded in that a second minor may be omitted to allow for prerequisite course work which the student was unable to complete during the first two years (i.e., physics, organic chemistry or second year mathematics). If a student proposes a major in botany and a minor in zoology, or vice versa, he may include seminars listed under Biology in his major, but not

\* Absent on leave, fall semester, 1967-68.

his minor. A major program in biology will by definition include four seminars selected from the total departmental offerings, and may not include an additional minor in botany or zoology. Any Honors program in the biological sciences must include at least two seminars outside the department.

Students planning a minor in biology, botany or zoology should note the prerequisites listed for each seminar, and consult with the department chairman.

## Biology

### 1-2. GENERAL BIOLOGY. Staff. *Full course*

An introduction to the study of living things. A consideration of the properties of protoplasm and the structure of the cell; a brief survey of living forms, both plant and animal. The methods by which organisms maintain themselves, grow and reproduce, and a discussion of the mechanism of heredity. Some time will be devoted to the interrelationships of plants and animals in communities, and the place of man in the whole structure.

Three lectures and one three-hour laboratory per week.

### 20. GENETICS. *Fall semester*

A study of the fundamental principles of inheritance as they apply to living organisms generally. The course includes a detailed consideration of the principles of Mendelian inheritance, an analysis of the underlying chromosomal mechanisms, the gene theory, and the relationship of the principles of genetics to evolution, to plant and animal improvement, and to man.

Three lectures per week, with assigned problems and laboratory and/or library projects in lieu of formally organized laboratory work.

Prerequisite: Biology 1-2.

### 21. CELL BIOLOGY. Mr. Savage. *Spring semester*

A study of the ultrastructure and function of cytoplasmic components of the cell, including membranes and membrane surrounded organelles (endoplasmic reticulum, Golgi, lysosomes, microbodies, mitochondria, chloroplasts and other plastids), ribosomes, centrioles, and related structures. Laboratory experiments illustrate techniques commonly used in cell biology.

Three hours of lecture or discussion and one period of laboratory per week.

Prerequisites: Biology 1-2 and concurrent registration in organic chemistry.

### 59. CYTOLOGY. Mr. Savage. *Fall semester*

A study of the structure and function of cells as units of biological organization, and relationships within tissues and organs. In the laboratory the student learns some of the techniques by which information about cells is arrived at and observes the characteristics of cells as units and as parts of organized tissues.

Three lectures and one laboratory period per week.

Prerequisites: Biology 1-2 and organic chemistry.

Not offered in 1967-68.

### 68. BIOLOGY OF BACTERIA. Mr. Livingston. *Spring semester*

An approach to the study of bacteriology with principal emphasis on the consideration of bacteria as organisms rather than as causative agents of disease, etc. The morphology, physiology and biochemistry, ecology, genetics, and classification of bacteria.

Three lectures and one laboratory period per week.

Prerequisites: Biology 1-2 and organic chemistry.

Not offered in 1967-1968.

## HONORS WORK

102. **CYTOLOGY.** Mr. Savage. *Fall semester*  
A study of the structure and function of the cell. Living material will be examined and modern microscopical techniques employed in the laboratory.
113. **GENETICS.** *Spring semester*  
An extension of the area covered in course 20, with particular emphasis on current research in the field of inheritance in all its aspects. The seminar discussion is accompanied by a full day of laboratory work each week.
115. **MICROBIOLOGY.** *Spring semester*  
An extension of the area covered in course 68. Particular emphasis is placed on physiological and biochemical aspects of the subject. Some work on fungi and viruses is included.  
Not offered in 1967-1968.

## Botany

15. **TAXONOMY OF SEED PLANTS.** *Spring semester*  
An introduction to the classification of the major groups of flowering plants and gymnosperms, stressing those of biological, cultural, or economic interest. The emphasis is upon a world wide flora and upon cultivated as well as wild plants. Modern concepts of phylogeny, biosystematics, and biogeography are included. Suggested as an early course for biology majors and as a cultural course for non-majors.  
Three lectures and one field trip and/or laboratory period per week.  
Prerequisite: Biology 1-2.
16. **DEVELOPMENTAL PLANT ANATOMY.** Mr. Livingston. *Alternate years, fall semester*  
The fundamentals of anatomy of seed plants approached from a developmental standpoint. The structure and behavior of meristems, problems and processes of differentiation, and a detailed analysis of cellular, tissue and organ structure in higher plants.  
Two lectures and one three-hour laboratory period per week.  
Prerequisite: Biology 1-2.  
Not offered in 1967-68.
18. **BIOLOGY OF LOWER PLANTS.** Mr. Livingston. *Alternate years, fall semester*  
An introduction to the algae, fungi, mosses, and ferns, including aspects of their classification, phylogeny, structure, physiology, and ecology. The laboratories are in part exploratory and experimental. Their content depends in part upon the current interests of staff and students.  
Three lectures and one field trip and/or laboratory period per week.  
Prerequisite: Biology 1-2.
67. **PLANT PHYSIOLOGY.** Mr. Livingston. *Alternate years, spring semester*  
An integrated study of the physiological processes of higher plants, including general cellular physiology, water relations, mineral nutrition, enzyme action, photosynthesis, metabolic processes, translocation, the physiology of growth and development, and related topics.  
Two lectures, one discussion period, and one laboratory period per week.  
Prerequisites: Biology 1-2 and organic chemistry.

70. PLANT ECOLOGY.

*Alternate years, fall semester*

A study of the structure, distribution, and dynamics of plant communities. Background material in physical geography is included. The impact of plant communities upon man through agriculture and land use practices is mentioned but not stressed. Laboratory work emphasizes the accumulation and analysis of field data.

Three lectures and one field trip or laboratory period per week.

Prerequisites: Biology 1-2 and permission of the instructor.

Not offered in 1967-68.

71-72. SPECIAL TOPICS. Staff.

With the permission of the department, qualified students may elect to pursue a research or reading program not included in the regular course program.

### HONORS WORK

111. PLANT PHYSIOLOGY. Mr. Livingston. *Alternate years, spring semester*

An extension of the area covered in course 67, with particular emphasis on a critical study of original sources, both classical and current. The seminar discussion is accompanied by a full day of laboratory work each week.

Prerequisites: Biology 1-2 and organic chemistry.

112. PROBLEMS OF PLANT GROWTH AND DEVELOPMENT. Mr. Livingston.

*Alternate years, fall semester*

A correlated anatomical and physiological approach to developmental plant anatomy and morphogenesis. The seminar discussion is accompanied by a full day of laboratory work each week.

Prerequisites: Biology 1-2 and permission of the instructor.

Not offered in 1967-68.

118. PLANT ECOLOGY. Mr. Livingston.

*Alternate years, fall semester*

A study of the interrelationships between plants and their environment. Discussion periods are devoted to the development of basic principles. Field and laboratory work applies these concepts to specific organisms and habitats. Laboratory work is used to isolate problems encountered in the field. Both higher plants and microorganisms are used as experimental materials. Comparisons are made between aquatic and terrestrial habitats.

Prerequisites: Biology 1-2 and permission of the instructor.

Not offered in 1967-68.

120. SPECIAL TOPICS. Staff.

With the permission of the department, qualified students may elect to pursue a research problem or reading program not included in the regular offerings in honors.

### Zoology

12. VERTEBRATE PHYSIOLOGY. Mr. Flemister.

*Spring semester*

A general consideration of the functional process in animals with emphasis placed on mammals and other vertebrates. The aspects of adaptation of the animal to environmental stress are treated in such a way as to serve the individual student's area of concentration. In preparation the introductory course in Biology is desirable. Two lectures, one conference and one laboratory period per week.

Not offered in 1967-68.

14. VERTEBRATE MORPHOLOGY. Mr. Meinkoth.

*Fall semester*

A consideration of the vertebrate body plan at the microscopic, developmental

- and adult gross morphological levels. Areas stressed in some detail will include the structure and microscopic appearance of vertebrate tissues and organs, embryonic development of an amphibian through organogenesis and adult mammalian gross morphology.
- Three hours of lecture or discussion and one laboratory period per week.  
Prerequisite: Biology 1-2.
25. FIELD ZOOLOGY. Mr. Weber. *Spring semester*  
Emphasis is on the living animals as they occur in nature, their systematics, relationships to the environment, habits and distribution. Regional and world faunas will be discussed. Much of the work will be done in the field.  
Prerequisite: Biology 1-2, Zoology 14 desirable.
52. EMBRYOLOGY. Mr. Enders. *Fall semester*  
A study of development of vertebrate anatomy. The lectures are concerned with an investigation of the events which precede development, an analysis of the development processes, and a brief survey of the contributions of the field of experimental embryology. Laboratory periods are devoted to the embryology of the frog, chick and pig. Three lectures and one laboratory period per week.  
Prerequisites: Biology 1-2, Zoology 14.
53. BIOLOGY OF ARTHROPODS. Mr. Weber. *Fall semester*  
The study of insects and their relatives, their morphological and physiological adaptations and their effect on man. Laboratory work will include the study of living material and current research will be considered. Each student will prepare a study collection from field trips.
54. BIOLOGY OF PARASITISM. Mr. Meinkoth. *Alternate years, spring semester*  
A consideration of parasitology with reference to evolution and adaptation to the parasitic habit. Surveys are made of parasites in native animals. Classification, life cycles and epidemiology are reviewed.  
Not offered in 1967-68.
56. INVERTEBRATE ZOOLOGY. Mr. Meinkoth. *Spring, 1968; Fall, 1968-69*  
A course designed to acquaint the student with the fundamental morphology, classification, phylogeny and special problems of the invertebrate phyla.  
Three lectures and one laboratory period per week. Occasional field trips.
57. COMPARATIVE PHYSIOLOGY. Mr. Flemister. *Fall semester*  
A course of lectures and laboratory experiments treating functional processes from the standpoint of adaptation of the animal to its environment. These processes in representative animals are compared in order to follow their elaboration from the more general to the more specialized.  
Two lectures and one laboratory period per week.  
Prerequisites: Zoology 14, organic chemistry and physics.
58. PHYSIOLOGICAL ECOLOGY. Mr. Flemister. *Spring semester*  
A course of lectures, discussions and experiments concerning the physiological adaptations of representative animals to environmental stress. Requirements and availability of optimum conditions of temperature, oxygen, food-stuffs and the maintenance of ionic independence are appraised.  
Two lectures and two laboratory periods per week.  
Prerequisite: Zoology 57.
60. BIOLOGY OF ANIMAL COMMUNITIES. Mr. Rawson. *Fall semester*  
The study of animals at the emergent level of populations. Problems of animal behavior as related to the growth and maintenance of populations will

be considered with particular reference to communication and social interaction within animal groups. Both field and laboratory study techniques will be used. Two lectures per week and the equivalent of one laboratory meeting per week. Prerequisite: Biology 20 or Zoology 14. Not offered in 1967-68.

63, 64. SPECIAL TOPICS. Staff. *Full or half course*

For advanced students. Open to those who, on account of fitness, have arranged a program of special work in the department.

### HONORS WORK

103. EMBRYOLOGY. Mr. Enders. *Spring semester*

An analysis of reproduction and development. The laboratory work includes individual projects by the students, a study of developmental anatomy of the chick, pig and frog, and the observation of living material under normal and experimental conditions.

Prerequisite: Zoology 14.

104. COMPARATIVE PHYSIOLOGY. Mr. Flemister. *Fall semester*

An intensive consideration of the physical and chemical phenomena underlying the function of animals. A comparative approach is maintained in order to consider the progression from more general to the most specialized adjustments, acclimatizations and adaptations of animals to physical, chemical and biological stresses in the environment. The terminal portion of the laboratory program is devoted to the pursuit of original, independent work by the student.

Prerequisites: Zoology 14, organic chemistry and physics.

106. BIOLOGY OF ARTHROPODS.

Following a survey of insects in general, a detailed study of one aspect of the field will be undertaken. This will involve use of a scientific library, independent work on one topic, and discussions of current research.

107. INVERTEBRATE ZOOLOGY. Mr. Meinkoth. *Alternate years, fall semester*

A study of the morphology, taxonomy, natural history, distribution and adaptation of invertebrate phyla with a special emphasis on evolutionary trends, ecological relations, and problems peculiar to each group.

Not offered in 1967-68.

108. SENSORY PHYSIOLOGY. Mr. Rawson. *Alternate years, spring semester*

The functional specializations of sense organs for the transfer of information in biological systems are considered in relation to the adaptations of vertebrate and invertebrate animals to their environments. Electrophysiological and behavioral approaches are used in laboratory studies.

109. BIOLOGY OF ANIMAL COMMUNITIES. Mr. Rawson. *Fall semester*

The subject of Course 60 in seminar format. The analysis of the interrelations of species considered in an ecological context including a study of animal behavior relating to the growth and maintenance of animal populations.

Not offered in 1967-68.

110. SPECIAL TOPICS. Staff.

Open to students who, having satisfied all requirements, desire further work in the department. Frequently this will include acting as junior assistants in the research of staff members.



# CHEMISTRY

PROFESSORS: EDWARD A. FEHNEL  
WALTER B. KEIGHTON, JR., *Chairman*

ASSOCIATE PROFESSOR: PETER T. THOMPSON

ASSISTANT PROFESSORS: JAMES H. HAMMONS  
ROBERT E. LEYON †  
RONALD A. MITCHELL

INSTRUCTOR: JAMES R. HUTCHISON

The aim of the Department of Chemistry is to provide a sound training in the fundamental principles and basic techniques of the science rather than to deal with specialized branches of the subject.

The various courses and seminar offerings are designed to meet the needs of three classes of students:

1. Students with a primary interest in the humanities or social sciences, who turn to chemistry as a scientific study of general educational value. Chemistry 1, 2 offers training in the scientific approach to problems, experience with the laboratory method of investigation, and a presentation of some of the major intellectual achievements of chemistry.
2. Students who seek training in chemistry as a supplement to their study of astronomy, botany, engineering, mathematics, medicine, physics, or zoology. These students should consult with their major department and with the Chemistry department concerning the chemistry courses most suitable to their needs.
3. Students who consider chemistry their major interest. These students should take Chemistry 1, 2, or 3, 4 and Mathematics in their freshman year; Chemistry 28, 29, Mathematics and Physics in their sophomore year; Chemistry 26, 27 and Chemistry 61, 62 in their junior year. Some students interested in chemistry as a scientific study of general educational value, but with no intention of pursuing chemistry as a profession, will find these basic courses sufficient for their needs.

Students who wish to meet the minimum standards of the American Chemical Society for professional training in chemistry should also take Chemistry 66, an additional semester of advanced chemistry, and have a reading knowledge of German.\* Additional mathematics and physics are strongly recommended.

## 1, 2. INTRODUCTION TO CHEMISTRY. Mr. Keighton and Staff.

A study of the central concepts and basic principles of chemistry; the interpretation of chemical properties and reactions through equilibrium constants, oxidation potentials, free energies, thermochemistry; the relation of chemical properties to atomic and molecular structure and to the Periodic Table; rates and mechanisms of chemical reactions.

Students who enter college with advanced training in chemistry are encouraged to take a placement examination during freshman orientation week to determine which college chemistry course they should start with.

Chemistry 1, 2 or 3, 4 is a prerequisite for all other courses in chemistry. Three lectures and one laboratory period weekly.

## 3, 4. GENERAL CHEMISTRY. Mr. Thompson and Staff.

The subject matter of this course parallels that of Chemistry 1, 2 but at a more advanced and mathematically oriented level. The course is intended

\* This may be demonstrated by completing German 4 or 8 or by an examination given by the Department of Chemistry, preferably before the beginning of the senior year.

† Absent on leave, 1967-68.



for students with a strong interest in chemistry, whose high school preparation has been extensive, and who are prepared to work independently.

Admission to this course is based on consultation with the staff and a placement examination.

Chemistry 1, 2 or 3, 4 is a prerequisite for all other courses in chemistry. Three lectures and one laboratory period weekly.

26, 27. QUANTITATIVE CHEMISTRY. Mr. Mitchell.

Reactions and equilibria in acid-base, complexation, oxidation-reduction, and two-phase systems are studied, with emphasis on their applications in chemical analysis. The principles and methods of laboratory measurements, volumetric and gravimetric analysis, spectrophotometry, electroanalytical techniques, separations and chromatography, and organic analysis are introduced and developed. Laboratory work is designed to illustrate the lecture material, to give the student practical experience with theories, techniques, and instruments of modern analytical chemistry, and to encourage an independent approach to experimental work. Course 26 satisfies most medical school requirements.

Chemistry 61, 62 taken concurrently is highly desirable.

Three lectures and one laboratory period weekly.

28, 29. ORGANIC CHEMISTRY. Mr. Fehnel and Mr. Hammons.

An introduction to the chemistry of the more important classes of organic compounds, with emphasis on nomenclature, structure, reactions, and methods of synthesis. Current theoretical concepts of structure and mechanism are applied throughout the course to the interpretation of the properties and reactions of a wide variety of organic compounds. The laboratory work illustrates some of the principles and reactions discussed in the classroom and provides practical experience in the techniques involved in synthesizing, isolating, purifying, and characterizing organic compounds.

Three lectures and one laboratory period weekly.

60. PHYSICAL CHEMISTRY

*Spring semester*

The principles of physical chemistry are studied with emphasis on application to material systems including the gaseous, liquid, solid and solution states. Topics included are chemical thermodynamics, rate processes and the application of quantum mechanical principles in such areas as spectroscopy, structure determination, and molecular bonding.

Three lectures and one laboratory period weekly.

This course is intended primarily for students majoring in engineering.

Prerequisites: Mathematics 12 or 16, Physics 2, and Engineering 52.

To be offered in 1968-69.

61, 62. THEORETICAL CHEMISTRY. Mr. Hutchison and Mr. Thompson.

The principles of physical chemistry are studied and a number of numerical exercises are worked; the gaseous, liquid and solid states, solutions, colloids, elementary thermodynamics, chemical equilibria, electrochemistry, the kinetics of chemical reactions.

Prerequisites: Second year mathematics and general physics.

Three lectures and one laboratory period weekly.

63. QUANTUM CHEMISTRY. Mr. Thompson.

*Fall semester*

An extension of course 61, 62 in breadth and depth. Quantum mechanics is introduced and applied to a variety of problems in valence theory and molecular structure determination. Such topics as atomic structure, chemical bonding theory, molecular spectroscopy, dielectric and magnetic phenomena, molecular symmetry, and statistical mechanics are considered.

Prerequisite: Chemistry 62.

Three hours of discussion weekly.

65. **ADVANCED INORGANIC CHEMISTRY.** Mr. Hutchison. *Spring semester*  
 The periodic classification of elements is studied from the point of view of correlation of structure and properties. Consideration is given to such topics as atomic and molecular structure, coordination complexes, metal carbonyls, intermetallic and interstitial compounds, modern concepts of acids and bases, chemistry of the transition metals and rare earths, solvent systems, inorganic reaction mechanisms, and other phases of inorganic chemistry.  
 Prerequisite: Chemistry 61.  
 Three lectures or conferences and one laboratory period weekly.
66. **QUALITATIVE ORGANIC ANALYSIS.** Mr. Hammons. *Fall semester*  
 Classroom and laboratory study of the characterization and systematic identification of organic compounds. Emphasis is placed on the correlation of structure and properties of organic molecules and on the theoretical principles underlying various chemical and physical methods of isolation and identification. A reading knowledge of German is desirable.  
 Prerequisite: Chemistry 28, 29.  
 Two lectures and two laboratory periods weekly.
67. **ADVANCED ORGANIC CHEMISTRY.** Mr. Fehnel. *Spring semester*  
 Selected topics in organic chemistry, including resonance and molecular orbital concepts, reaction mechanisms, molecular rearrangements, stereochemistry, free radicals, and other topics of current interest. A familiarity with physical chemistry is desirable.  
 Prerequisite: Chemistry 28, 29.  
 Three hours of discussion weekly.
69. **SPECIAL TOPICS.** Staff. *Fall and spring semester*  
 An elective half-course, which provides an opportunity for qualified advanced students to undertake original investigations or to make detailed literature studies of selected topics in the fields of inorganic, organic, analytical, and physical chemistry. The course is designed to give the student practical experience in the solution of a research problem, to develop facility in the use of the chemical literature and in the interpretation and communication of experimental results, and to stimulate interest in current developments in chemical research. Students who propose to take this course should consult with the appropriate instructor during the semester preceding that in which the work is to be done.  
 One conference and approximately ten hours of laboratory and/or library work weekly.

## HONORS WORK

Before admission to honors work the chemistry major will have completed Chemistry 1, 2 or 3, 4, 28, 29, Mathematics 3, 4, 11, 12, and Physics 1, 2. The honors program includes Chemistry 101, 105 in the junior year and Chemistry 106 and 108 in the senior year, with four other seminars usually in biology, mathematics, or physics.

101. **THEORETICAL CHEMISTRY.** Mr. Thompson. *Fall semester*  
 The gaseous, liquid, and solid states, solutions, colloids, elementary thermodynamics, chemical equilibria, electrochemistry, the kinetics of chemical reactions.  
 Prerequisites: Second year mathematics and general physics.  
 One seminar and seven hours of laboratory weekly.

105. CHEMICAL ANALYSIS. Mr. Mitchell. *Spring semester*  
The material covered is essentially the same as in courses 26 and 27: the principles and practice of volumetric and gravimetric analysis, optical and electrical methods of analysis, separation techniques, and the analysis of organic compounds. The analytical chemistry of the common elements is studied to illustrate the application of analytical methods.  
Prerequisite: Chemistry 2 or 4, and 101.  
One seminar and eight hours of laboratory weekly.
106. ADVANCED ORGANIC CHEMISTRY. Mr. Hammons. *Fall semester*  
An intensive study of essentially the same subject matter as is covered in courses 66 and 67. A reading knowledge of German and a familiarity with physical chemistry are desirable.  
Prerequisites: Chemistry 28, 29 and senior standing.  
One seminar and seven hours of laboratory weekly.
108. VALENCE AND MOLECULAR STRUCTURE. Mr. Hutchison and Mr. Thompson. *Spring semester*  
Topics such as the periodic table and atomic structure, types and properties of bonds, the chemistry of transition metals, coordination compounds, acid-base and oxidation-reduction mechanisms, etc., are studied. Quantum theory is developed and applied throughout to these topics and the use of dielectric and magnetic phenomena, spectroscopy, and molecular symmetry in determining structure is discussed. Laboratory: study of reaction kinetics and equilibria in inorganic systems.  
Prerequisite: Chemistry 62 or 101.  
One seminar and six hours of laboratory weekly.

## CLASSICS

PROFESSORS: SUSAN P. COBBS  
HELEN F. NORTH, *Chairman* ‡  
MARTIN OSTWALD, *Acting Chairman*

INSTRUCTORS: MATTHEW W. DICKIE  
GILBERT P. ROSE

LECTURER: GABRIELE S. HOENIGSWALD

The Department of Classics offers instruction in the various fields which constitute the study of Greek and Roman culture. Courses numbered from 1 to 20 are devoted to the Greek and Latin languages and literatures. Courses numbered from 31 onwards presuppose no knowledge of the Greek or Latin languages and are open without prerequisite to all students; they deal with the history, mythology, religion, archaeology, and other aspects of the ancient world and include the study of classical literature in translation.

Swarthmore College contributes to the American Academy in Rome and the American School of Classical Studies in Athens, and its students have the privileges accorded to undergraduates from contributing institutions (use of the library at both schools and consultation with the staff). Swarthmore is also one of the institutions sponsoring the Intercollegiate Center for Classical Studies in Rome which provides facilities for the study of Classics, Archaeology, and Ancient History. Classics majors, recommended by the Department, are eligible to study at the Center usually during their junior year, for either one semester or for two.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS

Greek or Latin may be offered as the major subject either in course or in honor work. Major students in course are normally required to complete during the first two years either Intermediate Greek (course 11-12) or Introduction to Latin Literature (course 11-12). Both of these courses are prerequisite for honors seminar for a major student and one of them for honors seminars for a minor student.

Students reading for Honors in Greek may offer Latin as one of their minors and vice versa. Students majoring in Greek may substitute a Latin seminar for one of their seminars in Greek, and vice versa. In addition, majors in both Honors and course are strongly advised to take for at least one semester a course in prose composition (Greek 9, 10 or Latin 9, 10).

### Greek

- 1-2. ELEMENTARY GREEK. Mr. Ostwald. *Full course*  
The essentials of Greek grammar are covered and selections from masterpieces of Greek literature are read.
- 9, 10. GREEK PROSE COMPOSITION. Staff. *Each semester*  
A non-credit course, meeting one hour a week. This course is recommended in conjunction with courses at the intermediate level or above, to provide the student with grammatical and stylistic exercise.
- 11, 12. INTERMEDIATE GREEK. Mr. Rose.  
Plato's *Apology*, a play of Euripides, and selections from Homer are read.

‡ Absent on leave, 1967-68.

13, 14. GREEK PROSE AUTHORS. Staff.

The works read are determined by the interests and needs of the members of the class. These readings are supplemented by a survey of the history of Greek Literature. Credit is given for each semester.

15, 16. GREEK POETS. Mr. Dickie.

The works read are determined by the interests and needs of the members of the class. Credit is given for each semester. The course is offered only when required.

20. SPECIAL TOPICS. Staff.

Readings selected to fit the needs of individual seniors in preparation for their comprehensive examinations.

## Latin

1-2. ELEMENTARY LATIN. Mrs. Hoenigswald. *Full course*

The course is designed for students who begin Latin in college or who are not prepared to enter Intermediate Latin, and it normally covers the equivalent of two years' work in secondary school.

4. INTERMEDIATE LATIN. Mrs. Hoenigswald. *Fall semester*

The study of Virgil's *Aeneid* and a review of the principles of Latin Grammar.

9, 10. LATIN PROSE COMPOSITION. Staff. *Each semester*

A non-credit course, meeting one hour a week. This course is recommended in conjunction with courses at the intermediate level or above, to provide the student with grammatical and stylistic exercise.

11, 12. INTRODUCTION TO LATIN LITERATURE. Miss Cobbs.

The course aims to give some conception of the scope and characteristic qualities of Latin literature. The reading includes a comedy and the *Cena Trimalchionis* from Petronius' *Satyricon* in the first semester and the *Odes* of Horace in the second. Credit is given for each semester. It is open to students who have had four years of preparatory Latin or who have completed Intermediate Latin.

13. CATULLUS AND ELEGY. Mr. Rose. *Fall semester*

A study of the poems of Catullus and the elegiac poets.

14. LITERATURE OF THE EMPIRE. Mrs. Hoenigswald. *Spring semester*

Readings in the prose and poetry of the Silver Age of Latin literature.

20. SPECIAL TOPICS. Staff.

Readings selected to fit the needs of individual seniors in preparation for their comprehensive examinations.

## Ancient History and Civilization

31. HISTORY OF GREECE. Mr. Dickie. *Fall semester*

The course is devoted to the study of the political and social history of the Greek states to the time of the Hellenistic kingdoms. This is preceded by a brief survey of the Oriental civilizations by which the Greeks were influenced. Special attention is given to the 6th and 5th centuries B. C. Considerable reading is done in the primary sources in translation.

32. HISTORY OF ROME. Mr. Dickie. *Spring semester*  
 The course is devoted to the study of the political and social history of Rome to the time of Constantine. Special attention is given to the last century of the Republic and the first century of the Empire. Considerable reading is done in the primary sources in translation.
33. GREEK LITERATURE IN TRANSLATION. Mr. Rose. *Fall semester*  
 The works read in this course include the *Iliad*, Hesiod's *Theogony* and *Works and Days*, much of Greek tragedy and comedy, selections from the historians, the lyric and elegiac poets, and the pre-Socratic philosophers, and several dialogues of Plato.
34. LATIN LITERATURE IN TRANSLATION—CLASSICAL AND MEDIAEVAL. Miss North. *Spring semester*  
 The works studied in this course range in time from the age of the Roman Republic to the twelfth century after Christ. They include, from the classical period, such major authors as Cicero, Lucretius, Virgil, Livy, Ovid, and Seneca; from the Latin Fathers, St. Jerome and St. Augustine; and from the Middle Ages, Boethius, Prudentius, Bede, the chief figures of the Carolingian Renaissance, and the writers of Mediaeval Latin hymns and secular poetry. The course is normally given in alternate years.
36. CLASSICAL MYTHOLOGY IN LITERATURE AND ART. Miss North. *Spring semester*  
 The course is designed to give familiarity with those myths and legends that have served as material for writers and artists from ancient times to the present. The principal works studied are Homer's *Odyssey*, Hesiod's *Theogony*, selected Greek tragedies, Virgil's *Aeneid*, the *Metamorphoses* of Ovid, and Dante's *Commedia*. A study is made of the way in which mythological themes have been handled in painting and sculpture at various periods, and topics for papers provide an opportunity for the study of the treatment of mythology by writers from the Renaissance to modern times. The course is normally given in alternate years.
42. GREECE IN THE FIFTH CENTURY B.C. Mr. Ostwald. *Spring semester*  
 An intensive study, chiefly on the basis of primary sources, of Athens and the Greek world from the reforms of Cleisthenes to the end of the Peloponnesian War. Special emphasis is placed on the political, social, and economic institutions of the Athenian democracy and on the problems of the Delian League, both internal and in its relation to the Greek and non-Greek world. The course is normally given in alternate years.  
 Prerequisite: Classics 31 or its equivalent.
44. ROME IN THE AGE OF AUGUSTUS. Mr. Dickie. *Spring semester*  
 This course treats in detail the political, economic, social, and cultural development of Rome and the Roman world from the death of Julius Caesar to the accession of Tiberius. Special emphasis is placed on Octavian's rise to power, the nature of the principate, the relationship of the ruling city to her provinces, Rome's changing social structure, and the problems of political stability and the transference of power. Some attention is paid to literary, artistic, and religious movements. Readings are chiefly in primary sources in translation. The course is normally given in alternate years.  
 Prerequisite: Classics 32 or its equivalent.

#### HONORS SEMINARS

102. ROMAN HISTORIANS. Mr. Dickie.  
 This seminar combines a survey of Latin historical writing to the end of

the Silver Age with intensive study of selected books of Livy and Tacitus, both as examples of Roman historiography and as sources for Roman history. The seminar is given in the spring semester.

103. LATIN EPIC. Mr. Dickie.

This seminar traces the development of Roman epic poetry, with particular emphasis on the *De Rerum Natura* of Lucretius and the *Aeneid* of Virgil. Some attention is also given to early Roman epic, as represented by the *Annales* of Ennius, and to the later epic, typified by Lucan's *Pharsalia*. The seminar is given in the fall semester.

104. LATIN COMEDY AND SATIRE. Mr. Dickie.

Representative comedies of Plautus and Terence are read, and a study of the *Satires* and *Epistles* of Horace and the *Satires* of Juvenal is supplemented by a general survey of the development of Roman satire. The seminar is given in the fall semester.

107. ANCIENT RHETORIC AND LITERARY CRITICISM. Miss North.

This seminar combines the study of Greek and Roman rhetorical theory and literary criticism with the reading of representative speeches of Cicero. It also considers the influence of rhetorical education on Latin literature, particularly that of the Empire. The seminar is given in the fall semester.

108. MEDIAEVAL LATIN. Miss North.

The works studied in this seminar are chosen from the principal types of mediaeval Latin literature (including religious and secular poetry, history and chronicles, saints' lives, satire, philosophy, and romances). Some attention is paid to their origins in late antiquity and their influence on the early Renaissance.

111. GREEK PHILOSOPHERS. Mr. Ostwald.

This seminar is devoted mainly to the study of Plato, which is supplemented by study of the pre-Socratic philosophers and of Aristotle and the Hellenistic schools. The orientation of the seminar is primarily philosophical, although the literary merits of the Greek philosophers receive consideration. The seminar is given in the fall semester.

112. GREEK EPIC. Miss North.

The study of Homer's *Odyssey* constitutes the chief work of this seminar. Some attention is also paid to Hesiod's *Theogony* and to the *Argonautica* of Apollonius of Rhodes. The seminar is given in the spring semester.

113. GREEK HISTORIANS. Mr. Ostwald.

The greater part of the work of this seminar is devoted to Herodotus and Thucydides, but portions of Xenophon's *Hellenica* and of Polybius are also studied, both as examples of Greek historiography and as sources of Greek history. The seminar is given in the fall semester.

114. GREEK DRAMA. Mr. Rose.

The whole body of extant Greek tragedies and comedies is studied, with a careful reading in the original language of one play by each of the major dramatists. The seminar is given in the spring semester.



## ECONOMICS

PROFESSORS: EDWARD K. CRATSLEY  
FRANK C. PIERSON, *Chairman*  
CLAIR WILCOX

ASSOCIATE PROFESSORS: FREDERIC L. PRYOR  
BERNARD SAFFRAN

ASSISTANT PROFESSORS LEWIS R. GATY

INSTRUCTORS JOHN D. PATRICK

LECTURERS: HELEN M. HUNTER \*  
ANITA A. SUMMERS

The courses in economics are designed: first, to acquaint the student with the institutions and processes through which the business of producing, exchanging, and distributing goods and services is organized and carried on; second, to train him in the methods by which these institutions and processes may be analyzed; and third, to enable him to arrive at informed judgments concerning relevant issues of public policy.

Course 1-2 is prerequisite to all other work in the department except courses 3 and 4. Students intending to major in economics are advised to take Political Science 1-2, statistics, and/or accounting. While not essential, college-level mathematics would also be helpful. Students intending to do graduate work in economics should take Mathematics 3-4 and 11-12 or (if they are especially interested or gifted in mathematics) 5-6 and 15-16. Majors in course are required to take courses 50 and 51 in the junior year. Majors in honors are advised to take seminars 103 and either 101 or 102.

1-2. INTRODUCTION TO ECONOMICS. Messrs. Gaty, Patrick, Pierson, Pryor, Saffran, and Mrs. Summers.

This course is designed both to afford the general student a comprehensive survey and to provide students doing further work with a foundation on which to build. It describes the organization of the economic system and analyzes the allocation of resources, the distribution of income, the maintenance of economic stability, and international economic relations.

3. ACCOUNTING. Mr. Cratsley. *Fall semester*

The purpose of this course is to equip the student with the rudiments of accounting that he will need to employ in his advanced work in business finance, banking, taxation, and public regulation.

4. STATISTICS. Mrs. Hunter. *Spring semester*

The course is designed to make the student a critical user of statistics. Topics covered include frequency distributions, sampling, correlation, economic time series, and an introduction to econometric analysis. Students acquire some familiarity with the IBM 1620 computer.

11. ECONOMIC DEVELOPMENT. Mr. Wilcox. *Fall semester*

Requisites for the economic development of underdeveloped countries. Obstacles to development. Strategy and tactics of development. Aid for development.

\* Absent on leave, fall semester, 1967-68.

50. ECONOMIC THEORY. Mr. Saffran. *Fall semester*  
 Determination of prices in theory and in practice. Distribution of income. Determination of the level of income and employment.
51. MONEY AND BANKING. Mrs. Hunter. *Spring semester*  
 Organization and operation of commercial banking in the United States. Central banking; the Federal Reserve system. Monetary policy.
52. PUBLIC FINANCE. Mr. Gaty. *Fall semester*  
 Social goals and fiscal institutions, Federal, state, and local, including analysis of public expenditures, taxation, the national debt, fiscal federalism, and current fiscal policy.  
 Not offered in 1967-68.
54. BUSINESS FINANCE. Mr. Gaty. *Spring semester*  
 Analysis of private financial instruments, markets, and institutions, and public regulation of financial practices.
55. LABOR PROBLEMS. Mr. Pierson. *Fall semester*  
 The structure and functions of labor unions. Employer approaches to labor relations. Analysis of wage policies. Governmental control of labor relations.  
 Not offered in 1967-68.
56. SOCIAL ECONOMICS. Mr. Pryor. *Spring semester*  
 The extent, consequences, and causes of poverty and economic insecurity; an appraisal of reforms in social insurance, medical care, public housing, and rural development; the economics of discrimination.
57. MANAGERIAL ECONOMICS. Mr. Gaty. *Spring semester*  
 Analysis of business decision-making; economic theory and management control; market structure, pricing, and output; the budgetary process and business planning; business behavior and social welfare.  
 Not offered in 1967-68.
58. PUBLIC CONTROL OF BUSINESS. Mr. Gaty. *Fall semester*  
 Maintenance of competition in American industry; moderation of competition in agriculture, extractive industries, and distributive trades. Regulation of public utilities, transport, and communications. Public ownership and operation of industry.  
 Not offered in 1967-68.
59. BUSINESS CYCLES. Mr. Pierson. *Fall semester*  
 National income theory. Analysis of business fluctuations and long-term economic change. Public policies for stabilization and growth.
60. INTERNATIONAL ECONOMICS. Mr. Patrick. *Spring semester*  
 Theory and practice of international trade. Balance of payments, foreign exchange, national commercial policies, international investment, and foreign aid.
61. COMPARATIVE ECONOMIC SYSTEMS. Mr. Pryor. *Fall semester*  
 Analysis of methods by which economic systems can be compared; case studies of the Soviet Union, Yugoslavia, and several West European nations.

#### HONORS WORK

101. FINANCE. Mr. Gaty. *Fall semester*  
 Social goals and fiscal institutions, Federal, State, and local, including analysis of public expenditures, taxation, the national debt, fiscal federalism, and

- current fiscal policy. Analysis of private financial instruments, markets, and institutions, and public regulation of financial practices.
102. ECONOMIC STABILITY AND GROWTH. Mr. Pierson. *Spring semester*  
The theory of cyclical fluctuations and secular growth. Money and banking. Monetary and fiscal policy. Wage-price pressures and the control of inflation.
103. ECONOMIC THEORY. Mr. Saffran. *Each semester*  
Contemporary theory: price determination, the functional distribution of income, the level of employment. Evaluation of theory in the light of simplifying assumptions and empirical evidence. The relevance of theory to socio-economic problems.
104. PUBLIC CONTROL OF BUSINESS. Mr. Wilcox. *Fall semester*  
The maintenance of competition in American industry. The moderation of competition in agriculture, the extractive industries, and the distributive trades. The regulation of public utilities, transport, and communications. Public ownership and operation of industry.
105. INTERNATIONAL ECONOMICS. Messrs. Patrick and Wilcox. *Each semester*  
Theory and practice in international economic relations. The pure theory of international trade. The balance of payments and the mechanism of international exchange. Restrictionism and discrimination. Regionalism. Relations with controlled economies. International investment and foreign aid.
106. COMPARATIVE ECONOMIC SYSTEMS. Mr. Pryor. *Spring semester*  
Analysis of methods by which economic systems can be compared; study of resource allocation and growth in socialist, capitalist, and mixed economies; case studies of the U.S.S.R., Yugoslavia, China, France, and other nations; examination of special problems in economic planning.
107. LABOR AND SOCIAL ECONOMICS. Messrs. Pierson and Wilcox. *Fall semester*  
The organization of labor. Analysis of wage policies. Government control of labor relations. Poverty, inequality, and insecurity. Social insurance, medical care, public housing, and rural development.
108. MATHEMATICAL ECONOMICS. Mr. Saffran. *Spring semester*  
Econometrics, difference and differential equations, and other applications of mathematics to economics.  
Prerequisites: Mathematics 12 and Economics 103.  
Not offered in 1967-68.

## ENGINEERING

PROFESSORS: SAMUEL T. CARPENTER, *Chairman*  
JOHN D. McCRUMM  
BERNARD MORRILL

ASSOCIATE PROFESSORS: CARL BARUS  
DAVID L. BOWLER  
RAYMOND DOBY  
CLARK P. MANGELSDORF  
M. JOSEPH WILLIS

ASSISTANT PROFESSORS: G. STUART PATTERSON, JR.  
VICTOR K. SCHUTZ

The Department of Engineering offers engineering programs\* directed toward four principal educational aims: to introduce the student to a body of knowledge fundamental to all of modern engineering; to provide him with a comprehensive base of mathematics, chemistry and physics; to allow him maximum flexibility in electing plans of study to suit individual objectives; to provide him the opportunity to study in the humanities and social sciences.

The professional practice of engineering requires skill and resourcefulness in applying scientific knowledge and methods to the solution of engineering problems of ever growing technical complexity. In addition, the role of engineering in our society demands that the engineer recognize and take into account the economic and social factors that bear on his technical problems. The successful engineer will therefore possess an understanding of socio-economic forces, an appreciation of the cultural and humanistic aspects of the society in which he lives, and a sound working knowledge of human relations. Our total program furthers these objectives by providing the student with a broad technical knowledge, together with the foundation of a liberal education.

Courses in the Department of Engineering are open to all students who have the interest and the prerequisite background. Special inquiries may be made through the Chairman of the Department.

Educational plans available to engineering students at Swarthmore are as follows:

- (1) Four year course programs with the major in Engineering, with elected concentrations of study in the professional branches of engineering such as Civil, Electrical, and Mechanical Engineering, and in related engineering areas. (See suggested Elective Sequences.)
- (2) Four year course programs with the major in Engineering, with elected combinations of study in Biology, Chemistry, Economics, Mathematics, Political Science, etc.
- (3) Reading for Honors in Engineering.
- (4) Special sequences to meet unusual needs or interests:
  - (a) A four year program relating Engineering with other College areas of study, or
  - (b) A five year program leading to both a B.S. degree with a major in Engineering, and a B.A. degree.

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\* The new programs and courses presented in this catalogue are effective with the freshman class entering college in September 1966. Previously enrolled students follow programs and courses as outlined on page 106 and in the 1964-65 College Catalogue, a copy of which is available upon request.

A candidate for a degree in Engineering must meet the general requirements of the College as specified for the Division of Engineering (pp. 63-65). Curricular plans for the first two years must take two objectives into consideration: (1) the basic engineering science courses should meet the prerequisite requirements for advanced work in Engineering at the upper-class level, and (2) the general College requirements should normally be fulfilled prior to junior standing. The first two years of "Engineering Curriculum" (see following pages) will generally provide the background for the Engineering student to engage in any of the various plans of study and furnish the prerequisites for the advanced work of the junior and senior years. Modifications of the basic four year program are possible in individual cases but such changes must be approved by the student's course adviser and the Department of Engineering. During the second semester of the sophomore year the Engineering student, following College procedure, will apply for a Course program with a major in Engineering, or he may apply to read for Honors in Engineering.

### *Course Programs*

All four year programs lead to the degree of Bachelor of Science with the major in Engineering. The thirty-six semester courses are distributed as follows: Four semesters of mathematics, three semesters of Chemistry, three semesters of Physics, eight semesters of required Engineering common-core subjects, four semesters of approved Engineering electives and four semesters of free electives chosen from College-wide areas of instruction including Engineering. Except for the courses required to meet the College general requirements (pp. 63-65), the remaining courses are unrestricted, but it is recommended that they be selected from the humanities and social sciences.

The required courses, with the normal sequence of study, are shown in the following outline of the Engineering curriculum.

## Engineering Curriculum

### *First Year*

<i>Fall Semester</i>	<i>Spring Semester</i>
Introduction to Engineering	Mechanics I
Physics 1	Physics 2
Mathematics	Mathematics
Elective	Elective
Elective	Elective

### *Second Year*

Electrical Science	Physical Systems Analysis
Mechanics II	Mathematics
Mathematics	Chemistry 2
Chemistry 1	Elective
Elective	Elective

### *Third Year*

Fields and Continua	Physical Chemistry
Thermodynamics	Elective
Elective	Elective
Elective	Elective

## Fourth Year

Modern Physics

Materials Science

Elective

Elective

Elective

Elective

Elective

Elective

### *Course Advising and Approval of Programs*

Students are advised to make their educational goals known to their Engineering advisers at the earliest possible time. In this way the student can best benefit from the flexibility provided for course election and provide for a curricular program specifically oriented to his future educational goals. The basic plan of upper-class study in Engineering should be formulated during the second semester of the sophomore year when the student applies for a major in Engineering.

### *Reading for Honors in Engineering*

Students applying to become candidates for a degree with Honors should present their proposed program to the Division of Engineering for approval, after consulting with the Chairman of the Department of Engineering.

Each student must present an educationally sound program along with a statement of his reasons for believing that his program is appropriate to his goals. Reading for Honors in Engineering will normally require the scheduling of eight related seminars and should include seminars in Engineering, Physics or Chemistry, and Mathematics. The passing of the Honors examinations, with one paper for each seminar, leads to the Bachelor of Science degree with Honors, High Honors, or Highest Honors, in the Division of Engineering. Honors work in Engineering is customarily carried on in seminars of three or more students; a minimum of three students is thought to be desirable for the students to develop the full educational benefits of the seminar method of study.

### *Elective Sequences in the Course Program*

The required courses in Mathematics, Physics and Chemistry, and the required eight semester courses of the Engineering core provide the supporting subjects upon which to base a total program meeting particular needs and educational interests. The following suggested sequences of study beyond the required courses are listed to indicate the flexibility of choice open to the student. Other sequences may also be arranged beyond the suggested plans. At least four elected and approved courses in Engineering beyond the required courses must be included in the elected sequence. The four free electives are also available for inclusion in these sequences. Electives in the Humanities, Social Sciences and Life Sciences can also contribute, in many cases, to the central aims of a sequence. A course in Special Topics is available for meeting special interests or needs.

## Suggested Elective Sequences

### BIO-ENGINEERING

A minimum of four Engineering courses with additional elections in Engineering, Biology, and Chemistry.

The application of engineering principles to biological and medical problems. Students with this interest will normally elect two semesters of biology and two semesters of organic chemistry, and an appropriate sequence of engineering courses. Suggested sequences of study in this interdisciplinary field are available upon request or can be developed with the assistance of your Engineering adviser.

## CIVIL ENGINEERING AND RELATED AREAS

General Civil Engineering  
Structures  
Transportation Systems  
Urban and Regional Planning  
Water Resources

The minimum course sequence is Mechanics of Solids, Structural Mechanics I, Earth Science, Civil Engineering Design, with a fourth course chosen from Fluid Mechanics, Structural Mechanics II, or Soil Engineering. The minimum sequence provides the prerequisites for an additional elective sequence in Structures, Water Resources and Planning, Transportation Systems, Pre-Architecture, or General Civil Engineering. Plans may be made for work in Bio-Engineering with an emphasis on Environmental Control and Water Resources.

The early planning of electives in Biology, Economics, Political Science, Sociology, or Fine Arts, is essential for programs related to Urban and Regional Planning or Water Resources.

## ELECTRICAL ENGINEERING AND RELATED AREAS

General Electrical Engineering  
Electric Power and Energy Conversion  
Electronics and Information Processing  
Systems and Control  
Engineering Physics

Students who plan to do work in electrical engineering will normally include the following courses in their programs as a minimum background in the field beyond the required engineering core: Circuit Theory, Electromagnetic Theory, Electronics I, Electromechanical Energy Conversion I.

In addition, a student may pursue his electrical interests, with emphasis in one of the areas shown at the left, by the appropriate choice of further electives.

## ENERGY CONVERSION

Direct Energy Conversion  
Electromechanical Energy Conversion  
Thermodynamics and Heat Transfer

Energy conversion is one of the outstanding problems of the present and future. Conventional sources and means of conversion will continue to be important. New and as yet undeveloped systems will become increasingly significant. A concentration of electrical and mechanical courses built on fundamental courses in thermodynamics can be developed for students with a special interest in energy conversion.

## ENGINEERING SCIENCES

A number of feasible programs may be elected from Engineering, Mathematics, Chemistry, Physics, with the engineering courses dealing primarily with the theoretical bodies of knowledge.

A program in Engineering Sciences provides for diversity and depth in engineering, combined with mathematics, chemistry, or physics. It is suitable for those planning to enter college teaching or engineering research after graduate study.

## ENGINEERING COMBINED WITH STUDY IN OTHER COLLEGE AREAS

Biology  
Chemistry  
Economics  
Mathematics  
Political Science

An engineering student is required to include at least four approved engineering courses beyond the required engineering core. Fourteen electives, including the six to satisfy the College distribution requirements, are available for planning a sequence of study leading to concentrations or diversity in other College areas.



Psychology  
Physics

The areas listed on the left are not exclusive but they do represent areas in which engineering students may find a strong interest and a relationship to future engineering work.

#### MECHANICAL ENGINEERING AND RELATED AREAS

General Mechanical Engineering  
Applied Mechanics  
Thermodynamics and Energy Conversion  
Fluid Mechanics and Heat Transfer  
Engineering Design

Sequences in general mechanical engineering will normally include, in addition to the required engineering core, courses in advanced dynamics, solid mechanics, fluid mechanics and heat transfer, and automatic controls. Courses in thermodynamics, applied mechanics, fluids, heat transfer, and engineering design can be used to develop such specialized sequences as those shown at the left. Plans may be made for work in bio-engineering with an emphasis on the structure and function of biological systems.

#### COURSES

##### 1. INTRODUCTION TO ENGINEERING

*Fall semester*

An introduction to engineering analysis evolving solution to engineering problems through the use of simple mathematical models. The body of mathematics necessary for structuring these models is fully developed within the course. Only a background of high school mathematics is necessary. Programming concepts for the IBM-1620 digital computer are introduced so that the computer can be used for solution of some of the problems represented by the models. The laboratory work consists of some graphical concepts, shop practice, and design projects.

Three class periods and one three-hour laboratory each week.

##### 2. MECHANICS I.

*Spring semester*

Concept and definition of forces, vector methods of analysis. Equilibrium principles. Analysis of forces in machines and structures. Virtual work. Shear and bending in beams, elementary concepts of deformable bodies. Centroids and inertia of plane areas.

Three class periods and one three-hour laboratory each week.

##### 3. MECHANICS II.

*Fall semester*

Vector treatment of dynamics; kinematics of particles in fixed and moving reference systems; Newton's laws applied to particle motion; central force motion; rigid body kinematics, relative motion, and kinetics; energy methods; impulse and momentum methods; kinematics and kinetics of rigid bodies in three dimensions.

Three class periods and one three-hour laboratory each week.

Prerequisite: Mechanics I.

##### 5. ELECTRICAL SCIENCE.

*Fall semester*

The experimental and theoretical basis of electricity and magnetism; elementary electrostatics and magnetostatics; principles of energy conversion, foundations of circuit theory; mathematical basis for transient and steady state analysis of linear networks.

Three class periods and one laboratory every other week.

Prerequisites: Physics 1 and 2, and to be preceded or accompanied by Integral Calculus.

##### 6. PHYSICAL SYSTEMS ANALYSIS.

*Spring semester*

The study of physical phenomena and systems which may be represented to a good degree of approximation by a linear model or a lumped-parameter

pictorial model. The formulation of the mathematical model from basic physical laws and the treatment of the ordinary differential equations resulting therefrom. Emphasis will be placed upon the unity resulting from the mathematical representation for many types of physical systems: mechanical, electrical, electromechanical, thermal, etc. Techniques of analysis will include classical solution of differential equations including power series solutions, and also solution by Laplace transform methods. Transient and steady state response, frequency response, pole-zero concepts, notions of stability, and energy considerations. The analog computer will be introduced. Three class periods and one laboratory every other week.

7-8. PRINCIPLES AND PROBLEMS OF MODERN TECHNOLOGY.

*Full course*

This course is designed to meet the needs of non-science majors and fulfills the group I distribution requirement. (See pp. 59-61.) In the first semester, the logic and programming of the digital computer will be introduced, elementary decision theory will be developed, and the engineering concepts of optimization, feedback, and information discussed. Newton's laws of motion and the laws of thermodynamics will be introduced to illustrate the use of science in technology. The interactions among science, technology, and society will be considered in terms of the past, present, and future. In the second semester, a series of three to five special topics illustrative of modern technological problems and activity will be developed. Topics will be chosen for their timeliness, interest and importance to both society and technology.

Three class periods and one three-hour laboratory period every other week.

51. INTRODUCTION TO FIELDS AND CONTINUA.

*Fall semester*

A study of a class of physical systems that can be represented by simple distributed-parameter models. Phenomena common to fluid, elastic, electromagnetic, thermal, and other such systems are treated with emphasis on their physical analogy and their consequent mathematical unity. The partial differential equations governing such phenomena are developed from basic principles, introducing vector calculus. Application is made to realistic engineering situations.

Three class periods and one laboratory every other week.

Prerequisite: Engr. 6—Physical Systems Analysis, or equivalent.

53. THERMODYNAMICS.

*Fall semester*

Macroscopic concepts of thermodynamics: temperature, the First Law, thermodynamic properties, reversibility. Statistical inference of thermodynamics: probability, entropy and equilibrium, the partition function. Ideal gases. The Second Law of Thermodynamics. Cycles. Maxwell's Relations.

54. SYSTEMS ANALYSIS.

A study of advanced mathematical procedures useful in analyzing the behavior of physical systems. Included will be such topics as Laplace and Fourier methods, analysis by matrix state variable methods, phase-plane analysis, the Z-transform, signal flow graphs, concepts of optimization, control, etc. The systems to which the above procedures apply may be linear or nonlinear, and subjected to precisely defined or to random types of disturbances. Three class periods and one computation period each week.

Prerequisites: Engr. 6 and Engr. 51.

55. OPERATIONS RESEARCH.

The principles of operations research as applicable to defining optimum solutions of engineering and financial problems as an aid to managerial decision making. Probability and probability distributions, reliability, random number stimulation, queuing theory, linear programming, dynamic programming, allocation and transportation theory. The working principles of engineering economy are introduced and combined with operations research topics.

Three class periods each week.

59. MECHANICS OF SOLIDS.

This course deals with the internal stresses and changes of form when forces act on solid bodies. State of stress and strain, strength theories, stability, deflections, and photoelasticity. Elastic and Plastic theories.

Three class periods and one three-hour laboratory each week.

Prerequisites: Mechanics I and II.

60. MATERIALS SCIENCE.

*Spring semester*

This course brings together much of the background material acquired in other courses and focuses on the problem of understanding at a technological as well as theoretical level the engineering properties of materials in terms of atomic and sub-atomic phenomena. Among the topics considered will be crystal structure, electrical, thermal and magnetic properties of solids, imperfections and their effect on mechanical and electrical properties, corrosion and environmental effects.

Three class periods and one laboratory each week.

Prerequisites: Physical Chemistry, Modern Physics.

62. STRUCTURAL MECHANICS I.

Principles of statically determinate structural systems and advanced mechanics of deformable bodies pertaining to deflection, state of stress, state of strain, failure theories, strain energy, and stability. Structural Mechanics of space and plane framed structures including stress analysis, influence lines, and matrix solutions.

Three class periods and one three-hour laboratory each week.

Prerequisite: Engr. 59.

63. STRUCTURAL MECHANICS II.

A study of statically indeterminate structural systems and advanced structural theory. Response of structures to complex dynamic inputs such as earthquakes and moving loads. Digital computer applications.

Three class periods and one three-hour laboratory each week.

Prerequisite: Structural Mechanics I.

64. EARTH SCIENCE.

Using the basic concepts of physical geology as a unifying framework, the principles of soil mechanics and hydrology are studied. Subjects introduced include clay mineralogy, theory of consolidation of soils, stresses in earth masses, flow through porous media, precipitation-runoff relationships, open channel flow, ground water hydraulics, and sedimentation.

Three class periods and one laboratory each week.

65. CIVIL ENGINEERING DESIGN.

An introduction to the design of engineering structures with emphasis on structural components and structural materials; design projects involving planning, field surveys, analysis and synthesis, structural models, and optimization criteria.

Three class periods and one three-hour laboratory each week.

66. STRUCTURAL DESIGN.

An advanced course in the design of structures dealing with stability, flat plates, shells, pre-stressed concrete, high strength steels, ultimate design, dynamic force systems, comprehensive design problems, advanced structural model studies.

Three class periods and one three-hour laboratory each week.

Prerequisites: Engr. 59, 62, 63, 65.

67. WATER RESOURCES.

An introduction to the fundamentals of water-resources engineering, including pertinent areas of hydrology and hydraulics, precipitation-runoff relationships, groundwater flow, sedimentation, and hydraulics of steady and gradually varied flow through channels and reservoirs are studied. Fundamentals are related to engineering aspects of planning for water-resources projects, followed by some case studies of existing projects which draw on the background of the student in engineering science, design, the humanities, and the social sciences.

Three class periods and one laboratory each week.

68. TRANSPORTATION SYSTEMS.

The essentials of transportation planning, design and operation are introduced with the major emphasis on urban systems. Specific topics include traffic forecasting, geometric design of highways, theory of traffic flow and control, intersection design and operation of mass transportation facilities and terminals.

Three class periods and one laboratory each week.  
Prerequisite: Engr. 55, but may be taken concurrently.

69. SOIL ENGINEERING.

Advanced principles of soil mechanics with application to problems in design. Theoretical aspects of seepage, settlement and foundation stability analysis. The design of retaining walls, foundations, and earth structures are among the specific topics.

Three class periods and one laboratory each week.

Prerequisite: Engr. 64.

71. CIRCUIT THEORY.

Transient and steady-state analysis of electric circuits and networks with emphasis on Laplace and Fourier methods and s-plane interpretation. Network topology, equilibrium equations, theorems, network functions and their properties. Energy in electric networks. Introduction to synthesis.

Three class periods and one laboratory each week.

Prerequisites: Engr. 6, or Physics 12.

72. ELECTROMAGNETIC THEORY.

Maxwell's equations and their application. Macroscopic field treatment of magnetic, dielectric and conducting bodies. Forces, motion, and energy storage. Calculation of circuit parameters. Skin effect. Electromagnetic waves; their propagation, guidance, and radiation.

Three class periods and one laboratory each week.

Prerequisite: Engr. 51, or equivalent.

73. ELECTRONICS I.

Electronic circuit analysis. Emphasis is placed on the use of small-signal and piecewise linear models to represent transistors and vacuum tubes. Steady-state and transient responses of circuits are analyzed.

Three class periods and one laboratory each week.

Prerequisite: Engr. 6, or equivalent.

74. ELECTRONICS II.

Further study of electronic circuit analysis, with emphasis on the use of transistors at high frequencies and in the switching mode. Topics in communication theory may be included.

Three class periods and one laboratory each week.

Prerequisite: Engr. 73.

75. ELECTROMECHANICAL ENERGY CONVERSION I.  
Principles and physical aspects of electromechanical energy conversion; basic concepts of rotating machine performance and the analysis of ideal rotating electrical machinery and the dynamics of coupled systems.  
Three class periods and one laboratory each week.  
Prerequisite: Engr. 6.
76. ELECTROMECHANICAL ENERGY CONVERSION II.  
Transformers, D-C machines, analysis of performance and applications, synchronous machines, performance, effects of saturation and saliency; polyphase induction machines; fractional horsepower motors; rotating control devices; and self-synchronous machines.  
Three class periods and one laboratory each week.  
Prerequisites: Engr. 6 and Engr. 75.
77. TOPICS IN INFORMATION TRANSMISSION.  
Selected topics relating to the transmission and processing of information and information-bearing signals. Application to communication and information-processing systems.  
Three class periods and one laboratory each week.  
Prerequisites: Engr. 72 and Engr. 74.
78. AUTOMATIC CONTROL.  
An introduction to automatic control systems using the Laplace transform and signal flow graphs. System design is studied by means of the Nyquist diagram, frequency response methods, and the root locus method. Other topics include compensation networks, multiple input systems and system optimization. Advanced topics are introduced: nonlinear and sample data systems, adaptive control, etc.  
Three class periods and one laboratory each week.  
Prerequisites: Engr. 6 and Engr. 51.
79. PHYSICAL ELECTRONICS.  
A study of the physical principles underlying the operation of electronic devices. Attention is focused on the relationship between material properties and the characterization of devices as circuit elements. Semiconductor devices are extensively treated.  
Three class periods and one laboratory each week.  
Prerequisite: Physics 51.
81. INTRODUCTION TO FLUID MECHANICS AND CONVECTIVE HEAT TRANSFER.  
The fundamentals of the transfer of momentum, heat, and mass; the mechanics of the fluid state of matter. The continuum; stress, deformation rate, continuity, the Navier-Stokes equations. Application to inviscid, incompressible flow and viscous flow and convective heat transfer.  
Three class periods and one laboratory each week.  
Prerequisite: Engr. 51.
82. ADVANCED FLUID MECHANICS.  
A study of the more specialized areas of fluid mechanics; boundary layer theory, turbulence, and compressible flow.  
Three class periods and one three-hour laboratory each week.  
Prerequisite: Engr. 81.
83. CONTINUUM MECHANICS.  
A study of the formulation and solution of the governing equations for

the mechanics of a continuous medium. Stress, deformation, rheological models, constitutive equations, conservation laws, and applications.

Four class periods each week.

Prerequisite: Engr. 81 or Engr. 59.

84. ADVANCED THERMODYNAMICS.

An extension of the basic core thermodynamics, Engr. 53. The fundamental laws of thermodynamics are applied to conventional systems of energy conversion. Principles of irreversible thermodynamics are developed and applied to systems of direct energy conversion.

Three class periods and one three-hour laboratory each week.

Prerequisite: Engr. 53.

85. ADVANCED DYNAMICS.

Review of kinematics and particle dynamics using vectors. Vibrations and stability of lumped parameter system. Rigid body dynamics, including gyroscopes, in vector form. Lagrange's equations and Hamilton's Principle. Vibration of distributed systems.

Four class periods each week.

Prerequisite: Engr. 51.

88. CONDUCTION AND RADIATION HEAT TRANSFER.

A course dealing with the basic introduction to physical phenomena involved in the conduction and radiation heat transfer processes. Work is done in both steady state and transient conditions. Analytical, empirical and numerical approaches are covered.

Three class periods and one three-hour laboratory each week.

Prerequisites: Engr. 51, 53.

89. MACHINE DESIGN.

The study of the analysis and synthesis of the elements of machines.

Three class periods and one three-hour laboratory each week.

Prerequisites: Engr. 85, 59.

90. ENGINEERING DESIGN.

A generalized approach to the design of engineering systems and components is developed stressing inventiveness, engineering analysis and decision making. The design process is studied through case histories and student projects which utilize a number of areas of engineering science. Optimization theory, the use of probability and statistics in design, decision theory, and reliability theory are discussed.

Three class periods and one three-hour laboratory each week.

Prerequisite: Senior Engineering standing.

91. SPECIAL TOPICS.

Subject matter dependent on a group need or individual interest. Normally restricted to senior students and offered only when staff interests and availability make it practicable to do so.

92. THESIS.

With approval, a student may undertake a thesis project as a part of his program in the senior year. The student is expected to submit a prospectus of his thesis problem before the start of the semester in which the thesis project is carried out.



## HONORS SEMINARS

### 101. MECHANICS OF SOLIDS.

Mechanics and analysis of deformable bodies treating elastic and plastic stresses and strains due to general and specific force systems. General equations of equilibrium and compatibility. Failure theories, stability. Experimental analysis based on strains, photoelasticity, and membrane analogy. Elementary vibrations. Lagrange and Hamilton equations.

Prerequisites: Mechanics I and II; Mathematics 11, 12, or equivalent.

### 102. ENGINEERING SYSTEMS.

This seminar concerns itself with the representation of engineering systems as mathematical models. These models fall into the two fundamental classes of lumped parameters and distributed systems. Emphasis will be placed on the physical meaning of the applied mathematics.

### 103. THERMODYNAMICS.

Fundamental concepts, properties of substances, equations of state, first and second laws of thermodynamics and their applications, entropy, gas and vapor cycles, Maxwell equations, availability, Onsager's theorem, applications to direct energy conversion.

### 104. FLUID MECHANICS.

Fluid statics and dynamics, continuity, dimensional analysis, incompressible flow, generalized equations of motion, Navier-Stokes equation, boundary layer theory, convective heat transfer, mass transfer, compressibility phenomena.

### 105. LINEAR SYSTEMS.

Analysis and synthesis of electrical and electromechanical linear systems such as electric networks and servomechanisms. The following analytical methods are emphasized: differential equations, the Laplace transformation, Fourier methods, poles and zeroes, superposition integral, complex loci, analog simulation, transforms.

### 106. STRUCTURAL MECHANICS.

Theory, analysis, and design of structural systems. Basic theory of determinate and indeterminate structures, fundamentals of theoretical applied mechanics, including beams on elastic foundation, stability, plates and shells, with applicable vector and tensor approaches, and series solution. Ground motion and structural dynamics. Model analysis. Matrix methods.

Prerequisite: Engr. 101—Mechanics of Solids.

### 107. MECHANICAL DESIGN.

Analysis and synthesis of the elements of a machine. Vibrational study of both lumped and distributed mass systems. Dynamic systems are studied from a Newtonian and Lagrangian point of view.

### 108. EARTH SCIENCE.

Principles of soil mechanics, hydrology, hydraulics, sedimentation, ground water flow and clay mineralogy, using the basic concepts of physical geology as a unifying framework. Theory of consolidation of soils, stresses in earth masses, Laplace equation of seepage, precipitation runoff relationships, are introduced for the analysis of engineering problems.

### 109. THESIS. Elective, upon approval of the Engineering Division of an acceptable field of original investigation.

### 110. CONTINUUM MECHANICS.

Study of the mechanics of a continuous material. Stress, deformation, strain, rheological models, constitutive equations, conservation laws, and applications, with particular attention to elastic materials and Newtonian fluid mechanics.



111. CIRCUIT THEORY.

Theory of linear time invariant electric circuits with brief extensions to non-linear networks and methods of synthesis. Network topology and equilibrium equations. Pole-zero concepts, transient and steady state response, impedance, resonance and the complex s-plane. Superposition techniques, signal flow graphs, one- and two-port networks, filter theory and power networks. Analytic properties of network functions. Treatment of electromechanical energy transfer of devices having linear network equivalents.

112. ELECTROMAGNETIC THEORY.

Development and application of Maxwell's equations. Fields in bounded space and in dielectric, magnetic and conducting materials. Wave propagation and reflection. Radiation. Electromagnetic energy storage and electromechanical energy conversion.

113. ELECTRONICS.

A study of electronic devices and circuits. Subject matter includes physical theory of electron tubes, semiconductor devices, and other electronic circuit elements; design of electronic circuits applicable to communications, instrumentation, information processing systems, etc.; transient and steady-state analysis of electronic circuits and systems; introductory topics in the theory of communication and information. The seminar is accompanied by a full-day laboratory.

Prerequisite: Engr. 111, or equivalent.

## Engineering Curricula

FOR STUDENTS WHO HAVE ENTERED IN SEPTEMBER 1965 OR BEFORE

Three educational plans are offered:

- (1) The Course program with a major in Civil, Electrical, or Mechanical Engineering.
- (2) The Honors program in Engineering Sciences.
- (3) A special sequence to meet unusual needs or interests of certain students:
  - (a) a five-year program leading to both a B.S. and a B.A. degree, or
  - (b) a four-year program integrating engineering with other areas of study.

A candidate for a degree in Engineering must meet the general requirements of the College as specified for the Division of Engineering (pp. 63-65), and the requirements of the particular discipline or program in which he is a major. Thus curricular plans for the first two years must take two objectives into consideration: (1) the basic engineering science courses must provide a foundation and meet the prerequisite requirements for advanced work at the upper-class level, and (2) the general College requirements should be essentially fulfilled prior to junior standing. Experience has shown that the suggested "Basic Engineering Curriculum of the First Two Years" (page 112) will meet the needs of the usual engineering student in any one of the three plans and will clear the way for the advanced work of the junior and senior years. Modifications of the basic program, as well as those of the major disciplines, are possible in individual cases but such changes must be justified and approved by the student's course adviser. At the end of the sophomore year, the student will enter the Course program in a major field of Civil, Electrical, or Mechanical Engineering, or he may apply for Honors.

### (1) The Course Program

This program leads to the degree of Bachelor of Science in Civil, Electrical, or Mechanical Engineering; these curricula are accredited by the Engineers' Council for Professional Development. Over the four years, the student will take about one-quarter of his work in the Divisions of the Humanities and Social Sciences, one-quarter in the Departments of Chemistry, Mathematics, and Physics, and the remainder in the Department of Engineering. All students devote their last two years: (1) to certain basic courses required of all engineers; (2) to fulfilling the major requirements of one of the disciplines of Engineering; (3) to developing their special interests. After completing the basic program of the first two years, the student follows the curriculum outlined on the following pages under the particular area in which he is a major.

For descriptions of courses in Engineering, see the 1964-65 College Catalogue (pp. 91-100).

### (2) The Honors program in Engineering Sciences

The Division on Engineering offers an Honors program accredited in Engineering Sciences in addition to the above programs in Civil, Electrical, and Mechanical Engineering. A general statement describing Honors work at Swarthmore may be found on page 61. The program is open, by application, to qualified students upon completion of the sophomore year. Successful participants will receive the degree of Bachelor of Science with Honors, High Honors, or Highest Honors in Engineering Sciences.

The program has been established to meet the new and challenging demands placed upon the engineering profession by the rapid advances in science. The eight seminars in which the student participates cover a wide range of fundamental knowledge in the fields of mathematics, modern physics, and engineering sciences. The program is characterized by its orientation to basic scientific and mathematical principles in lieu of specialized subject matter. The program is unique and suited for those planning a future career in professional engineering, research and development, or college teaching.

Two seminars are normally taken each semester of the junior and senior year, for a total of eight. The final evaluation of the students in the program occurs at the end of the senior year by means of eight examinations, one for each seminar, given by outside examiners.

Students applying for the Honors program are required to submit their proposed seminar programs to the Division of Engineering, accompanied by a letter setting forth their defense of the program. The proposed program must include seminars in Mathematics, Physics, and Engineering Sciences. The Mathematics and Physics seminars are described in the departmental listings and the Engineering Science seminars are described in the 1964-65 College Catalogue (p. 92). It is advisable for students interested in this program to consult with the Chairman of the Department of Engineering.

### (3) Special Programs

There is growing recognition of the value of an engineering training fortified by a strong background of work in the humanities and social sciences or in the natural sciences. It is possible, with early planning of a five-year program, for a student to obtain both an engineering degree and a Bachelor of Arts degree in another field of interest. It is also possible to effect a four-year engineering plan with a minor in another field.

These special curricula are tailored to individual cases; in any event, planning early in the freshman year is essential. Requests for additional information should be directed to the Chairman of the Engineering Department.

## BASIC ENGINEERING CURRICULUM OF THE FIRST TWO YEARS

*Fall Semester*

*Spring Semester*

*Freshman Year*

Mathematics 3 (or 5)  
Physics  
Chemistry \*  
Introduction to Engineering  
Elective

Mathematics 4 (or 6)  
Physics  
Chemistry  
Mechanics I  
Elective

*Fall Semester*

*Spring Semester*

*Sophomore Year*

Mathematics 11 (or 15)  
Mechanics II  
Materials Science  
Elective  
Elective

Mathematics 12 (or 16)  
Engineering Measurements  
Electrical Engineering Science  
Elective  
Elective

### Civil Engineering

#### STANDARD PROGRAM FOR COURSE STUDENTS

*Fall Semester*

*Spring Semester*

*Junior Year*

CE51 Mechanics III  
EE63 Electronic Circuits  
ME51 General Thermodynamics  
EE55 Engineering Analysis

CE52 Structural Theory  
CE54 Soil Mechanics and Foundations  
ME54 Fluid Mechanics  
EL10 Writing and Speaking

*Senior Year*

CE53 Structural Mechanics  
CE55 Civil Engineering Design I  
CE57 Water Resources  
Elective

CE58 Special Topics  
CE56 Civil Engineering Design II  
GE57 Operations Research and Engineer-  
ing Economy  
Elective

### Electrical Engineering

#### STANDARD PROGRAM FOR COURSE STUDENTS

*Fall Semester*

*Spring Semester*

*Junior Year*

EE53 Circuit Theory I  
EE55 Engineering Analysis  
EE59 Electronics  
ME51 General Thermodynamics

EE54 Circuit Theory II  
EE56 Field Theory  
EE60 Electronics  
EL10 Writing and Speaking

*Senior Year*

EE57 Electrical Machinery I  
EE61 Waves and Transmission Lines  
Ph51 Modern Physics  
Elective

EE58 Electrical Machinery II  
Electrical Engineering Elective  
Technical Elective  
Non-technical Elective

\* Chemistry may be deferred until the sophomore year.

# Mechanical Engineering

## STANDARD PROGRAM FOR COURSE STUDENTS

### *Fall Semester*

CE51 Mechanics III  
ME51 General Thermodynamics  
EE55 Engineering Analysis  
Non-technical Elective

### *Fall Semester*

ME53 Heat and Mass Transfer  
ME55 Advanced Fluid Mechanics  
ME63 Engineering Design I  
EE63 Electronic Circuits

### *Spring Semester*

ME52 Advanced Thermodynamics  
ME54 Fluid Mechanics  
ME62 Advanced Strength of Materials  
Non-technical Elective

### *Spring Semester*

ME64 Engineering Design II  
ME66 Mechanical Engineering Problems  
EE64 Automatic Control  
Non-technical Elective

### *Junior Year*

### *Senior Year*

## ENGLISH LITERATURE

PROFESSORS: GEORGE J. BECKER,† *Chairman*  
SAMUEL HYNES

ASSOCIATE PROFESSORS: DAVID COWDEN  
ALAN FRIEDMAN \*\*  
HAROLD E. PAGLIARO

ASSISTANT PROFESSORS: THOMAS H. BLACKBURN  
JOHN J. McLAUGHLIN  
SUSAN B. SNYDER ‡  
EMILY M. WALLACE

INSTRUCTORS: THOMAS ARTIN  
JOHN S. SHACKFORD

This department offers courses and seminars in English literature, American literature, and some foreign literatures in translation. The departmental curriculum is planned to provide experience of several critical approaches: the intensive study of the works of major writers, study of the literature of limited periods, and thorough study of the development of literary types. The department also provides instruction in the techniques of expository writing.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS AND MINORS

*Prerequisites.* English 1 or its equivalent by Advanced Placement is the prerequisite for all other courses in literature. (This prerequisite does not apply to seniors.) The minimum requirement for admission as a major in English is English 1 plus one other semester-course in the department. However, students considering a major in English are strongly urged to take one or two additional courses during the sophomore year. The study of history, particularly of the history of England, is also recommended. Advanced study in a classical or modern foreign language is also desirable, and is virtually a requirement for admission to graduate school.

*Major in Course:* The work of a major in course consists of from 8 to 12 semester-courses in the department, including Shakespeare, Chaucer or Milton, and Problems of Literary Study.

*Major in Honors:* Majors in honors must take four seminars in the department, one of which must be Chaucer, Shakespeare, or Milton. Majors are advised to take two seminars in Group I.

*Minor in Honors:* Minors in honors are ordinarily required to take two seminars in the department.

### COURSES

1. THE ENGLISH POETIC TRADITION. Staff. *Each semester*  
Close study of selected works of Chaucer, Shakespeare, Donne, Pope, and Blake.
- 5, 6. ENGLISH FOR FOREIGN STUDENTS. *Each semester*  
Individual and group work on an advanced level for students with non-English backgrounds.

† Absent on leave, spring semester, 1967-68.

‡ Absent on leave, 1967-68.

\*\* Appointment begins February 1, 1968.

10. ADVANCED COMPOSITION. Staff. *Spring semester*  
 Analysis, organization, and effective presentation of complex subject matter.  
 The course will be conducted for the most part on a tutorial basis.
21. THE ART OF POETRY. Mr. Artin. *Fall semester*  
 Consideration of the essential aspects of the poetry of the English language.  
 Readings will be from all periods, but the approach will be generic rather than  
 historical.
22. SATIRE. Mr. Pagliaro. *Spring semester*  
 Examination of satire as a literary genre.
23. MAIN CURRENTS OF NINETEENTH-CENTURY LITERATURE. Mr. Becker. *Fall semester*  
 The major movements of romanticism, realism-naturalism, and symbolism in  
 European literature.  
 Not offered in 1967-68.
24. MAIN CURRENTS OF TWENTIETH-CENTURY LITERATURE. Mr. Friedman. *Spring semester*  
 Emphasis on the European novel. The creation of new forms of literary  
 experience by such figures as Proust, Gide, Camus, Kafka, Mann, Joyce, and  
 Lawrence.
25. SHAKESPEARE (for non-majors). Staff. *Each semester*  
 Study of representative plays. Not open to majors in the department.
28. MODERN BRITISH LITERATURE. Mr. Hynes. *Spring semester*  
 Forms and ideas in British writing in the twentieth century.  
 Not offered in 1968-69.
31. CHAUCER. Mr. Artin. *Fall semester*  
 Reading in Middle English of most of Chaucer's poems, with special emphasis  
 on *The Canterbury Tales*. The course attempts to place the poetry in the  
 context of medieval culture.
32. MEDIEVAL LITERATURE. Mr. Artin. *Spring semester*  
 Study of the literature of England from *Beowulf* to Malory. From time to  
 time the course will focus on more specialized topics, such as the Germanic  
 epic or the emergence of romance from Celtic narrative and mythology.
33. RENAISSANCE POETRY. Miss Snyder. *Fall semester*  
 The development of forms and ideas in English non-dramatic poetry from  
 the beginning of the sixteenth century to the death of Milton.  
 Not offered in 1967-68.
34. RENAISSANCE COMPARATIVE LITERATURE. Miss Snyder. *Spring semester*  
 Selected major writers of the Continental Renaissance will be studied in  
 translation.  
 Not offered in 1967-68.
35. TUDOR-STUART DRAMA. Mr. McLaughlin. *Fall semester*  
 Development of the English drama in the sixteenth and seventeenth centuries.
36. MILTON. Mr. Blackburn. *Spring semester*  
 Study of the main body of Milton's poetry with particular emphasis on  
*Paradise Lost*.
37. EIGHTEENTH-CENTURY LITERATURE. Mr. Pagliaro. *Fall semester*  
 Study of representative works with emphasis on the genres and on the critical  
 values of the age.  
 Not offered in 1968-69.

38. ROMANTIC POETRY. Mr. Pagliaro. *Spring semester*  
The major English romantic poets, with attention given to the ideas as well as to form and structure.  
Not offered in 1968-69.
39. THE ENGLISH NOVEL. Mr. Cowden. *Fall semester*  
Study of the beginnings of the novel concentrating on eighteenth-century, romantic, and Victorian novels.
41. CLASSIC AMERICAN LITERATURE. Mr. Shackford. *Fall semester*  
Study of the original ideals and forms of American literature as seen in the major writers between the Revolution and the Civil War.
43. VICTORIAN LITERATURE. Mr. Cowden. *Fall semester*  
Study of representative figures of the period.  
Not offered in 1967-68.
44. AMERICAN LITERATURE SINCE THE CIVIL WAR. Mr. Shackford. *Spring semester*  
Developments in the forms and character of American literature as seen in representative novels and poets from Mark Twain to Faulkner.
45. MODERN POETRY (BRITISH). Mr. Hynes. *Fall semester*  
Major British poets of the last hundred years. Readings include critical and autobiographical writings as well as poetry.  
Not offered in 1968-69.
46. MODERN POETRY (AMERICAN). Mrs. Wallace. *Fall semester*  
Examination of the poetry of Pound, Williams, and Stevens.
48. MODERN DRAMA. Mr. McLaughlin. *Spring semester*  
Examination of the range of dramatic literature since Ibsen.
50. THE MODERN NOVEL. Mr. Cowden. *Spring semester*  
Study of the development of the modern novel beginning with Meredith, Hardy, and James and continuing to the present.
- 51-52. COLLOQUIUM. Staff.  
In the spring of 1968 Mr. Friedman will offer a colloquium on the works of James Joyce.
53. SPECIAL TOPICS. Staff.  
From time to time intensive courses will be offered in fields not covered by the regular program.
- 61-62. SHAKESPEARE. Staff. *Fall semester*  
Study of the complete works of Shakespeare, tracing the development of his craftsmanship and ideas. Required of majors in the department, who meet weekly in small groups during the first semester of the senior year. Students should read through the plays before beginning the course.
- 63-64. PROBLEMS OF LITERARY STUDY. Staff. *Spring semester*  
Group meetings of departmental majors in the second semester of the senior year. About half the semester is devoted to writing a research paper of magnitude.
- 65-66. THESIS. *Spring semester*  
Majors may on occasion elect to substitute a thesis for Problems of Literary Study. Application must be made by May 15 of the junior year.



## HONORS SEMINARS

### Group I

101. SHAKESPEARE. Staff. *Each semester*  
Study of Shakespeare as dramatist and poet. The emphasis is on the major plays, with a more rapid reading of the remainder of the canon. Students are advised to read through all the plays before entering the seminar.
103. CHAUCER. Mr. Artin. *Fall semester*  
Reading of Chaucer's poems in the original Middle English, with particular attention to *Troilus and Criseyde* and *The Canterbury Tales*.
104. MILTON. Mr. Blackburn. *Spring semester*  
Study of Milton's works with special emphasis on *Paradise Lost*.
105. TUDOR-STUART DRAMA. Mr. McLaughlin. *Fall semester*  
The development of English drama from the medieval morality plays to Restoration tragedy and comedy.
108. RENAISSANCE POETRY. Miss Snyder. *Spring semester*  
Modes and preoccupations of English poetry from Wyatt and Surrey through Marvell.  
Not offered in 1967-68.
109. EIGHTEENTH-CENTURY LITERATURE. Mr. Pagliaro. *Fall semester*  
An examination of the literary forms and critical values of the age, with special attention given to the works of Dryden, Swift, Pope, and Johnson, and to a few representative playwrights.
110. THE ROMANTIC POETS. Mr. Pagliaro. *Fall semester*  
An examination of the poetry of Blake, Wordsworth, Coleridge, Byron, Shelley, and Keats.

### Group II

113. THE NOVEL. Mr. Cowden. *Each semester*  
Studies in four novelists: James, Conrad, Joyce, and Woolf.
114. MODERN DRAMA. Mr. McLaughlin. *Spring semester*  
Study of realism, expressionism, and the absurd in the works of Ibsen, Strindberg, Shaw, O'Neill, and Beckett.
115. MODERN COMPARATIVE LITERATURE. Mr. Becker. *Fall semester*  
Using the realistic movement as a starting point, this seminar considers some of the major themes and philosophic attitudes embodied in recent literature. The chief figures studied are Flaubert and Zola, Tolstoy and Dostoevsky, Kafka and Mann, Joyce and Faulkner.
116. AMERICAN LITERATURE. Mr. Shackford. *Fall semester*  
Study of the themes, forms, and character of American literature as seen in four or five representative writers from the nineteenth and twentieth centuries.
118. MODERN POETRY. Mr. Hynes and Mrs. Wallace. *Spring semester*  
Study of the modern tradition in English and American poetry from Yeats to the present. The seminar will concentrate on the work of a few major poets.

119. SPECIAL TOPICS IN LITERATURE. Staff.

Occasional seminars will be given in special fields not part of the regular program.

120. THESIS.

A major in Honors may elect to write a thesis as a substitute for one seminar. He must select his topic and submit his plan of work for departmental approval by the end of the junior year. Then during one semester of the senior year he writes his thesis under the direction of a member of the department.

## FINE ARTS

PROFESSORS: ROBERT M. WALKER, *Chairman*  
HEDLEY H. RHYS †

ASSOCIATE PROFESSOR: JOHN W. WILLIAMS

ASSISTANT PROFESSOR: TIMOTHY K. KITAO

VISITING LECTURER: DAVID SYLVESTER \*\*

The aim of the Department is to study the historical-cultural significance and aesthetic value of architecture, sculpture, painting and graphic art (prints and drawings). Methods and problems of criticism are considered: observation, analysis, interpretation and evaluation. Instruction is given by means of original works of art as well as by the usual visual aids. Field trips are made to public and private collections in New York, Philadelphia, Baltimore and Washington and to significant examples of architecture in those areas.

Since it is the objective of the Department to foster an intelligent comprehension of the visual arts rather than to develop technical skills, no courses in drawing, painting and sculpture are offered for credit. Instruction in such work, however, is available under the Studio Arts Program.

### REQUIREMENTS AND RECOMMENDATIONS

*Prerequisites:* Majors in course and majors and minors in honors must take two half-courses, one of which must be Fine Arts 1. This requirement must be fulfilled before the Junior year. For other students the prerequisite for all other courses is Fine Arts 1, Introduction to Art History, with the exception of Fine Arts 38, Modern Architecture, which is open to Engineers without any prerequisite.

*Majors in Course:* The program consists of at least eight half courses (including Fine Arts 1) in the Department. The student must have at least one course in each of the major periods of art history. The courses supporting this program depend on the needs of the individual and may be found in both the Division of the Humanities and the Division of the Social Sciences.

*Majors and Minors in Honors:* Majors in honors take four seminars in the Department. In special cases the seminar in Aesthetics may be substituted for one in Fine Arts. A minor in honors usually consists of two seminars. The seminars offered in any one semester vary according to the requirements of the students and the convenience of the Department.

*Language Requirements for Graduate Schools:* Students are advised that graduate work in Fine Arts requires a knowledge of French and German.

### COURSES

1. INTRODUCTION TO ART HISTORY. Mr. Kitao, Mr. Walker, Mr. Williams.  
*Each semester*

A critical study of the nature and development of architecture, sculpture and painting in the historical context of the major cultural periods of western civilization from the Fifth Century B.C. to the Twentieth Century A.D.

Three hours of lectures and eight conference meetings shared by all members of the staff.

† Absent on leave, 1967-68.

\*\* Fall semester, 1967-68.

11. DESIGN IN DRAWING AND PAINTING. Mr. Rhys. *Fall semester*  
 The basic elements of design and their function in drawing and painting. Types of harmony, sequence and balance such as linear, tonal and special. The methods of design and representation that characterize the various historical styles. Practical exercises required demand no special technical aptitude, since the purpose of the course is to develop a critical understanding of drawing and painting and not technical skill.  
 Not offered in 1967-68.
13. ANCIENT ART. Mr. Walker. *Fall semester*  
 A study of architectural forms as they express the cultural patterns of the civilizations of the Ancient Near East, Egypt, Greece, and Rome. Sculpture and painting will be discussed in relation to buildings which constitute the core of this course.
16. EARLY MEDIEVAL ART. Mr. Williams. *Fall semester*  
 The formation and development of art and architecture in Europe and the Mediterranean from about 300 to 1000 A.D.
17. ROMANESQUE AND GOTHIC ART. Mr. Williams. *Spring semester*  
 The art and architecture of Western Europe from about 1000 to about 1350 A.D.
18. ITALIAN RENAISSANCE ART. Mr. Kitao. *Fall semester*  
 A study of selected problems in Italian art and architecture from 1400 to 1600 as represented by such masters as Masaccio, Leonardo, Raphael, Michelangelo, Titian and Palladio.
20. NORTHERN RENAISSANCE ART. Mr. Walker. *Spring semester*  
 Developments in painting and the graphic arts of drawing and print making during the fifteenth and sixteenth centuries in England, France, the Netherlands, Germany, and Spain through the study of individual artists such as Jan van Eyck, Roger van der Weyden, Jean Fouquet, Albrecht Dürer, Grünewald, Holbein, Jerome Bosch and Pieter Bruegel.
21. BAROQUE ART. Mr. Kitao. *Spring semester*  
 A study of selected problems in European art and architecture of the 17th century as represented by such masters as Caravaggio, the Carracci, Rubens, Bernini, Borromini, Rembrandt and Velasquez. Special attention will be given to the genesis of the Baroque style in Rome.
36. AMERICAN ART. Mr. Rhys. *Spring semester*  
 Architecture, sculpture and painting in North America from the Colonial Period to the present day, their connection with European art and their significance as a reflection of American culture.  
 Not offered in 1967-68.
38. MODERN ARCHITECTURE. Mr. Walker. *Spring semester*  
 An introduction to the nature of architecture and the function of the architect through a study of developments in European and American building during the late nineteenth and twentieth centuries. The specific influence of economic, technological and social changes upon design and structure. Emphasis placed on the study of original examples in the Philadelphia area and on the work of such men as Sullivan, Wright, Mies van der Rohe, Gropius and Le Corbusier. The prerequisite of Fine Arts 1 or 2 is waived for students in Engineering.
51. MODERN PAINTING. Mr. Rhys. *Fall semester*  
 Important stylistic developments in European painting from the French Revolution through Matisse and Picasso: the meanings of the various movements and their relationship to changing social and political attitudes.  
 Not offered in 1967-68.

52. FAR EASTERN ART. Mr. Rhys. *Spring semester*  
An introduction to the history of pictorial art in Asia, especially China and Japan, from the earliest phases and origins of pictorial art in China to new movements in the eighteenth and nineteenth centuries. Iconography, stylistic definition, and the treatment of form, color, and space as they differ from such concerns in Western art will receive special attention.  
Open only to Juniors and Seniors who have had Fine Arts 1.  
Not offered in 1967-68.

53-54. COLLOQUIUM: PROBLEMS IN MODERN FRENCH PAINTING. Mr. Sylvester  
*Fall semester*  
Developments in modern French painting from Cezanne to Picasso.

60. SENIOR READING. Staff. *Spring semester*

61-62. SENIOR THESIS. Staff. *Full course*  
With the approval of the Department, a thesis may be written during the senior year with credit for one half-course each semester.

### HONORS SEMINARS

101. ANCIENT ART. Mr. Walker. *Fall semester*  
A study of architectural forms as they express the cultural patterns of the civilizations of the Ancient Near East, Egypt, Greece, and Rome. Sculpture and painting will be discussed in relation to buildings which constitute the core of this seminar.

103. MEDIEVAL ART. Mr. Williams. *Fall semester*  
The development of the forms of Christian art during the Middle Ages from the fourth to the thirteenth century.

104. ITALIAN RENAISSANCE ART. Mr. Kitao. *Fall semester*  
A study of selected problems in Italian art and architecture from 1400 to 1600 with special emphasis on the development of the High Renaissance by Raphael, Michelangelo and Bramante in Rome of Julius II.

105. NORTHERN RENAISSANCE PAINTING. Mr. Williams. *Spring semester*  
Developments in painting and the graphic arts of drawing and print making during the fifteen and sixteenth centuries in England, France, the Netherlands, Germany, and Spain through an intensive study of individual masters such as the Van Eycks, Roger van der Weyden, Jerome Bosch, Pieter Bruegel, Jean Fouquet, Martin Schongauer, Albrecht Dürer, Hans Holbein, and El Greco.

106. BAROQUE ART. Mr. Kitao. *Spring semester*  
A study of selected problems in European art and architecture of the 17th and 18th centuries with special emphasis on the genesis and development of the Baroque style in Rome.

107. PROBLEMS IN MODERN FRENCH PAINTING. Mr. Sylvester. *Fall semester*  
Developments in modern French painting from Cezanne to Picasso.

108. MASTER PRINT MAKERS. Mr. Walker. *Spring semester*  
A consideration of certain problems in the history of the graphic arts. A study of the significance of the work of such men as Schongauer, Dürer, Rembrandt, Goya, Daumier, Munch and Rouault for the development of expression in the media of the woodcut, engraving, etching, aquatint and lithography. Students work almost exclusively with original material in the Print Room of the Philadelphia Museum and the Lessing J. Rosenwald Collection in Jenkintown.

## HISTORY

PROFESSORS: PAUL H. BEIK  
JAMES A. FIELD, JR., *Chairman*  
LAURENCE D. LAFORE ‡  
FREDERICK B. TOLLES

ASSOCIATE PROFESSOR: HARRISON M. WRIGHT

ASSISTANT PROFESSORS: ROBERT C. BANNISTER  
GEORGE E. MCCULLY  
BERNARD S. SMITH  
JOHN G. WILLIAMSON

LECTURERS: PEGGY K. KORN  
TSING YUAN

The offerings of the History Department are designed to give the student a sense of the past and an acquaintance with the course of cultural and institutional development which has brought forth the world of today, and at the same time to provide some training in historical method and the use of evidence. Concerned as it is with these ends, the study of history in college emphasizes less the accumulation of data than the comprehension of those ideas and institutions—political, religious, social, economic—by which man has attempted to order his world.

The structure of the Department's program derives from the belief that some knowledge of European history since classical times is both an important part of a general education and a necessary prelude to further historical work. History 1-2 is planned as an introduction to this subject, to the methods and problems of the historian, and to the study and use of historical materials; it is a prerequisite for all other departmental offerings except Courses 5, 6, 24, 35 and 36. Students contemplating further work in the Department should, if possible, take History 1-2 in the freshman year; those who take the course in later years may, if they have successfully completed History 1, elect an additional history course in the second semester. Students who enter college with Advanced Placement in European history may, with the permission of the department, substitute *either* History 11 *or* History 12 for History 1-2.

The courses open to sophomores, numbered 5 to 36, deal with our heritage from England, offer a choice of approaches to the history of the United States, and provide basic coverage of other important broad areas. Courses 51-65, normally restricted to juniors and seniors, are designed for more intensive and specialized study of a variety of subjects.

The minimum requirement for acceptance as a major in history is the successful completion of History 1-2 and a satisfactory standard of work in other departments. The work of the major in Course consists of not less than eight nor more than twelve courses in the Department, including History 1-2, a course in American history, a course in English history, and Special Topics; while considerable latitude is permitted in the planning of individual programs, it should be noted that the Comprehensive Examination assumes some knowledge of these basic fields. For those contemplating work in Honors, history can serve as a major or minor field in either the Humanities or the Social Sciences or as a bridge in cross-divisional programs.

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‡ Absent on leave, 1967-68.

Students who are considering a major or minor in History Honors should give timely consideration to the prerequisites of their other fields. Those who intend to continue their studies after graduation should bear in mind that a reading knowledge of one or two foreign languages is now generally required for admission to graduate school.

## COURSES

- 1-2. EUROPE. Members of the department. *Full course*  
One of the basic courses in the curriculum. The subjects considered proceed in generally chronological order from the fall of the Roman Empire to the mid-twentieth century.
5. THE UNITED STATES TO 1877. Mr. Bannister or Mr. Field. *Fall semester*  
The colonial experience; independence, a new society, and a new government; transcontinental expansion and the struggle between North and South.
6. THE UNITED STATES SINCE 1877. Mr. Bannister or Mr. Field. *Spring semester*  
Industrialism and its consequences; the United States as a great power; the problems of a shrinking world.
7. AMERICAN INTELLECTUAL HISTORY TO 1865. Mr. Tolles. *Fall semester*  
The history of ideas in the United States from the colonial period through the mid-nineteenth century. A general knowledge of the political and social history of the period is assumed.
8. AMERICAN INTELLECTUAL HISTORY SINCE 1865. Mr. Bannister. *Spring semester*  
The history of ideas in the United States from the mid-nineteenth century to the present time. A general knowledge of the political and social history of the period is assumed.
11. THE FORMATION OF MEDIEVAL CIVILIZATION. Mr. Smith. *Fall semester*  
The history of the early Middle Ages, from the Christian Roman Empire to the eleventh century crisis of Church and State.
12. THE MATURING OF MEDIEVAL CIVILIZATION. Mr. Smith. *Spring semester*  
The period from about 1100 to the fifteenth century, with emphasis on Western Europe in the twelfth and thirteenth centuries.
13. RUSSIA. Mr. Beik. *Fall semester*  
The history of modern Russia. The course begins with the reign of Peter and gives half its time to the period since the Revolution.
16. MODERN ENGLAND. Mr. Williamson. *Spring semester*  
The development of constitutional government and the transition from an agricultural and aristocratic nation to an urban and socialist one.
22. AMERICAN RELIGIOUS THOUGHT. Mr. Tolles. *Spring semester*  
The course of religious thought in the colonies and the United States, with appropriate reference to general intellectual history and American church history.
24. QUAKERISM. Mr. Tolles.  
The history of the Society of Friends to the present day. The characteristic religious and social ideas of the Quakers are considered in their historical setting.  
Not offered in 1967-68.



26. LATIN AMERICA. Mrs. Korn. *Spring semester*  
The development of the Latin American countries from colonial times to the present.
32. THE EXPANSION OF EUROPE. Mr. Wright. *Spring semester*  
A survey of European overseas expansion since 1415, and of its impact on non-European societies. The emphasis is on South and Southeast Asia.
35. THE FAR EAST IN THE NINETEENTH CENTURY. Mr. Yuan. *Fall semester*  
The impact of the West; internal disruption and adjustment; the beginnings of nationalism and of the process of modernization.
36. THE FAR EAST IN THE TWENTIETH CENTURY. Mr. Yuan. *Spring semester*  
The search for a new identity; the rise of militarism and imperialism in Japan and of communism in China.
- 51-2. COLLOQUIUM. Mr. Wright. *Fall semester*  
A double credit course of restricted enrollment which seeks, through intensive investigation of a limited topic, to illuminate an important historical field. In 1967-68 the subject will be South Africa.
55. SECULARIZATION AND THE SEVENTEENTH CENTURY. Mr. McCully. *Spring semester*  
The 15th and 16th century secularization of thought and society and its influence upon the 17th century.
56. THE FRENCH REVOLUTION AND NAPOLEON. Mr. Beik.  
The significance of the period from 1789 to 1815 in the development of modern European social theories and political institutions.
57. MODERN EUROPE. Members of the department. *Fall semester*  
Recent European problems and institutions examined primarily through the experiences of one nation in the nineteenth and twentieth centuries. In 1967-68 this nation will be Germany. Mr. Williamson.
61. AMERICAN DIPLOMATIC HISTORY. Mr. Field. *Fall semester*  
Official United States foreign policy considered as a part of the larger problem of American participation in world affairs.  
Not offered in 1967-68.
63. BRITAIN AND AMERICA, 1880-1920. Mr. Bannister. *Spring semester*  
An investigation, by means of a comparative approach to significant developments, of the nature and importance of the Anglo-American connection. Stress will be laid on such topics as the rise of Liberalism and the causes and consequences of the First World War.  
Not offered in 1967-68.
65. AFRICA. Mr. Wright. *Fall semester*  
Aspects of African history and civilization with the emphasis on tropical Africa in modern times.
66. DIRECTED READING. Members of the department.  
Individual or group study in fields of special interest to the student not dealt with in the regular course offerings. The consent of the Chairman and of the Instructor is required.

## 68-69. SPECIAL TOPICS.

*Spring semester*

Group meetings of senior majors in their final semester to review, integrate, and supplement their programs. The readings and discussion center on the development of historical writing from the Middle Ages to the present, and on the relationship of the historian to his time.

## HONORS SEMINARS

The following seminars are offered by the department to juniors and seniors who are preparing for the examinations for a degree with Honors. They may be taken in any combination without regard to chronological order. History 1-2 is a prerequisite to all seminars. In addition, some preliminary reading is required for seminars 101, 102, and 103 if no work in American history has been previously elected.

Those who wish to specialize in international relations with a major in history (see page 127, last paragraph) should include in their programs at least three of the following seminars: 103, 126, 127, 131.

101. EARLY AMERICAN HISTORY. Mr. Tolles. *Spring semester*  
Political, economic, social, and cultural aspects of the period from the explorations to the end of the American Revolution.
102. PROBLEMS IN AMERICAN HISTORY. Mr. Bannister or Mr. Field. *Both semesters*  
Selected topics in the history of the United States.
103. PROBLEMS IN AMERICAN HISTORY: FOREIGN. Mr. Field. *Spring semester*  
A study of the evolution since 1776 of American relations with the outer world, with emphasis on ideological, economic, and strategic developments.
112. TUDOR AND STUART ENGLAND. Mr. McCully. *Spring semester*  
The English Renaissance and Reformation, constitutional developments, the Civil War and the Restoration.  
Not offered in 1967-68.
113. ENGLAND SINCE 1785. Mr. Lafore. *Spring semester*  
The rise of the first modern industrial state. Its social, political, and economic problems.  
Not offered in 1967-68.
121. MEDIEVAL EUROPE. Mr. Smith. *Spring semester*  
A study of the civilization that flourished in Western Europe between the eleventh and the fourteenth centuries.
122. THE RENAISSANCE AND REFORMATION. Mr. McCully. *Fall semester*  
The birth of Modern Europe as seen in such developments as the recovery of classical culture, the crisis of religion and the Church, the establishment of centralized states, and the origins of modern science.
123. SEVENTEENTH-CENTURY EUROPE. Mr. McCully.  
The consolidation of early modern European culture and society, from the end of the Wars of Religion to the beginnings of the Enlightenment.  
Not offered in 1967-68.
124. EUROPE 1760 TO 1870. Mr. Beik. *Fall semester*  
The disintegration of the old regime and the rise of liberalism.

125. EUROPE 1870 TO 1945. Mr. Williamson. *Both semesters*  
 Political and social changes in Europe through the Second World War.
126. DIPLOMATIC HISTORY OF EUROPE. Mr. Williamson or Mr. Lafore.  
 The management of international affairs since 1870.  
 Not offered in 1967-68.
127. EASTERN EUROPE. Mr. Beik. *Spring semester*  
 The origins and consequences of the Russian Revolution and the development of the nations of East Central Europe.
131. MODERN AFRICA. Mr. Wright. *Fall semester*  
 Studies in African history with emphasis on the period since 1800, the region south of the Sahara, and the European impact.
132. THE MODERN FAR EAST. Mr. Yuan. *Spring semester*  
 Political, social, and intellectual movements in China and Japan since about 1840.
141. THESIS.  
 A thesis may be substituted for one of the Honors seminars by permission of the department. The topic should be selected and approved before the end of the junior year. The thesis must be completed during the first semester of the senior year.

#### GRADUATE WORK

The Department of History offers work leading to the Master's degree for graduate students who wish to use the research resources of the Friends Historical Library for a thesis. In addition to the thesis the candidate normally takes three Honors seminars. For the general regulations concerning the Master's degree see pages 73-74.

## INTERNATIONAL RELATIONS

Students who plan to enter upon a career in the field of international relations should include in their programs, during the first two years, the introductory courses in economics, history, and political science and should complete the intermediate course in one or more modern languages.

Advanced courses selected from the groups listed below may be incorporated in the programs of students who do their major work in economics, history, political science, or a modern language.

These students who wish to concentrate in international relations may take their Senior Comprehensive Examination in this field. Students preparing for this examination should take eight, nine, or ten half courses from among those listed below, including all of those listed in Group I, one or more in Group II, and one or more in Group III. The examination is administered by a committee appointed by the chairmen of the Departments of Economics, History, and Political Science, under the Chairmanship of the Department of Political Science.

### *Group I*

Political Science 2C. INTERNATIONAL POLITICS  
Political Science 13. INTERNATIONAL LAW AND ORGANIZATION  
Political Science 14. AMERICAN FOREIGN POLICY  
Economics 60. INTERNATIONAL ECONOMICS

### *Group II*

Economics 11. ECONOMIC DEVELOPMENT  
History 13. RUSSIA  
History 32. THE EXPANSION OF EUROPE  
History 35, 36. THE FAR EAST  
History 61. AMERICAN DIPLOMATIC HISTORY  
History 65. AFRICA

### *Group III*

Economics 61. COMPARATIVE ECONOMIC SYSTEMS  
Political Science 2B. COMPARATIVE GOVERNMENT  
Political Science 18. POLITICS OF DEVELOPING NATIONS  
Political Science 19. SOVIET POLITICS  
Political Science 21. POLITICS OF AFRICA  
Political Science 55. MODERN POLITICAL THEORY

Students who plan to enter the Honors program will find it possible to select a similar combination of courses and seminars in the field of international relations. In planning such programs, they should consult with the chairman of their prospective major department.

# MATHEMATICS

PROFESSORS: HEINRICH BRINKMANN, *Chairman*  
DAVID ROSEN ‡

ASSOCIATE PROFESSOR: STEVENS HECKSCHER

ASSISTANT PROFESSORS: ROLAND B. DI FRANCO  
EUGENE A. KLOTZ  
J. EDWARD SKEATH

INSTRUCTORS: THOMAS W. HAWKINS  
JAMES T. WOOD

Pure mathematics is an abstract subject and may be looked upon as the model of a deductive science. On the other hand, the subject matter of mathematics has for the most part arisen out of concrete applications to the physical sciences among which geometry occupies a central position. The courses offered in the Department of Mathematics attempt to combine these points of view and to give a picture of the power and beauty of the subject when studied for its own sake as well as its many relations to other fields of thought. The study of mathematics is essential as a tool for the understanding of the principles of the physical sciences and engineering; a knowledge of its techniques is indispensable for a successful pursuit of these subjects. The same is becoming increasingly true in the biological sciences and the social sciences.

The sequence consisting of courses 3-4, 11, 12 forms the normal preparation for further work in mathematics as well as for work in physics and other sciences, and engineering. Courses 5-6, 15, 16 are Honors courses and can be taken in place of courses, 3-4, 11, 12 by properly qualified students.

A student who wishes to major in mathematics in course must complete course 12 or course 16 in his sophomore year. In his junior and senior years he will take courses 23, 24, 51, 52, 55; these are required of all majors in course. It is also recommended that he take Physics 1, 2.

In order to be admitted to honors seminars in mathematics, either as a major or as a minor, a student must have completed course 12 or course 16. A junior honors student will normally take seminar 101 (Calculus on Manifolds) or seminar 103 (Advanced Analysis); these seminars are offered each year. The remaining seminars are offered as they are required. An honors student whose major is mathematics will usually take four seminars in mathematics; the following seminars must form part of his program: 101 (Calculus on Manifolds) or 103 (Advanced Analysis), 104 (Modern Algebra), 105 (Complex Analysis). Such a student should also take Physics 1, 2 and it is furthermore highly desirable that he have a reading knowledge of French or German.

## 1. INTRODUCTION TO MATHEMATICS.

*Fall semester*

The purpose of this course is to acquaint the student with some of the principles and fundamental concepts of mathematics. The main topics for study will be an introduction to logic and sets, linear algebra, the basic ideas of the calculus, with probability theory and statistics as an application. The course is designed as a terminal course in mathematics and cannot be used as a prerequisite for any course offered by the Department of Mathematics.

## 3-4. CALCULUS.

*Full course*

This is an introductory course in calculus designed for students with normal preparation.

‡ Absent on leave, 1967-68.

- 5-6. CALCULUS (Honors Course). *Full course*  
 This is an introductory course in calculus intended for students with superior preparation and aptitude in mathematics. Permission to enroll in this course must be obtained from the instructor.
11. LINEAR ALGEBRA. *Fall semester*  
 This is the normal course for the first semester of the second year. The subject matter of the Course is linear algebra and related topics.  
 Prerequisite: Completion of courses 3-4 or 5-6 with grade C or better. Freshmen who obtain a score of 3 on the Advanced Placement Examination may also take this course.
12. INTERMEDIATE CALCULUS. *Spring semester*  
 Linear differential equations and multivariate calculus are studied in this course.  
 Prerequisite: Satisfactory completion of one of courses 11, 15 or 17.
15. LINEAR ALGEBRA (Honors Course). *Fall semester*  
 This course is designed for students who have done superior work in preceding courses.  
 Prerequisite: Superior work in Courses 3-4 or 5-6; permission to enroll in this course must be obtained from the instructor.
16. INTERMEDIATE CALCULUS (Honors Course). *Spring semester*  
 Linear differential equations and multivariate calculus are studied in this course. It is designed for students who have done superior work in preceding courses.  
 Prerequisite: Superior work in one of courses 11, 15 or 17; permission to enroll in this course must be obtained from the instructor.
17. SPECIAL COURSE. *Fall semester*  
 This course is specifically designed for those freshmen who obtain a score of 5 or 4 on the Advanced Placement Examination. The content of the course is linear algebra and infinite series.
22. NUMERICAL METHODS. *Spring semester*  
 This course will deal with the numerical solution of various mathematical problems, pure and applied. A laboratory period will be included.  
 Prerequisite: Course 12 or Course 16.
23. HIGHER GEOMETRY. *Fall semester*  
 Various kinds of geometry (mostly in the plane) will be studied in this course, using both analytic and synthetic methods. A portion of the work will deal with projective geometry and its relation to metric and other geometries. The conic sections will be studied in some detail. This course is not open to freshmen except by special permission.  
 Prerequisite: Course 11 or 15 or 17.
24. HIGHER ALGEBRA. *Spring semester*  
 The subject matter of this course consists of various topics of modern algebra, such as groups, rings, and fields. Note that linear algebra is studied in Mathematics 11, 15 and 17.  
 Prerequisite: Course 11 or 15 or 17.
51. ADVANCED ANALYSIS I. *Fall semester*  
 Among the subjects studied in this course are multivariate calculus, uniform convergence of infinite processes, Fourier series and related topics.  
 Prerequisite: Course 12 or Course 16.

52. **ADVANCED ANALYSIS II.** *Spring semester*  
 The theory of functions of a complex variable is the main subject of this course.  
 Prerequisite: Course 51.
54. **PROBABILITY AND STATISTICS.**  
 This course deals with the mathematical theory of statistics, based upon a study of the theory of probability. An introduction to the theory of sampling and statistical inference will be given.  
 Prerequisite: Course 12 or Course 16.
55. **SENIOR CONFERENCE.** *Spring semester*  
 A weekly meeting held for the purpose of integrating and supplementing the course program of majors in this department. It is required of all majors in the course program.
60. **READING COURSE IN MATHEMATICS.**  
 This course is to provide an opportunity for students to do special work in fields not covered by the undergraduate courses, listed above. The work consists in the preparation of papers requiring extensive and detailed examination of the literature of a problem.

### HONORS SEMINARS

101. **CALCULUS ON MANIFOLDS.** *Fall semester*  
 The subject matter of this seminar includes the differential and integral calculus of functions of several variables as well as topics from the theory of infinite series.
102. **TOPOLOGY.** *Spring semester*  
 This seminar is intended to bridge the gap between Advanced Calculus and certain topics in abstract mathematics. The topics covered will vary from year to year and may include such items as: Point set topology with some applications to functional analysis, homology and homotopy theory.
103. **ADVANCED ANALYSIS.** *Fall semester*  
 Among the subjects studied in this seminar are multivariate calculus, uniform convergence of infinite processes, Fourier series and related topics.
104. **MODERN ALGEBRA.**  
 This seminar deals with the theoretical properties of such formal systems as groups, rings, fields and vector spaces. While these concepts will be illustrated by many concrete examples, the emphasis will be on the abstract nature of the subject. The student will thus be introduced to an important aspect of modern mathematics.
105. **COMPLEX ANALYSIS.**  
 A brief study of the geometry of complex numbers is followed by a detailed treatment of the Cauchy theory of analytical functions of a complex variable. Various applications are given and some special classes of functions, such as elliptic functions, are studied. Analytic continuation and the theory of Weierstrass are briefly considered.  
 Prerequisite: Seminar 101 or 103.
106. **THEORY OF NUMBERS.**  
 Among the subjects studied in this seminar are: Elementary properties of integers, the congruence relation, quadratic residues, quadratic forms, certain classical Diophantine equations, simple examples of fields of algebraic numbers.



107. FUNCTIONAL ANALYSIS.

This seminar is intended for students of some mathematical maturity, and will be an introduction to some material that is important in present-day mathematics. Topics covered will include axiomatic set theory, topological and metric spaces, measure theory, topological groups, and elements of the theory of Banach and Hilbert spaces.

108A. SYMBOLIC LOGIC.

An examination of symbolic logic as (1) the theory of inference, (2) a tool of analysis, and (3) a foundation for mathematics. Emphasis will be placed on the fundamental concepts (e.g., the axiomatic method, consistency, decidability), major theorems (completeness and incompleteness), and problems of the foundations of logic.

NOTE: This seminar is given by the Department of Philosophy. Students who have taken 108B may not take this seminar.

108B. FOUNDATIONS AND PHILOSOPHY OF MATHEMATICS.

This seminar will begin with a brief survey of the major results in foundations of mathematics: axiomatic development of symbolic logic and set theory, Gödel incompleteness theorem, consistency and independence of the axiom of choice and the continuum hypothesis. This will be followed by a comparison of the logicist, formalist and intuitionist view of foundations of mathematics.

NOTE: This seminar is offered jointly by the Departments of Philosophy and Mathematics. Students who have taken 108A may not take this seminar. Prerequisite: One course in philosophy and Mathematics 24 or equivalent work with axiomatic mathematics.

109. PROBABILITY AND STATISTICS.

The purpose of this seminar is to give the mathematical background necessary for an understanding of the mathematical analysis of statistical data. In addition the modern development of this subject provides a valuable application of the concepts and techniques acquired in the study of advanced calculus. The topics treated include: the axiomatic approach, the use of Stieltjes integrals, correlation and regression, some special distributions, sampling theory, and a short introduction to the theory of statistical estimation.

110. APPLIED MATHEMATICS.

This course is designed to acquaint the student with the methods of mathematical physics. The main emphasis will be the theory of functions of a complex variable and its many ramifications. Topics will include applications of the theory to potential theory and the Dirichlet problem as well as certain Differential Equations such as Bessels and Legendre's equation. Fourier and Laplace transforms will be considered as time permits.

113. GROUP REPRESENTATIONS.

The purpose of this seminar is to introduce the student to important aspects of modern algebra through the study of the specific problem of group representations. The emphasis will be on the classical case: finite groups, with the characteristic not dividing the order of the group. Although considerable care will be devoted to developing the appropriate algebraic background, a good knowledge of several areas of modern algebra will be required.

## MODERN LANGUAGES AND LITERATURES

PROFESSORS: HILDE D. COHN (German) †  
FRANZ H. MAUTNER (German)  
FRANCIS P. TAFOYA, *Chairman* (French)

ASSOCIATE PROFESSORS: GEORGE C. AVERY (German)  
OLGA LANG (Russian)  
JEAN ASHMEAD PERKINS (French)

ASSISTANT PROFESSORS: ELISA ASENSIO (Spanish)  
THOMPSON BRADLEY (Russian)  
ROBERT ROZA (French)

INSTRUCTORS: OLGA FERNANDEZ CONNOR (Spanish)  
SIMONE VOISIN SMITH (French)  
MARIE JOSE SOUTHWORTH (French)  
RICHARD TERDIMAN (French)

VISITING LECTURERS: ROBERT P. NEWTON (German)  
HELEN P. SHATAGIN (Russian)

The purpose of the departmental major is to acquaint the student with the important periods and major figures in the literatures of France, the German-speaking countries, Russia, Spain and Latin-America, and to provide training in critical analysis while developing his appreciation of literary and cultural values.

Courses numbered 1 through 6 are primarily designed to help students acquire the linguistic competence necessary to pursue literary studies in a foreign language (and satisfy college and departmental requirements) through work with the language and selected literary texts. Courses numbered 11 or above stress the study of literature as a humanistic discipline but also have as one of their aims the achievement of competence in the spoken and written language.

Students who show unusual promise or a willingness to do intensive supplementary work can major or enter Honors seminars in a language started in college, but in general, students planning to major in a foreign language and its literature are advised to present enough credits upon admission to enable them to register for courses numbered 11 and 12 in their freshman year or at the very latest by the beginning of the sophomore year. Language courses numbered 1 through 5 do not count toward the minimum of eight half courses required for the major.

All students offering credit in a foreign language upon admission will be placed at the course level where they will profit best according to the rating in the College Entrance Examination or tests administered by the department. Exceptions to course requirements are made for those who show competence in the language of specialization. Students who speak French, German, Russian or Spanish fluently should consult with the department before electing courses.

Prerequisites for majors are noted under the listing of each of the literatures taught.

Majors are urged to elect supporting courses in other literatures (classical or modern), History, Philosophy, Political Science, Psychology, Fine Arts and Music.

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† Absent on leave, spring semester, 1967-68.

Students planning to do graduate work are reminded that, in addition to the language of specialization, a reading knowledge of other languages is generally required for admission to advanced studies. Students who need advice concerning the choice of languages should consult with the department.

### MODERN LANGUAGE COURSE (conducted in English)

#### 13. MEDIEVAL COMPARATIVE LITERATURE.

The tension between ideals and their realization as reflected in the literature of the Middle Ages, especially the epic (*Roland, Cid, Nibelungen*) and the romance (*Tristan, Yvain, The Grail*).

### MODERN LANGUAGE SEMINAR (conducted in English)

#### 130. LINGUISTICS.

*Spring semester—even years*

1. The basic techniques of descriptive linguistics (phonology, morphology, syntax) with emphasis on their application to languages known to the participants; II. The methods and results of historical-comparative language study; other topics (such as language typology, translation problems, semantics, language and culture, histories of linguistics) may be covered, depending on time and students' interests.

## French

French may be offered as a major in course or as a major or minor in honors. Prerequisites for both course and honors students are as follows:

Required:

French 6, 11, and 12 or evidence of equivalent work.

Recommended supporting subjects: see the introductory departmental statement.

Majors in course and honors, as well as minors in honors, are expected to be sufficiently proficient in spoken and written French to do all of their work in French, *i.e.*, discussions and papers in courses and seminars, and all oral and written examinations, including comprehensive and honors examinations.

NOTE: Not all advanced courses or seminars are offered every year. Students wishing to major or minor in French should plan their program in consultation with the department.

## COURSES

#### 1-2. FIRST-YEAR FRENCH.

For students who begin French in College and for those who have had only one year in high school. Equivalent to two years of French in high school. The initial approach is oral but a foundation is laid for a reading knowledge. No credit is given for French 1 alone.

#### 3, 4. SECOND-YEAR FRENCH.

For students who have completed French 1-2 or, in general, two years of French in high school, or the equivalent. Students who have had three years of high school French usually enter French 4. Review of grammar and intensive practice in developing an active command of French; includes readings and discussions (in French) of unannotated literary and cultural texts. Completion of French 4 satisfies the language requirement. French 4 is normally followed by French 11, but exceptionally qualified students may, with permission, take French 12. French 3 is offered in the fall semester only; French 4 and the sequential courses are offered each semester.

5. COMPOSITION AND DICTION.  
Emphasis is placed on syntax, translation and composition. An effort is made to encourage fluency and to correct faulty pronunciation. (Does not count towards a French major.)
6. STUDIES IN STYLISTICS.  
For majors or those who wish an advanced course to develop self-expression in the written and oral language. Original compositions are based on a stylistic study of texts (by representative French authors) from the XVIIth Century to the present.
11. READINGS IN FRENCH LITERATURE.  
The transition from language learning to literary study is facilitated through intensive readings in modern French literature (principally, works by Beckett, Butor, Camus, Genet, Gide and Sartre). Frequent oral exposés and written compositions as well as extensive readings are assigned to improve fluency and accuracy in French. Prerequisite: French 4 or equivalent. Offered each semester.
12. INTRODUCTION TO LITERARY STUDIES  
A comparative study of representative works by classical and modern authors: poetry (Ronsard, Hugo, Apollinaire), drama (Racine-Sartre, Molière-Giraudoux), novel (Prévost-Proust), essay (Pascal-Camus). Prerequisite: French 11 or equivalent. Offered each semester.
14. L'HUMANISME DE LA RENAISSANCE.  
The evolution of French thought from the optimism of Rabelais to the skepticism of Montaigne as reflected primarily in the prose works of the Renaissance.
15. LE THÉÂTRE CLASSIQUE.  
Corneille, Racine, Molière.
16. LE CLASSICISME.  
The major writers of the 17th century, excluding the dramatists: Descartes, Pascal, La Fontaine, Boileau, La Rochefoucauld, La Bruyère, Mme. de La Fayette.
17. L'ESPRIT CRITIQUE DU 18<sup>e</sup> SIÈCLE.  
Development of the critical approach in the works of Montesquieu, Voltaire, Diderot and Rousseau.
19. ROMAN DU 19<sup>e</sup> SIÈCLE.  
A study of innovations in technique and form as well as the examination of moral problems arising from socio-political changes in 19th century France. Based primarily on the novels of Balzac, Stendhal, Flaubert and Zola.
20. ROMAN DU 20<sup>e</sup> SIÈCLE.  
Representative 20th century novelists.
21. THÉÂTRE MODERNE.  
Major trends in 20th Century drama with special emphasis on the works of Giraudoux, Anouilh, Sartre, Camus, and the Theatre of the Absurd.
22. POÉSIE DU MOYEN-ÂGE ET DE LA RENAISSANCE.  
Poetic doctrines and achievements from the Middle Ages through the period of the Renaissance (includes Neo-Platonism and the Pléiade) to the Baroque. Emphasis on the works of Villon, Marot, Scève, DuBella and Ronsard.

23. POÉSIE SYMBOLISTE.

The evolution of symbolist aesthetics from Baudelaire through Apollinaire. Includes Rimbaud, Mallarmé, Verlaine, LaForgue and Valéry.

24. L'EXISTENTIALISME.

Literary manifestations of French Existentialism. Principally an examination of the novels, plays and essays of Sartre.

25. POÉSIE CONTEMPORAINE.

Major poets after Apollinaire: includes the Surrealists (Breton, Reverdy, Eluard, Aragon and Char) as well as Saint-John Perse, Supervielle and representative poets since World War II (Guillevic and Bonnefoy).

50-51. COLLOQUIUM.

Offered from time to time for double credit and devoted to the intensive investigation of subjects or topics not covered by the regular program. Enrollment is limited and subject to departmental approval. The subject for the fall semester of 1967-68 is *Le Nouveau Roman*.

52. SPECIAL TOPICS. (For senior majors.)

Study of individual authors, selected themes or critical problems.

### HONORS SEMINARS

100. LITTÉRATURE DU MOYEN AGE.

Old French readings in lyric poetry, theater and romance.

101. LA RENAISSANCE.

102. LE THÉÂTRE CLASSIQUE.

Corneille, Racine, Molière.

103. L'ÂGE DES LUMIÈRES.

The "Philosophes," the theater and the novel of the eighteenth century.

104. STENDHAL AND FLAUBERT.

105. PROUST.

106. POÉSIE MODERNE.

Baudelaire, Rimbaud, Verlaine, Mallarmé, Claudel, Valéry.

108. LE ROMAN DU 20<sup>e</sup> SIÈCLE.

Some seminars, treat the same subject as the courses, but the reading required in both the texts and critical material is more extensive. The work of a seminar corresponds to two half courses.

### German

In all courses (with the exception of German 7-8) German is, as far as possible, the language of the classroom.

German may be offered as a major in course or as a major or minor in honors.

Prerequisites for both course and honors students are as follows:

Required:

German 11 or 12, or equivalent work.

Recommended supporting subjects: see the introductory departmental statement.

Majors are expected to speak German with sufficient fluency to take part in discussion in courses and seminars in the language and to pass oral examinations in German.

NOTE: Not all advanced courses or seminars are offered every year. Students wishing to major or minor in German should plan their program in consultation with the department.

## COURSES

1-2. ELEMENTARY GERMAN.

For students who begin German in college. Equivalent to two years' German in secondary school. Fundamentals of grammar; easy literary prose, such as Max Frisch, *Brandstifter* or Schnitzler, *Der blinde Geronimo*.

NOTE: German 2 is usually also offered in the fall semester for students not ready for German 3.

3. INTERMEDIATE GERMAN.

Prerequisite: German 1-2 or its equivalent. Narrative and expository prose of moderate difficulty such as Hesse: *Knulp*; Brecht: *Kalendergeschichten*; Schweitzer: *Leben und Denken*. Review grammar.

4. INTERMEDIATE GERMAN.

Fulfills the college requirement. Literary narrative, drama, poetry, expository prose of greater difficulty, conversation. Some grammar review.

Prerequisite: German 3 or equivalent.

6. WRITING AND SPEAKING GERMAN.

Oral discussions and writing practice based on general and literary topics of contemporary interest.

Prerequisite: Course 3-4 or equivalent.

7-8. ELEMENTARY GERMAN (Special Reading Course.)

A special course designed for those who wish to acquire only a reading knowledge of German. German 7-8 may be used to fulfill the requirements of certain departments or of graduate schools, but not the college foreign language requirement.

11, 12. INTRODUCTION TO GERMAN LITERATURE.

A study of representative German dramas, *Novellen*, and lyric poems. Discussion, papers. Not a survey course.

Prerequisite: German 4 or equivalent.

Course 11 deals mainly with 19th and 20th century authors, course 12 with the classical period.

13. DIE GOETHE-ZEIT.

The most significant works of Goethe, Schiller, and their contemporaries.

14. GOETHE'S FAUST, ERSTER UND ZWEITER TEIL.

An intensive study of *Faust, I and II*. Also for students who only know *Faust, Part One*.

15. DIE DEUTSCHE ROMANTIK.

An introductory study of the Romantic movement in Germany, with readings from representative authors such as Hölderlin, Novalis, Tieck, Arnim, Brentano, Eichendorff.

16. DIE DEUTSCHE NOVELLE SEIT GOETHE.

A study of significant examples of this typically German genre. Authors: Goethe, Eichendorff, Kleist, Stifter, Keller, Meyer, Storm, Thomas Mann, Kafka, Brecht.

17. MODERNE DEUTSCHE LITERATUR.

A study of leading German writers of the twentieth century, including Hauptmann, Thomas Mann, Rilke, Hofmannsthal, Kafka.

18. DIE DEUTSCHE LYRIK.

A study of German poetry through the ages. The interrelation of form and "contents." Readings will include, among others, Goethe, Schiller, Hölderlin, Eichendorff, Heine, Mörike, Meyer, George, Rilke, and contemporary poets.

20. DIE DEUTSCHE KOMÖDIE.

Outstanding comedies from Goethe to the present time will be studied in their own right, as examples of the genre, and as illustrations of German intellectual history.

21. KAFKA UND BRECHT.

A study of the principal works of each author with stress on the interpretation of major themes and the examination of literary craftsmanship. Includes consideration of the cultural and social environment in which the works were written.

51. SPECIAL TOPICS.

Readings selected to fit the specific needs of students with an advanced knowledge of the German language. Not designed to prepare for any specific type of comprehensive examination.

### HONORS SEMINARS

103. DEUTSCHES BAROCK UND AUFKLAERUNG.

A study of German literature in the seventeenth and early eighteenth centuries. The lyric poetry of the period, the mysticism of Angelus Silesius and Jakob Böhme, the plays of Gryphius, and the prose of Grimmelshausen; a study of Lessing.

104. GOETHE.

Goethe's most significant works and his rôle in German intellectual history will be studied.

105. DIE DEUTSCHE ROMANTIK.

Romanticism as the dominant movement in German literature, thinking, and the arts of the first third of the nineteenth century. Authors: Hölderlin, Novalis, Tieck, Arnim, Brentano, Eichendorff.

106. "BIEDERMEIER" UND "REALISMUS."

Studies in the works of Grillparzer, Mörike, Stifter, Keller, Meyer, and Storm. Emphasis on the *novelle*.

107. MODERNE PROSA.

The emergence of modern trends as reflected primarily in the prose works of Schnitzler, Hofmannsthal, Rilke, Mann, Kafka, Döblin and Grass.

108. DAS DEUTSCHE DRAMA.

Representative examples of the dramatic genre in German literature from the end of the 18th century to the present.

109. DIE DEUTSCHE KOMÖDIE.

Outstanding comedies from Goethe to the present time will be studied in their own right, as examples of the genre, and as illustrations of German intellectual history.

110. DIE DEUTSCHE NOVELLE.

A study of significant examples of this typically German *genre*. Authors: Goethe, Eichendorff, Kleist, Stifter, Keller, Meyer, Storm, Thomas Mann, and contemporary writers.



111. DIE DEUTSCHE LYRIK.

Studies in German poetry. Methods and problems of interpretation.

112. MODERNES DRAMA UND LYRIK DES XX. JAHRHUNDERTS.

The emergence of modern trends as reflected primarily in the poetic and dramatic works of Hauptmann, George, Hofmannsthal, Rilke, Trakl, Sternheim, Benn and Brecht.

### Russian

Russian may be offered as a major in course or as a major or minor in honors. Prerequisites for both course and Honors students are as follows:

Required: Russian, 11,12 and 13, or evidence of equivalent work.

Recommended supporting subjects: see the introductory departmental statement.

NOTE: Not all advanced courses or seminars are offered every year. Students wishing to major or minor in Russian should plan their program in consultation with the Department.

### COURSES

1-2. FIRST-YEAR RUSSIAN.

*Full course*

Designed to familiarize the beginner with the essentials of the spoken and written language. Fundamentals of grammar and reading of easy literary prose and poetry.

3, 4. SECOND-YEAR RUSSIAN.

Readings in Russian literature and history. Review of grammar. Conversation. Reports. Composition. Translation. Conducted in Russian.

Prerequisite: Russian 1-2 or its equivalent.

5, 6. ADVANCED RUSSIAN.

For majors and those who are not primarily interested in literature. Advanced conversation, composition, style and translation. Readings of newspapers and Russian dramas. Conducted in Russian.

11, 12. INTRODUCTION TO LITERATURE.

A critical analysis of Russian classical and modern short stories and poetry. Intensive work in translation and composition. Reports. Conducted in Russian.

Prerequisite: Russian 5, 6 or the equivalent.

13. RUSSIAN NOVEL.

Lectures and reading in English. The Russian majors will be required to read a part of the material in Russian.

51. SPECIAL TOPICS.

Readings selected to fit the specific needs of students.

### HONORS SEMINARS

(Open to majors in course.)

101. TOLSTOY.

102. CHEKHOV AND GORKY.

103. PUSHKIN AND LERMONTOV.

104. DOSTOEVSKY.

105. LITERATURE OF THE SOVIET PERIOD.

## Spanish

Spanish may be offered as a major in course or as a major or minor in honors. Prerequisites for both course and honors students are as follows:

Required: Spanish 11, 12.

Recommended supporting subjects: see the introductory departmental statement.

Majors are expected to speak Spanish with sufficient fluency to take part in discussion in courses and seminars in the language and to pass an oral comprehensive or oral honors examination in Spanish.

NOTE: Not all advanced courses or seminars are offered every year. Students wishing to major or minor in Spanish should plan their program in consultation with the department.

### COURSES

#### 1-2. FIRST-YEAR SPANISH.

For students who begin Spanish in college. Equivalent to two years of Spanish in high school. The emphasis is both on the spoken language and on reading.

#### 3, 4. SECOND-YEAR SPANISH.

For students who have had Spanish 1-2 or its equivalent (two years in high school). Students who have had three years usually enter Spanish 4. Grammar is reviewed. Reading is from Spanish and South American literature with emphasis on increasing the student's vocabulary and his ability to discuss his reading in oral and written Spanish.

#### 9. ADVANCED COMPOSITION AND DICTION.

For majors and others who wish an advanced course in which the emphasis is not primarily literary. An effort is made to correct faulty pronunciation and to improve self-expression in the language both oral and written.

#### 11, 12. INTRODUCTION TO SPANISH LITERATURE.

Representative texts of modern Spanish and Latin American writers. Conducted in Spanish with frequent written work in Spanish.

#### 13. EL TEATRO MODERNO.

Plays of the major Spanish writers in the nineteenth and twentieth centuries.

#### 14. LA NOVELA HISPANOAMERICANA.

Representative novelists from Mármol in Argentina to Yáñez in Mexico.

#### 15, 16. LAS OBRAS DE CERVANTES.

Novelas ejemplares. The *Quixote*. (A year course giving a thorough study of Cervantes. The first semester may stand alone.)

#### 17. LA POESIA EN EL SIGLO XX.

A study of the major poets of Spain and Latin America since *modernismo*.

#### 18. LA NOVELA EN EL SIGLO XX.

A study of the major novelists since the Spanish Civil War.

#### 19. POESIA, TEATRO Y NOVELA DEL SIGLO DE ORO.

Representative authors of the Siglo de Oro, excluding Cervantes.

52. SPECIAL TOPICS FOR SENIOR MAJORS.

Readings selected to fit the needs of seniors and to supplement their selection of courses. Not designed to prepare for any specific type of comprehensive examination, but to give an opportunity in the senior year for the student to see his courses in perspective and to see possible relationships to work in other fields.

HONORS SEMINARS

101. LA NOVELA HISPANOAMERICANA.
102. LA NOVELA EN EL SIGLO XX.
103. LAS OBRAS DE CERVANTES.
104. EL TEATRO MODERNO.
105. POESIA, TEATRO Y NOVELA DEL SIGLO DE ORO.
106. LA POESIA EN EL SIGLO XX.
107. LA LITERATURA DE LA EDAD MEDIA.

NOTE: While the titles of seminars in Spanish correspond to the titles of courses, honors students read more extensively both in the texts and critical work. The work of a seminar corresponds to that of two half courses.

## MUSIC

ASSOCIATE PROFESSORS: CLAUDIO SPIES  
PETER GRAM SWING, *Chairman*

INSTRUCTOR: JAMES D. FREEMAN

VISITING ASSOCIATES IN PERFORMANCE: GILBERT KALISH  
PAUL ZUKOFSKY

The study of music as a liberal art requires an integrated approach to theory, history and performance, experience in all three fields being essential to the understanding of music as an artistic and intellectual achievement. Theory courses and seminars train the student to work with musical materials, to understand modes of organization in compositions, and to evolve methods of musical analysis. History courses and seminars introduce students to methods of studying the development of musical styles and genres, and the relationship of music to other arts and areas of thought. Performance is assumed as part of the training in understanding music and is included in classroom work. While the Department does not give course credit for instruction in instruments or voice, it encourages its students to develop performing skills through private study and through participation in the orchestra and chorus, both of which are conducted by members of the Department. The Department administers scholarships to assist music majors who are talented instrumentalists or singers finance the cost of private instruction. Members also coach individual performers and chamber music groups organized by the students for Bond concerts and other public performances.

Students wishing to combine instrumental or vocal studies outside the College with a major in music at Swarthmore can, with special permission from the Department and the Dean, elect a five-year plan of study, thus reducing the normal number of courses to be taken per semester.

### REQUIREMENTS FOR MAJORS AND MINORS

One full course in Theory is prerequisite for acceptance as a major. Majors will normally take three full courses (including Music 61-62) in Theory, four half-courses (including Music 15,16) in History, and basic piano. Music 1 cannot be counted in a major program.

*Majors in Honors:* A student intending to major in honors should plan to take Music 11-12, 13-14 and 15,16 (or the equivalent) in the first two years. If he takes all three courses he will stand for three honors examinations in music. A student who is excused from one of the three introductory courses (by demonstrating competence on an examination given by the Department) can elect to stand for four honors examinations in music. He will take Music 61-62 in course, preferably in the junior year, in preparation for an honors examination on the material covered.

*Minors in Honors:* A minor in honors will normally stand for two examinations in music. Music 15 or 16 and a full course in Theory, is prerequisite for History seminars. Music 1 may, with permission of the department, be substituted for the Theory course.

*Language Requirements for Graduate Schools:* Students are advised that graduate work in music requires a reading knowledge of French and German. A reading

knowledge of Latin is also desirable for students planning to do graduate work in musicology.

*Proficiency on an instrument:* All majors in music will be expected to play a keyboard instrument well enough to perform at sight a two-part invention of J. S. Bach and a first movement of an easy late 18th or early 19th century sonata. By the end of the junior year they should be able to read chamber music scores, also vocal music in four clefs, and realize figured basses. Students with exceptional proficiency in an instrument other than the piano, or in singing, will not be expected to meet the performing standards of pianists.

*The basic piano program:* This program is designed to develop keyboard proficiency to a point where a student can effectively use the piano as a tool for study, also to help students meet the keyboard requirements outlined above. There are two classes, one for beginning students, one for advanced students, each meeting two hours a week. These classes are open to freshmen and sophomores planning to major in music. No academic credit is given specifically for basic piano, the classes being, in effect, laboratories for courses.

## COURSES AND SEMINARS

NOTE: All seminars are open to qualified course students for double credit.

1. INTRODUCTION TO MUSIC. Mr. Freeman. *Fall semester*  
Mr. Swing *Spring semester*

A course combining study of the materials of music with training in listening. Students will work with a selected repertory of compositions from different eras. The course assumes no prior work in music.  
Open to all students.

## THEORY AND COMPOSITION

- 11-12. HARMONY. Mr. Freeman. *Full course*

A course in elementary Harmony. Emphasis will be placed on written exercises along with ear-training, dictation and keyboard harmony. Frequent reference will be made to a variety of keyboard and chamber compositions which will be carefully analysed.

- 13-14. COUNTERPOINT. Mr. Spies. *Full course*

A course primarily in strict counterpoint involving the first four species in two, three and four-part writing. Students will be required to submit exercises regularly. The course will include some analysis of pertinent vocal and instrumental compositions.

- 61-62. INTERMEDIATE THEORY. Mr. Spies. *Full course*

A continuation of Music 11-12 and 13-14 covering specialized areas of Harmony, Counterpoint and analysis.

Prerequisites: Music 11-12, Music 13-14, or the equivalent.

## HONORS SEMINARS

163. ADVANCED THEORY. Mr. Spies.

181. COMPOSITION. Mr. Spies.

Offered as a tutorial to qualified students. Prerequisite: Music 61-62.

## HISTORY OF MUSIC

15. INTRODUCTION TO THE HISTORY OF MUSIC. Mr. Swing. *Fall semester*  
The history of music in Western civilization from the Middle Ages to 1750.  
Prerequisite: Music 1 (or the equivalent).
16. INTRODUCTION TO THE HISTORY OF MUSIC. Mr. Freeman. *Spring semester*  
A continuation of Music 15 covering the period from 1750 to the present.  
Prerequisite: Music 1 (or the equivalent).
22. CONTEMPORARY MUSIC. Mr. Spies. *Spring semester*  
An examination of a selected group of compositions. Rather than attempt a survey based on stylistic considerations, or on aesthetic evaluation, the course will deal with the analysis of individual solutions to common compositional problems.  
Prerequisite: Music 11-12 or 13-14, preferably both.
27. J. S. BACH. Mr. Swing.  
A study of representative compositions (including the *Mass in B minor* and the *Passion according to St. Matthew*) coordinated with readings in primary and secondary sources. A reading knowledge of German is desirable, but not essential.  
Music 22 and 27 are designed for students who have taken Music 1, or a course in theory wishing to do further work in special areas or music history. They can be counted for credit in a major-in-course program.

## HONORS SEMINARS

122. STUDIES IN TWENTIETH CENTURY MUSIC. Mr. Spies.  
Prerequisite: Music 11-12 and 13-14.
128. W. A. MOZART. Mr. Swing.  
A study of representative works in the light of modern style criticism. A reading knowledge of French or German is desirable.
132. HISTORY OF THE STRING QUARTET. Mr. Swing. *Spring semester*  
This seminar traces the development of the string quartet from the middle of the 18th century to the present through study of selected quartets by Haydn, Mozart, Beethoven, Schubert, Brahms, Bartók, Schoenberg, Webern, and Carter.
151. MEDIEVAL AND RENAISSANCE MUSIC. Mr. Swing.  
An introduction to the study of music from the 9th century to the middle of the 16th century. Emphasis will be placed on analysis of selected compositions, related problems in performance practice, the function of music in the Catholic liturgy and the relationship of music to the thought and art of the times.
152. MUSIC IN THE BAROQUE ERA. Mr. Freeman.  
A continuation of Music 151. The emergence of opera, oratorio and cantata in Italy and their dissemination over the Continent; the development of idiomatic instrumental music.
191. TUTORIAL. Staff.

## PHILOSOPHY AND RELIGION

PROFESSORS: MONROE C. BEARDSLEY †  
JOHN M. MOORE

ASSOCIATE PROFESSOR: P. LINWOOD URBAN, *Acting Chairman*

ASSISTANT PROFESSORS: PATRICK HENRY, III  
HANS OBERDIEK  
CHARLES RAFF

INSTRUCTORS: EDWARD BECKER  
RICHARD SCHULDENFREI

LECTURERS: GILMORE STOTT  
UWE HENKE

VISITING LECTURERS: JOHN J. FISHER  
D. PAUL SNYDER

The study of philosophy consists in examining the beliefs to which one is committed by accepting scientific knowledge and common-sense views of the world; clarifying basic concepts; determining the circumstances under which statements may properly be said to be true in all fields of human inquiry and concern, including ethical and aesthetic discourse; and drawing the outlines of an account of human experiences coherent with the evidence of the sciences. Because of the role of philosophy in the history of human thought, and because of the relation of philosophical ideas to problems in other fields, philosophy may be studied as instrumental to the understanding of wider areas of history or thought.

Religion is studied primarily as a system of ideas, both ethical and theological: systematically, through a consideration of representative forms of contemporary religious thought; and historically, through an examination of the great religions and the development of religion, particularly of the Judaeo-Christian tradition.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS AND MINORS

The minimum prerequisite to admission as a major in either philosophy or religion will normally be the completion of one year's work in the department. Students who major in philosophy must obtain permission in order to count for credit in fulfillment of their major requirement more than one course in religion; and students who major in religion must obtain permission in order to count for credit in fulfillment of their major requirement more than one course in philosophy. (Courses 25, 26 and 27 may be counted either as philosophy or as religion.) Philosophy majors in course must elect course 52 in their senior year, and are normally required to take courses 11, 12, 13, and 14. It is recommended that course 12 be taken before the middle of the junior year, and that course 13 be taken by the end of the junior year. Honors majors who do not take course 12 must acquire familiarity with the material by summer study.

### Philosophy Courses

1. INTRODUCTION TO PHILOSOPHY. The staff. *Each semester*  
Several of the most important problems of philosophy, and alternative answers to them, are discussed. Typical examples are: the problem of free will, the arguments for the existence of God, the nature of logic and mathematics, the sources and kinds of knowledge, the justification of ethical judgments.

† Absent on leave, 1967-68.



NOTE: Course 1 is a prerequisite for course 11 and courses 13 through 27. Other courses may be taken in any order that is convenient. Members of the department will offer advice on request concerning an order of courses to suit individual needs. Students planning to do honors work should not take courses dealing with material to be covered in honors seminars.

11. ETHICS. Mr. Stott. *Each semester*  
A study of the principal theories about value and moral obligation, and of their justification. The emphasis is systematic, but works of leading ethical philosophers, both classical and contemporary, will be read as illustrations of the major theories.
12. LOGIC. Mr. Oberdiek. *Spring semester*  
An introduction to the principles of deductive logic; the methods of both traditional logic and modern symbolic logic will be used in the evaluation of deductive arguments. Some attention will be given to the axiomatic development of logic, as well as to informal topics such as the fallacies of relevance and ambiguity, and to definition.
13. SELECTED MODERN PHILOSOPHERS. Mr. Raff. *Spring semester*  
A history of modern philosophy is presented through the metaphysical and epistemological problems common to Descartes, Leibniz, Spinoza, Locke, Berkeley, Hume and Kant. One or more of these philosophers may be selected for separate, detailed examination.
14. ANCIENT PHILOSOPHY. Mr. Henke. *Fall semester*  
The main emphasis will be on Plato and Aristotle, with some treatment of the pre-Socratics as background. Primary attention will be given to metaphysical and epistemological issues.
15. PHILOSOPHY OF SCIENCE. Mr. Schuldenfrei. *Spring semester*  
A consideration of the nature of scientific inquiry through a study of its fundamental concepts, among them theory, evidence, explanation, causation, induction. Emphasis will also be given to the distinctions between empirical and non-empirical science and between scientific and non-scientific inquiry.
16. CONTEMPORARY PHILOSOPHY. Mr. Raff. *Fall semester*  
A study of current attempts to resolve fundamental philosophical issues. Readings include articles and books by major Twentieth Century philosophers.
17. AESTHETICS. Mr. Beardsley. *Spring semester*  
A study of some problems that arise in describing, interpreting, and evaluating aesthetic objects, including literature, music and fine arts. Among these problems are the clarification of such terms as "form," "style," and "meaning," an examination of current attempts to subsume aesthetic objects under the general theory of signs, and the analysis of the reasoning by which value judgments about aesthetic objects are supported and defended.  
Not offered in 1967-68.
18. PHILOSOPHY OF THE SOCIAL SCIENCES. *Fall semester*  
A survey of philosophical and methodological problems arising from the study of the behavior and history of human individuals and societies. Such problems as the nature of explanation and prediction in the social sciences and history, the role of value judgment in the social sciences, the conceptual apparatus necessary for the description of human behavior, and the possibility of "scientific" history, are discussed.  
Not offered in 1967-68.

19. RECENT PHILOSOPHICAL MOVEMENTS. *Fall semester*  
 An examination of some of the basic trends in recent thought such as Pragmatism, Positivism, Analytical Philosophy, and Existentialism. Special emphasis will be placed upon the degree of adequacy of these systems in dealing with questions concerning the nature, scope, and limits of human knowledge.  
 Not offered in 1967-68.
20. PHILOSOPHY OF LANGUAGE. Mr. Becker. *Fall semester*  
 An examination of philosophical and logical problems in the study of "natural" languages. Topics may include: (1) the role of the investigation of language in the solution of traditionally philosophical problems, (2) investigations into the conceptual framework necessary to any adequate theory of ordinary language, (3) the relationships between natural and formalized or artificial languages, (4) recent attempts to found linguistics on a scientific basis.
21. SOCIAL AND POLITICAL PHILOSOPHY. Mr. Oberdiek. *Fall semester*  
 An analysis of conceptual and moral problems that socio-political life poses for many. Among the problems studied are the relation of ethics to political/social philosophy; the justification of democracy; the nature and basis of political obligation, political freedom, equality, rights, justice, and social institutions.
22. PHILOSOPHY IN AMERICA. Mr. Oberdiek. *Spring semester*  
 A critical examination of thinkers representative of the major philosophic traditions in America, with special emphasis on Peirce, James, and Dewey. The primary aim is to understand and evaluate the philosophic worth of their views; some attention is also given to their relation to American culture.  
 Not offered in 1967-68.
23. HISTORY OF SCIENCE. *Spring semester*  
 A survey of the development of physics and astronomy in the 16th and 17th centuries, emphasizing the nature of the scientific revolution, the revolt against Aristotle, the new role of mathematics within science, the role of experiment, and the gradual development of concepts like mass, force, universal gravitation, and the heliocentric universe. The philosophical and sociological origins of the scientific revolution will also be studied. Readings will be drawn mainly from the writings of Copernicus, Kepler, Descartes and Newton.  
 Not offered in 1967-68.

### Philosophy-Religion Courses

25. PHILOSOPHY OF RELIGION. Mr. Moore. *Spring semester*  
 The nature of religion; the psychology and interpretation of religious experience; the problem of religious knowledge; the validity and difficulties of Christian theology and ethics.
26. MEDIEVAL PHILOSOPHY. Mr. Urban. *Fall semester*  
 Philosophical thought from Augustine to the fifteenth century. Attention will be paid both to specific problems such as universals, analogy, and epistemology and to outstanding thinkers such as Anselm, Aquinas, and Ockham. Although the primary emphasis will be historical, attention will be given to the contemporary relevance of medieval thought.
27. THEOLOGY AND ANALYTICAL PHILOSOPHY. Mr. Moore or Mr. Urban. *Spring semester*  
 A study in the meaning and verification of religious statements, the concept of analogy, the nature of theological explanation, and the analytical critique

of the arguments for the existence of God. Readings in the articles and books of contemporary thinkers, including Ayer, Flew, Hepburn, MacIntyre, Toulmin and Zuurdeeg. The course will consider both the question of the validity of the analytical critique of traditional theology and the possibility of a philosophy of religion within analytical philosophy.

Not offered in 1967-68.

## Religion Courses

Students may begin work in Religion with any of the following courses: Religion 31, 35, 36 and 37. Completion of one of these courses is a prerequisite for Religion 33, 34, and 38.

31. PROBLEMS OF CHRISTIANITY TODAY. Mr. Urban. *Spring semester*

The purpose of this course is to study various answers to the chief religious problems of the twentieth century. Problems include: faith and reason, the existence of God, religion and morality, science and religion, the Bible, and the problem of evil. Answers include reference to various schools of thought: fundamentalism, liberalism, humanism, and neo-orthodoxy; and to the works of individual thinkers: Reinhold Niebuhr, Paul Tillich, Martin Buber, and others. The student will be urged to find his own answers and to work out his own religious beliefs.

33. EARLY CHRISTIAN THOUGHT. Mr. Henry. *Fall semester*

The rise and development of Christian thinking to the 13th century, the influence of Judaism and Greek philosophy, the formation of the creeds, Scholasticism, Augustine and Aquinas.

Not offered in 1967-68.

34. LUTHER TO BARTH. Mr. Henry. *Spring semester*

The development of Christian thought from the Reformation to the twentieth century, with emphasis upon the relationship between Christian and secular thinking; the main ideas of the Reformation, church and sect in the Reformation, Roman Catholic development, Protestant orthodoxy, Protestant liberalism.

35. HISTORY OF RELIGIONS Mr. Moore. *Fall semester*

An historical and comparative study of the world's religions: primitive religions, Hinduism, Buddhism, Chinese and Japanese religion, Islam. Stress will be placed upon the ethical and philosophical teaching of these religions and their role in the interaction of modern cultures. Comparisons and contrasts will be made between these religions and Judaism and Christianity.

36. THE OLD TESTAMENT AND THE RISE OF JUDAISM. Mr. Henry. *Fall semester*

An introduction to the literature and history of the people of Israel. Early traditions, the law and the prophets, the emergence of Judaism.

37. THE NEW TESTAMENT. Mr. Henry. *Spring semester*

An introduction to the literature and history of early Christianity. The formation of the gospels, the life and teachings of Jesus, the Christian movement in the apostolic age.

38. OLD TESTAMENT PROPHECY. Mr. Henry. *Fall semester*

The rise and development of prophecy in Israel, and the impact of the prophetic movement on the character of the rest of the Old Testament.

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51. SPECIAL TOPICS. Staff.

An intensive course may be offered from time to time in a field not covered by the regular program. Open only to juniors and seniors.

52. SENIOR CONFERENCE. Staff.

*Spring semester*

For senior majors in philosophy. Individual programs are planned to prepare for the comprehensive examination.

HISTORY 22. AMERICAN RELIGIOUS THOUGHT. Mr. Tolles.

The course of religious thought in the colonies and the United States, with appropriate reference to general intellectual history and American church history.

HISTORY 24. QUAKERISM. Mr. Tolles.

The history of the Society of Friends to the present day. The characteristic religious and social ideas of the Quakers are considered in their historical setting. (May be counted toward a major in religion.)

### HONORS WORK

For admission to honors in philosophy, the requirement is normally two semester courses drawn from those numbered from 1 to 27. For admission to honors work in religion, the requirement is normally two semester courses selected from among courses numbered 25 to 45.

101. MORAL PHILOSOPHY. Mr. Oberdiek.

*Fall semester*

An examination of the principal theories about value and moral obligation, and of their justification; of the concepts of justice and human rights; of the implications for ethics of different theories about the freedom of the will. Works of representative theorists, both classical and contemporary, will be read.

102. ANCIENT PHILOSOPHY. Mr. Henke.

*Spring semester*

The development of Greek thought in ethics, metaphysics, logic and science, with special attention to Plato and Aristotle. Emphasis is given to tracing the emergence of distinctively philosophical and scientific methods, and the relation of these methods to contemporary techniques.

103. HISTORY OF MODERN PHILOSOPHY. Mr. Raff.

*Fall semester*

Metaphysical and epistemological problems about the nature of minds and bodies, the varieties of knowledge and freedom, are approached through the philosophical systems of Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, Reid, Kant.

104. CONTEMPORARY PHILOSOPHY. Messrs. Becker, Raff.

*Each semester*

Some current philosophical problems are investigated in light of the work of Bradley, More, Wittgenstein, and the most recent contributions.

105. PHILOSOPHY OF SCIENCE. Mr. Schuldenfrei.

*Spring semester*

A consideration of the nature of scientific inquiry through a study of its fundamental concepts, among them theory, evidence, explanation, causation, induction. Emphasis will also be given to the distinctions between empirical and non-empirical science and between scientific and non-scientific inquiry.

106. AESTHETICS. Mr. Fisher.

*Spring semester*

A systematic examination of the philosophy of art and the methodological foundations of criticism. (See course 17.) Recommended for students of literature, music and the fine arts.

107. PHILOSOPHY OF THE SOCIAL SCIENCES. Mr. Snyder.

*Fall semester*

A survey of philosophical and methodological problems arising from the study of the behavior and history of human individuals and societies. Such problems as the nature of explanation and prediction in the social sciences

and history, the role of value judgments in the social sciences, the conceptual apparatus necessary for the description of human behavior, and the possibility of "scientific" history, are discussed.

108A. SYMBOLIC LOGIC. Mr. Schuldenfrei. *Fall semester*

An examination of symbolic logic as (1) the theory of inference, (2) a tool of analysis, and (3) a foundation for mathematics. Emphasis will be placed on the fundamental concepts (e.g., the axiomatic method, consistency, decidability), major theorems (completeness and incompleteness), and problems of the foundation of logic.

(NOTE: Students who have taken 108B may not take this semester.)

108B. FOUNDATIONS AND PHILOSOPHY OF MATHEMATICS. Mr. Schuldenfrei and Mr. di Franco.

This seminar will begin with a brief survey of the major results in foundations of mathematics: axiomatic development of symbolic logic and set theory, Gödel incompleteness theorem, consistency and independence of the axiom of choice and the continuum hypothesis. This will be followed by a comparison of the logicist, formalist and intuitionist views of the foundations of mathematics.

(NOTE: This seminar is offered jointly by the Departments of Philosophy and Mathematics. Students who have taken 108A may not take this seminar.)

Prerequisite: One course in philosophy and Mathematics 14 or equivalent work with axiomatic mathematics.

110. MEDIEVAL PHILOSOPHY. Mr. Urban. *Fall semester*

Philosophical thought from Augustine to the fifteenth century. Attention will be paid both to specific problems such as universals, analogy, and epistemology and to outstanding thinkers such as Anselm, Aquinas, Scotus and Ockham. Although the primary emphasis will be historical, attention will be paid to the contemporary relevance of medieval thought.

Not offered in 1967-68.

111. THE IDEA OF GOD IN WESTERN THOUGHT. Mr. Urban. *Spring semester*

An examination will be made of writings which have contributed most to Western concepts of God. The study will include Plato, Aristotle, the Bible, Athanasius, Augustine, Thomas Aquinas, Luther, Calvin, Kant, Schleiermacher, Rudolf Otto, John Baillie and others.

112. CONTEMPORARY RELIGIOUS PHILOSOPHERS. Mr. Urban. *Fall semester*

This seminar will concentrate on representative thinkers and schools of thought in the present century. These will include Karl Barth, Martin Buber, Jacques Maritain, Reinhold Niebuhr, William Temple, Paul Tillich, and Henry N. Wieman.

113. THE OLD TESTAMENT. Mr. Henry. *Spring semester*

For the year 1967-68 this seminar will deal with the rise and development of prophesy in Israel, and the impact of the prophetic movement on the character of the rest of the Old Testament.

114. THE NEW TESTAMENT. Mr. Henry. *Fall semester*

The following topics will be studied: the Synoptic Gospels; Luke-Acts; the Johannine literature; the Letters of Paul; Text and Canon. Each student will give special attention to one or two of these subjects. An attempt will be made to assess the relationship of the New Testament to the life of the early church, and to the wider Jewish Hellenistic environment.

Not offered in 1967-68.

115. EARLY CHRISTIANITY. Mr. Henry.

*Fall semester*

A study of the development of Christian thought and institutions from the end of the first century to the Council of Chalcedon (A.D. 451). Major topics will include church and empire, missionary expansion, episcopacy, sacraments, councils, doctrinal development and dogmatic definition, heresy, beginnings of monasticism.

116. CHRISTIAN DIVISIONS EAST AND WEST. Mr. Henry.

*Spring semester*

A study of the doctrinal, cultural, political, and ecclesiastical factors that caused divergence between Greek and Latin Christianity, and led to eventual schism. A good deal of attention will be paid to Origen and Augustine as representative of the Greek and Latin styles of Christian thought.

Not offered in 1967-68.

120. THESIS.

A thesis may be submitted by majors in the department in place of one of the seminars, upon application by the student and at the discretion of the Department.

## PHYSICAL EDUCATION FOR MEN

DIRECTOR OF ATHLETICS AND PHYSICAL EDUCATION FOR MEN AND

ASSOCIATE PROFESSOR: WILLIS J. STETSON

ASSOCIATE PROFESSORS: LEWIS H. ELVERSON

EDWIN J. FAULKNER

ASSISTANT PROFESSORS: GOMER DAVIES

RICHARD F. MALACREA

ASSISTANTS: CHARLES ASSIFF

BROOKE P. COTTMAN

DUDLEY HEATH

J. D. HOFFSTEIN

JAMES W. LUKENS, JR.

JAMES J. MCADOO

ROBERT MCCOACH

JAMES W. NOYES

RICHARD WRIGHT

COLLEGE PHYSICIAN: DR. MORRIS A. BOWIE

TEAM PHYSICIAN: DR. HAROLD C. ROXBY

The course in Men's Physical Education is designed to acquaint each participant with both team and individual sports. The value of team play is developed while emphasis is also placed on the so-called "carry over" sports which one can enjoy after graduation. Each individual, while benefiting from the physical exercise, also becomes better acquainted with the fundamentals, rules, etc., of the various sports and so is better able to enjoy these activities as a spectator.

The intercollegiate athletic program is a comprehensive one with varsity schedules in eleven different sports. In many of these activities there are contests arranged for junior varsity teams, thus providing ample opportunity for large numbers of men to engage in intercollegiate competition.

### FACULTY REQUIREMENTS

Physical education is required of all non-veteran freshmen and sophomores unless excused by the College physician. During this two-year period, men students must attend a minimum of three classes per week.

All men not excused for medical or other reasons are expected to fulfill this requirement. A semester's work failed in the first two years must be repeated in the Junior year. No man with a deficiency in physical education is permitted to enter his Senior year.

#### FALL ACTIVITIES

Adapted Physical Education	†Folk Dance	†Tennis
†Aquatics	*Football	Touch Football
Badminton	†Modern Dance	Track
*Cross Country	**Soccer	

#### WINTER I AND II ACTIVITIES

Adapted Physical Education	†Folk Dance	†Volleyball
†Aquatics	†Modern Dance	Weight Training
†Badminton	*Swimming	**Wrestling
**Basketball	†Tennis	

#### SPRING ACTIVITIES

Adapted Physical Education	*Lacrosse	**†Tennis
†Aquatics	†Modern Dance	**Track
*Baseball	Softball	†Volleyball
**†Golf		

\* Intercollegiate competition only.

\*\* Intercollegiate competition and course instruction.

† Some co-ed sections.



# PHYSICAL EDUCATION FOR WOMEN

ASSOCIATE PROFESSORS: ELEANOR K. HESS, *Chairman*  
IRENE MOLL

ASSISTANT PROFESSOR: AILYN TERADA

COLLEGE PHYSICIAN: DR. MORRIS A. BOWIE

The aim of the Department is to contribute to the education of all women students through the medium of physical activity. We believe this contribution can best be achieved through participation in a broad program of sports, dance and developmental activities. The program provides: instruction and experience in sports and dancing; swimming instruction on all levels; corrective and developmental exercises. It is our hope that the student will also acquire: appreciation of the dance as an art form; good sportsmanship; added endurance; good posture; leadership training; joy in outdoor exercise; and a program of interests and skills that will carry over for her after college, so she may become a useful part of her community.

Classes are kept small to insure individual attention, and students are grouped where possible according to ability. Ample opportunities are given for intramural and intercollegiate competition, as well as for public performances and demonstrations.

Freshmen and sophomores take three periods of activity each week. These may be elected from classes listed below with the stipulation that they take swimming until a test is passed; take a dance activity; take a team sport; take an individual sport; and take developmental gymnastics if the posture grade or motor skill test indicates a need for it.

In addition to the departmental requirements, the faculty regulations state the following: "If any semester's work of the first two years is failed, it shall be repeated in the junior year. No student shall be permitted to enter her senior year with a deficiency in physical education."

Regulation costumes should be ordered before college opens. Blanks for this purpose will be sent out from the Office of the Dean to all incoming students.

## ACTIVITIES

ARCHERY.	<i>Fall and Spring</i>
Class and Varsity.	
BADMINTON.	<i>Winter</i>
Class and Varsity.	
BASKETBALL.	<i>Winter</i>
Class and Varsity.	
BOWLING.	<i>Winter</i>
Class.	
DEVELOPMENTAL MOVEMENT.	<i>Winter</i>
Required of all first-year students whose posture grade or motor ability test indicates a need for it.	
FOLK AND SQUARE DANCING.	<i>Fall and Winter</i>
Class and Performance Group. Open to men students who have fulfilled the requirements of the Men's Physical Education Department.	

GOLF.	<i>Fall and Spring</i>
Class and Course Golf.	
HOCKEY.	<i>Fall</i>
Class and Varsity.	
LACROSSE.	<i>Spring</i>
Class and Varsity.	
MODERN DANCE.	<i>Fal, Winter and Spring</i>
Class and Performance Group. Open to men students who have fulfilled the requirements of the Men's Physical Education Department.	
SOCCER.	<i>Winter</i>
Class.	
SOFTBALL.	<i>Spring</i>
Class and Varsity.	
SWIMMING.	<i>Fall, Winter and Spring</i>
Beginning, intermediate and advanced classes in strokes and diving. Class and Varsity.	
American Red Cross Life Saving and Water Safety. (Upon successful completion of these courses, American Red Cross certificates will be awarded.)	
TENNIS.	<i>Fall, Winter and Spring</i>
Class and Varsity.	
VOLLEYBALL.	<i>Fall and Winter</i>
Class and Varsity.	
WATER BALLET.	<i>Fall and Spring</i>
Class and Performance Group.	

## PHYSICS

PROFESSOR: WILLIAM C. ELMORE, *Chairman*

VISITING PROFESSOR: HANS H. STAUB \*\*

ASSOCIATE PROFESSORS: OLEXA-MYRON BILANIUK ‡

MARK A. HEALD

PAUL C. MANGELSDORF, JR.

ALBURT M. ROSENBERG

ASSISTANT PROFESSORS: JOHN R. BOCCIO

CYRUS D. CANTRELL

CLAIR W. NIELSON ‡

The physics department, through its introductory course in general physics, endeavors to give an integrated account of basic physics. In this course, as well as in the advanced work of the department, emphasis is placed on quantitative, analytical reasoning, as distinct from the mere acquisition of facts and skills. The introductory course makes no pretense of covering all material of interest to physicists, but rather comprises a selection of topics which form a coherent group.

Advanced work in the department involves a more intensive study of topics covered at the introductory level, and of many phases of modern physics which require a considerable background in mathematics and electricity. In all courses and seminars particular importance is attached to laboratory work, since physics is primarily an experimental science. Honors candidates taking physics seminars accompanied by laboratory work must submit their laboratory notebooks to the visiting examiners for their inspection.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS AND MINORS

Students who intend to major in physics normally take Physics 1, 2 and Chemistry 1, 2 in the freshman year and Physics 11, 12 in the sophomore year. In addition they should complete Mathematics 12 or 16 by the end of their sophomore year. In view of graduate school requirements and of the extensive literature of physics in German and Russian, it is strongly recommended that the student fulfill his language requirement in one of these languages. A grade of C or better in Physics 1, 2 is normally prerequisite for all further work in the department, and Chemistry 2 or 4 is a prerequisite for Physics 112 and 114.

Honors students majoring in physics normally take Physics 102, 106, 112, in that order, and Mathematics 101 or 103, and 104. Physics 114 or a third mathematics seminar is encouraged but not required. An honors student who has been unable to schedule Physics 11, 12 should plan to take Physics 111. Other seminars in the program are normally chosen from astronomy, biology, chemistry, engineering, experimental psychology or philosophy. Such a program is a particularly satisfactory way of preparing for graduate or other professional work in physics or mathematics. However, it constitutes in itself an effective educational program, since the aim throughout is to achieve an understanding of fundamental ideas and concepts, as distinct from the mastery of information, skills, and techniques in a limited segment of science.

Course students majoring in physics normally complete the following courses in their junior and senior years: Mathematics 51, 52; Chemistry 61, 62; and Physics

\*\* Spring semester, 1967-68.

‡ Absent on leave, 1967-68.

51, 52, 53, 54, 56. It is recommended that Physics 60 or additional work in engineering or chemistry be included in the program of course students who intend to do graduate work in physics. This program provides a well-rounded study of physics, and by requiring less intensive concentration than an honors program offers the student the opportunity to extend his work outside the Division of the Natural Sciences. It should also meet the needs of those who wish to teach science in secondary school.

Secondary school students who are considering majoring in physics at Swarthmore are strongly encouraged to complete four years of mathematics and a minimum of two years of either German or Russian, or French if neither of these is available.

1, 2. GENERAL PHYSICS. Mr. Boccio, Mr. Mangelsdorf, and Staff.

An introductory course in basic physics. During the first semester special emphasis is placed on mechanics, conservation principles, harmonic motion, wave motion and heat. During the second semester the topics include basic concepts in electricity and magnetism, direct current circuits, alternating current circuits, optics and modern physics. This course, or its equivalent, must precede any advanced courses or seminars in physics. It is required of most science majors. Three lectures, a conference, and a laboratory period weekly.

Prerequisite: First Year Mathematics taken concurrently, or adequate preparation in mathematics.

7-8. CONCEPTS AND THEORIES IN PHYSICAL SCIENCE. Mr. Rosenberg.

*Full course*

The first semester consists in an analysis of motion leading to the Newtonian synthesis, the conservation laws of physics, the development of an atomic theory of matter, the periodic table of elements, and the kinetic theory of gases.

The second semester considers the evolution of modern physics: physical properties of light, aspects of relativity, the wave versus the quantum theory of light, certain electrical phenomena, atomicity of charge, Bohr's model of the atom, radioactivity, elementary particles, the nuclear atom and nuclear energy, stellar energy.

This course is designed as a terminal course in physical science to meet the needs of non-science majors and fulfills the group 1 distribution requirement. It is not intended to fulfill the physics requirement of medical schools, and cannot be used as a prerequisite for further work in the Division of the Natural Sciences.

Three lectures and one three-hour laboratory per week.

10. TOPICS IN BIOPHYSICS. Mr. Rosenberg.

Applications of physical tools and analysis to living systems. Emphasis will be at the subcellular level of integration. The course is intended for physical science, mathematics, and engineering students. Previous biological training is not required. Three lectures per week. In lieu of laboratory work, visits will be made to nearby biophysical laboratories.

Not offered in 1967-68.

11, 12. MECHANICS AND WAVE MOTION. Mr. Cantrell and Mr. Elmore.

Particle and rigid body mechanics with an introduction to advanced dynamics. Elastic waves and wave motion. Interference and diffraction phenomena. Considerable emphasis is placed on laboratory work, both to illuminate and extend the subject matter, and to foster the students' ability to work independently. This course is required of physics majors. In addition, this course or its equivalent, Physics 111, is recommended for others who desire further work in physics. Three lectures and a laboratory period weekly.

Prerequisite: Second Year Mathematics taken concurrently.

51, 52. MODERN PHYSICS. Mr. Elmore and Mr. Heald.

A selection of topics including special relativity; quantum theory with applications to atomic structure, and solid-state physics; nuclear and high-energy physics. Three lectures and one laboratory period weekly. Open to seniors only.

Prerequisite: Second Year Mathematics and consent of the instructor.

53. CIRCUIT THEORY 1.

*Fall semester*

Transient and steady state analysis of electric circuits based upon the differential equations of the circuit arising from Kirchhoff's Laws. Classical treatment is followed by Laplace transform analysis giving system response as a function of complex frequency. Pole-zero concepts are introduced. Extensive study is made of linear network analysis by the superposition integral, convolution, the Fourier integral, etc. Three phase systems and symmetrical components. Three class periods and a laboratory weekly.

Prerequisite: Physics 12.

54. THERMAL PHYSICS. Mr. Mangelsdorf.

Continuum properties of matter and of thermal energy. Thermodynamics and statistical mechanics of mechanical, chemical, electrical and magnetic systems. Entropy, fluctuation theory, irreversible thermodynamics. Brownian motion, diffusion theory, transport processes. Three lectures and one conference section weekly.

Offered spring semester 1968-69, and in alternate years thereafter.

Prerequisite: Second Year Mathematics.

56. ELECTROMAGNETIC FIELD THEORY. Mr. Barus.

*Spring semester*

An analytical study of electromagnetism. Maxwell's equations are developed and applied, with greatest attention given to the static and quasi-static cases. Considerable emphasis is given to the following topics: solutions of Laplace's equation, fields in dielectric and magnetic materials, energy and forces, and the relationship of field theory to circuit theory. Three class periods and a laboratory weekly.

Prerequisites: Physics 12 and 53.

58. QUANTUM MECHANICS. Mr. Boccio.

*Spring semester*

Review of classical mechanics. The postulates of quantum mechanics; the Schrödinger equation; the uncertainty principle. Applications to the harmonic oscillator, square well potential problems and the hydrogen atom. Perturbation theory; transition probabilities; electron spin and the Pauli exclusion principle; selected applications. This course develops further the concepts and methods of quantum mechanics, treated at an introductory level in Physics 51.

Prerequisite: Physics 51.

60. SPECIAL TOPICS. Staff.

*Fall semester*

A semester course that may be elected by senior physics majors. Readings and problems will be assigned in areas of physics not covered in other courses. The associated laboratory work will be directed toward the acquisition of knowledge and skills that will be useful to future research, and normally will involve the development of apparatus and the performance of an experiment of contemporary significance in physics. A carefully written report of the experiment, together with solutions of assigned problems, is required in lieu of a final examination.

## HONORS SEMINARS

102. ELECTRICITY AND MAGNETISM. Mr. Heald. *Fall semester*  
Classical electrodynamics, covering static and dynamic electricity, magnetism and electromagnetism, with some electronics. Laboratory measurements in direct and alternating currents and in magnetism, together with fundamental experiments in electronics.  
Prerequisites: Second Year Mathematics, and Physics 11, 12 (or 111).
106. ATOMIC AND NUCLEAR PHYSICS. Mr. Staub. *Spring semester*  
Special theory of relativity. Wave-particle duality. Introduction to wave mechanics, the hydrogen atom, structure and spectra of many-electron atoms. Elements of solid state physics. Properties and systematics of nuclei, nuclear reactions, nuclear forces and models. Introduction to fundamental particles, their symmetries and inter-actions. The accompanying laboratory includes basic experiments in atomic and nuclear physics.  
Prerequisite: Physics 102, or equivalent preparation in the Honors program in Engineering Sciences.
111. CLASSICAL MECHANICS AND WAVES. Mr. Boccio. *Spring semester*  
This seminar covers substantially the same material as Physics 11,12. It is offered for students unable to schedule the course, and who desire further work in physics as part of an Honors program. One full-day laboratory each week.  
Prerequisite: Second Year Mathematics.
112. RADIATION AND STATISTICAL PHYSICS. Mr. Mangelsdorf. *Fall semester*  
Free and guided electromagnetic waves, with particular emphasis on waves in the microwave, optical, and X-ray regions. The velocity of electromagnetic waves and the four-vector formulation of the special theory of relativity. Thermodynamics and statistical mechanics. Thermal radiation, and quantum statistics with applications. Accompanied by a full-day laboratory each week.  
Prerequisites: Chemistry 2 or 4, and Physics 106.
114. QUANTUM MECHANICS. Mr. Cantrell. *Spring semester*  
Advanced classical dynamics. Classical vs. quantum physics, correspondence principle. Heisenberg's and Schrödinger's versions of quantum mechanics. Observables and quantum mechanical operators. Eigenfunctions and eigenvalues. Approximation methods. Identical particles and spin. Scattering and the Born approximation. Quantum mechanics of the nucleon-nucleon interaction and nuclear structure. Accompanied by experimental and computational projects.  
Prerequisite: Physics 112.

## POLITICAL SCIENCE

PROFESSORS: J. ROLAND PENNOCK,\* *Chairman*  
CHARLES E. GILBERT  
DAVID G. SMITH

ASSISTANT PROFESSOR: ROBERT O. KEOHANE

INSTRUCTORS: RAYMOND F. HOPKINS  
RICHARD W. MANSBACH

LECTURERS: FREDERICK A. HARGADON  
NANNERL O. HENRY

Courses and seminars offered by the Political Science Department deal with the place of politics in society and contribute to an understanding of the purposes, organization, and operation of political institutions, domestic and international. For the beginning student, the Department offers a general introduction to the nature of politics, to its major institutions and moving forces, and to the key concepts of the discipline, followed by a more detailed examination of these elements in a particular institutional setting. For those who become majors and for others who take additional work in political science, courses are provided that will permit giving special attention to political theory, comparative political systems, politics and government in the United States, and international relations.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS

Political Science 1-2 (A, B, or C) is prerequisite to all other work in the Department, except that students wishing a one semester *terminal* course providing some knowledge of an insight into a particular field may take Political Science 2 (A, B, or C) without prerequisite. Students who intend to major in political science should take the introductory course during the freshman year if possible. Majors are also advised to take Economics 1-2. Courses in Statistics (Economics 4) and history are recommended. Political Theory, either in seminar or in course (Political Science 54), is required of all majors. Course majors must take Course 60-61.

### PROGRAM IN INTERNATIONAL RELATIONS

Students who plan to enter upon a career in the field of international relations should include in their programs, during the first two years, the introductory courses in economics, history, and political science and should complete the intermediate course in one or more modern languages.

Advanced courses selected from the groups listed below may be incorporated in the programs of students who do their major work in economics, history, political science, or a modern language.

Those students who wish to concentrate in international relations may take their Senior Comprehensive Examination in this field. Students preparing for this examination should take eight, nine, or ten half courses from among those listed below, including all of those listed in Group I, one or more in Group II, and one or more in Group III. The examination is administered by a committee appointed by the chairmen of the Departments of Economics, History, and Political Science, under the Chairmanship of the Department of Political Science.

\* Absent on leave, fall semester 1967-68.



## Group I

Political Science 2C—International Politics  
Political Science 13—International Law and Organization  
Political Science 14—American Foreign Policy  
Economics 60—International Economics

## Group II

Economics 11—Economic Development  
History 13—Russia  
History 32—The Expansion of Europe  
History 35, 36—The Far East  
History 61—American Diplomatic History  
History 65—Africa

## Group III

Economics 61—Comparative Economic Systems  
Political Science 2B—Comparative Government  
Political Science 18—Politics of Developing Nations  
Political Science 19—Soviet Politics  
Political Science 21—Politics of Africa  
Political Science 55—Modern Political Theory

Students who plan to enter the honors program will find it possible to select a similar combination of courses and seminars in the field of international relations. In planning such programs, they should consult with the chairman of their prospective major department.

## COURSES

### 1. INTRODUCTION TO POLITICAL SCIENCE. All members of the department.

A study of the basic institutions, concepts, and moving forces of politics, combined with some consideration of the analytical tools and methods of the discipline. The works of major historical figures in the development of political ideas and of contemporary political scientists will be read. Except as noted below, this course is prerequisite to all other courses offered by the Department. Credit is given for this course only when combined with Political Science 2 (A, B, or C).

### 2A. POLICY-MAKING IN AMERICA.

Consideration of basic elements of American national politics, and of ways of defining and explaining the functions and results of American politics. Major attention will be devoted to electoral organizations, voting behavior and opinion formation, legislation and presidential leadership.

### 2B. COMPARATIVE GOVERNMENT.

A critical study of selected political systems of Western Europe. The countries studied include Great Britain, France, and Germany. Major emphasis will be placed on comparative politics and comparative public policy as well as the relation of domestic politics to problems of foreign policy and international cooperation.

### 2C. INTERNATIONAL POLITICS.

An introduction to the analysis of the contemporary international system, and its evolution since 1945. The course will consider the foreign policies of major powers and their interaction, contemporary forces influencing the nature of international relations, and the role of ideologies. Various approaches to world order, such as diplomacy, collective security, disarmament and world government will be considered.

11. PROBLEMS IN COMMUNITY GOVERNMENT. *Spring semester*  
 The social, economic, and legal setting of local government. Politics and administration at state and local levels. Problems of federalism and metropolitan areas. The course emphasizes special research projects, such as field work in nearby communities.
13. INTERNATIONAL LAW AND ORGANIZATION. Mr. Keohane. *Alternate years, spring semester*  
 An analysis of international law and organization in the context of the international political system. Special attention will be given to the political process of the United Nations and to its accomplishments, limitations, and prospects. The course will also consider the relations between international politics and international law, and the theory and practice of regionalism.
14. AMERICAN FOREIGN POLICY. Mr. Keohane or Mr. Mansbach. *Alternate years, fall semester*  
 The problem of defining the objectives of American foreign policy and of selecting the means for achieving them; past, present and suggested American strategies in world politics; the influence of internal and external conditions on the making of foreign policy; the effects of American policies in crucial areas of the world.
18. POLITICS OF DEVELOPING NATIONS. Mr. Hopkins. *Fall semester*  
 An examination of theories of political modernization and their various applications to developing societies, including examples from Asia, Africa, and Latin America. Among the questions to be studied are the nature and causes of social change, psychological, sociological, and economic factors affecting political development and the relative role of leadership, ideology, and social structure in shaping the political process.
19. SOVIET POLITICS. Mr. Hargadon. *Spring semester*  
 An analysis of Soviet political theory, the structure and development of the Communist Party of the Soviet Union, Soviet political and administrative leadership, and selected policy problems.
21. POLITICS OF AFRICA. Mr. Hopkins. *Spring semester*  
 The analysis of political processes in a variety of African states. Included will be an examination of traditional systems, the colonial situation, the rise of independence movements, and the problems of nation building.
51. PUBLIC ADMINISTRATION. Mr. Gilbert. *Alternate years, fall semester*  
 An analysis of policy-making and administration in modern governments with illustrative material drawn chiefly from the national government of the United States and with particular reference to recent developments. Problems of administrative organization, conduct of regulatory and managerial activities, financial administration, personnel, public relations, administrative law, politics and administration.  
 Open to juniors and seniors only, except by special arrangement.
52. AMERICAN CONSTITUTIONAL LAW. Mr. Smith. *Fall semester*  
 The role of the Supreme Court in the American political system, viewed both historically and through analysis of leading cases. Areas of Constitutional development emphasized are: the nature and exercise of judicial review; federalism and the scope of national power; civil liberties.  
 Open to sophomores and upperclassmen. Sophomores carrying five courses will be relieved of the term paper requirement.
53. AMERICAN PARTY POLITICS. Mr. Gilbert. *Alternate years, fall semester*  
 An historical and functional analysis of American political parties. The study

of interest groups, public opinion and voting behavior, electoral systems and representation, the legislative process.

54. POLITICAL THEORY: PLATO TO ROUSSEAU. Mrs. Henry or Mr. Smith.  
*Fall semester*

The development of thought on the nature of the state and of individual rights and duties, based largely on readings of the chief political philosophers from Plato to Rousseau. Topics studied include: Greek and Roman political thought; medieval universalism and the divine right of kings; the Reformation and the development of contractual theory; natural law and natural rights.

Open to sophomores planning to take the "Modern and Analytical" version of the Political Theory honors seminar; otherwise to juniors and seniors only, except by special arrangement.

55. MODERN POLITICAL THEORY. Mrs. Henry or Mr. Smith. *Spring semester*

Political theory from the Enlightenment to the present. Idealism and nationalism; Marxism and other socialist doctrines; Utilitarianism and liberalism; elite theory, pluralism, corporatism, and sociological theories of politics, especially in the twentieth century; authoritarian and totalitarian political theories.

56. JURISPRUDENCE. Mr. Pennock.

A study of the sources and nature of law; historical, sociological and philosophic approach to legal theory; the nature of the judicial process; key problems of jurisprudence illustrated by case study in selected areas of American constitutional law.

Open to sophomores by arrangement with the instructor.

59. MARXISM. Mr. Smith.

A study of Marxist political theory and philosophy. Primary emphasis is placed on the works of Marx, Engels, Lenin, and Stalin. In addition, some attention is devoted to the background of Marxist thought as well as to influential derivatives of Marxism other than Communism. Selected examples of contemporary Marxist theory are also considered.

- 60-61. SPECIAL TOPICS IN POLITICAL SCIENCE. Mr. Smith. *Spring semester*

This course, conducted in seminar fashion, is designed for senior majors. By means of papers and assigned readings it covers aspects of political science not elsewhere intensively developed and helps the students to integrate materials studied previously.

62. POLITICAL SOCIOLOGY. Mr. Gilbert. *Spring semester*

The relations of politics to basic social structures, processes, and traditions. Study of problems, concepts, and theories about politics viewed as human behavior. The specific topics will vary from year to year.

63. ADVANCED INTERNATIONAL POLITICS. Mr. Keohane.  
*Alternate years, fall semester*

A theoretical approach to the abiding and changing patterns of relations among states and the various factors that affect them, drawing both on classical and contemporary writings. The contemporary international system will be subjected to a detailed analysis.

Prerequisite: 2C or the equivalent.

64. TOPICS IN INTERNATIONAL RELATIONS. *Alternate years, spring semester*

An analysis of certain problems of international relations chosen by the instructor. Possibilities include: comparative foreign policy, war, international relations of developing nations, regionalism.

Prerequisites: 2C or the equivalent and 63.

## HONORS WORK

*Prerequisite:* Political Science 1-2. The following seminars prepare for examination for a degree with Honors:

101. (a) and (b). POLITICAL THEORY. Mr. Pennock or Mr. Smith. *Each semester*  
The nature of the state, the bases of political obligation, sovereignty and the nature of law, liberty, equality, rights, democracy, totalitarianism—all in the light of the theories set forth by writers on these subjects from Plato to the present. This seminar is given in two versions, one (101a) beginning with Plato and proceeding chronologically, and the other (101b, designated "Modern and Analytical") starting with Machiavelli and organized in more topical fashion. It is desirable but not required for students planning to take 101b to take Political Science 54 during their sophomore year.
102. POLITICS AND LEGISLATION. Mr. Gilbert. *Spring semester*  
The study of political parties, interest groups, public opinion and voting behavior, electoral systems and representation, the legislative process. Emphasis is on American politics, with some comparative material; and, ultimately, on politics from the standpoint of theories of political democracy.
103. PROBLEMS IN GOVERNMENT AND ADMINISTRATION. Mr. Gilbert. *Fall semester*  
Problems of administrative organization, policy-making and responsibility, with primary reference to the United States and to selected fields of policy.
104. INTERNATIONAL POLITICS. Mr. Keohane. *Fall semester*  
An inquiry into the principles and problems of international politics, this seminar will consider theories of international stability and disorder, the relationship between foreign policies and the international system, and approaches to international order such as diplomacy, international law, and collective security. Basic to the analysis will be the question: what are the causes of war and the conditions of peace?  
*Prerequisite:* 2C or the equivalent.
105. AMERICAN FOREIGN POLICY. Mr. Keohane. *Spring semester*  
A study of key problems faced by the United States in the modern world together with a detailed, critical investigation of the making and implementing of American foreign policy. The changing assumptions of our policy and the political, economic, and social influences upon it will be carefully considered.
106. PUBLIC LAW AND JURISPRUDENCE. Mr. Pennock. *Spring semester*  
Sources and nature of law; historical, sociological, philosophic, and "realistic" approaches to law; key problems of jurisprudence illustrated by study of the fields of federalism and civil liberties in American constitutional law.
107. SOVIET POLITICS. Mr. Hargadon. *Fall semester*  
An analysis of Soviet political theory, the structure and development of the Communist Party of the Soviet Union, Soviet political and administrative leadership, and selected policy problems.
108. COMPARATIVE GOVERNMENT.  
Advanced study of comparative government; governmental structures and political processes largely as exemplified by selected governments of Western and Eastern Europe; inquiries into common problems, such as planning, defense, nationalization, and transnational political movements.  
Not offered in 1967-68.

109. POLITICAL DEVELOPMENT. Mr. Hopkins. *Spring semester*

An examination of theories of political modernization and their application to developing societies.

110. URBAN SOCIOLOGY AND POLITICS. Mr. Gilbert and Mr. Van Til. *Fall semester*

The impact of urbanization on contemporary politics and social structure, from the perspectives of political science and sociology. Emphasis will be placed on empirical study of selected problems such as physical planning, social welfare, and political organization.

129. THESIS. All members of the department.

Approval must be secured early in the student's junior year.

## PSYCHOLOGY AND EDUCATION

PROFESSORS: JOSEPH B. SHANE  
HANS WALLACH‡

ASSOCIATE PROFESSORS: KENNETH J. GERGEN, *Chairman*  
DEAN PEABODY

ASSISTANT PROFESSORS: GERALD R. LEVIN †  
JOHN ANTHONY NEVIN  
NICHOLAS S. THOMPSON

LECTURER AND DIRECTOR OF STUDENT TEACHING: ALICE K. BRODHEAD

The work of the Department of Psychology deals with the scientific study of human behavior and experience; the basic processes of perception, learning, thinking and motivation, and consideration of their relation to development of the individual personality; and the social relations of the individual to other persons and to groups. For those students planning for graduate and professional work in psychology the courses and seminars of the department are designed to provide a sound basis of understanding of psychological principles and a grasp of research method. Other students learn the nature of psychological inquiry and the psychological approach to various problems encountered in the humanities, the social sciences and the life sciences.

### REQUIREMENTS AND RECOMMENDATIONS

The course Introduction to Psychology is the only requirement for other work in the department.

Majors should include advanced work in two areas of psychology: (a) basic processes underlying human and animal behavior, such as perception, learning and motivation; (b) human behavior in its social context, such as personality, child psychology, social psychology. Majors in course should take at least two half courses and majors in Honors, at least one seminar from each area.

*Education:* Courses in education—11, 12, 14, 15, 16, and 17 will not be credited toward a major in psychology. Education alone may not be elected as a major subject, and not more than two full courses in education will be accepted for credit toward the bachelor's degree.

Swarthmore students may fulfill the Pennsylvania requirements in Education for the college provisional certificate for secondary school teachers by taking the four courses:

- Psychology 3—Introduction to Psychology.
- Education 11—Educational Psychology
- Education 14—Introduction to Teaching.
- Education 16—Student Teaching.

plus two out of three of the following:

- Education 12—Principles and Methods of Secondary Education.
- Education 15—History of Education.
- Education 17—Problems in Urban Education.

† Absent on leave, spring semester, 1967-68.

‡ Absent on leave, 1967-68.

Swarthmore students may receive credit toward a Pennsylvania elementary school certificate by taking:

- Psychology 3—Introduction to Psychology.
- Psychology 55—Child Psychology.
- Education 11—Educational Psychology.
- Education 14—Introduction to Teaching.
- Education 16—Student Teaching.

## Psychology

### 3. INTRODUCTION TO PSYCHOLOGY. Staff.

An introduction to the study of the behavior and experience of the individual. The broader significance of psychology will be emphasized. This one-semester course replaces the previous two introductory courses, Psychology 1 and 2. Three lectures, plus weekly conference hours to be arranged.

### 12. MOTIVATION. Mr. Thompson.

The determination of behavior by maturation, early experience, deprivation, stimulation, and reward. The concepts of instinct, homeostasis, drive, reinforcement, arousal, and incentive are analyzed with reference to data drawn largely from animal experimentation. Some reference is made to recent findings in the physiology of drive and reinforcement. Term paper or an original experiment is required.

### 13. STATISTICS FOR PSYCHOLOGISTS. Mr. Nevin.

The logic and the application of standard statistical tests in the analysis of data. Emphasis is placed on the relations between experimental and statistical procedures. No mathematics required.

### 14. LEARNING AND BEHAVIOR THEORY. Mr. Nevin.

The experimental analysis of the major phenomena of learning and conditioning is studied mainly at the animal level. Specific empirical and theoretical issues are considered in detail, and the major theories of learning are evaluated. The laboratory is designed to acquaint students with the major processes considered.

### 15. CHILD PSYCHOLOGY. Mr. Levin.

Cognitive development, the socialization process, and the influence of child-rearing practices will be emphasized. Observing of preschool children will be required.

### 41. COMPARATIVE PSYCHOLOGY. Mr. Thompson.

The course considers determinants of behavior in the individual animal. It will explore in detail experimental and field studies of behavior in a few selected animal species. In each species, the adult behavior of the individual animal will be shown to be the result of the complex interaction of genetic, maturational, developmental, and social effects. Weekly laboratory and field work. Sophomores admitted by permission of the instructor.

### 42. PHYSIOLOGICAL PSYCHOLOGY. Mr. Thompson.

The physiological foundations of human behavior and its disorders. The course starts with a review of the anatomy and physiology of the human nervous system. Each student then prepares and reads a theoretical paper in which he collects, integrates, and interprets the most recent experimental and clinical information on some facet of the operation of the nervous system. Tutorial meetings in addition to regular class meetings. Sophomores admitted by permission of the instructor.



50. PERCEPTION. Mr. Wallach.  
Laboratory section one afternoon per week to be arranged. The major facts and some problems of visual perception are outlined and used to acquaint the student with experimental research.
52. HUMAN LEARNING AND THINKING.  
An examination of the phenomena of association, memory, problem solving thinking and language.
56. SOCIAL PSYCHOLOGY. Mr. Gergen, Mr. Peabody.  
A systematic examination of theory and research relevant to the understanding of social interaction from a psychological viewpoint. Special emphasis will be placed on social perception and its distortion, attitude development and change, conformity, the self and self-presentation, the relationship of personality to social interaction, and social motivation.
57. PSYCHOLOGY OF ATTITUDES. Mr. Peabody.  
The course will concentrate on topics designed to supplement Psychology 56, Social Psychology, with particular attention to social and political attitudes.
58. PERSONALITY. Mr. Gergen.  
An examination of contrasting theories of the human personality. Theories of Freud, Jung, Lewin, Rogers and others will be discussed, and special attention will be given to current empirical work.
- 62-63. COLLOQUIUM IN LEARNING. Mr. Nevin.  
In consultation with the instructor, students select a problem in the analysis of learned behavior for study in the laboratory. In weekly class meetings, they discuss the rationale, methods, and results of their work as it progresses, relating it to the research literature and to general theoretical issues. A paper reviewing the pertinent literature and describing the experimental work is required. Those desiring to enroll must see the instructor before registration; enrollment will be limited to eight students. Double credit.
- 64-65. COLLOQUIUM IN HISTORY AND SYSTEMS OF PSYCHOLOGY. Mr. Peabody.  
Reading and discussion intended to provide integration of different fields of psychology and to help majors prepare for comprehensives. Historical treatment will concentrate on the major systematic points of view. Special consideration will be given to problems overlapping several areas of psychology. Double credit.
69. INDEPENDENT RESEARCH. Staff.  
Students conduct independent research projects. They typically study problems with which they are already familiar from their course work. Students must submit a written report of their work. Registration for Independent Research requires the approval of the department and the sponsorship of a faculty member who agrees to supervise the work.
- The following course is not to be counted toward a major in psychology and is not included in the comprehensive examination; it is designed primarily for students whose major work is in other departments.
42. APPLIED SOCIAL PSYCHOLOGY.  
This course deals with communications within groups, leadership, attitudes and propaganda, wage payment plans, consumer motivation and behavior, and the structure of organizations. Attention will be given to the application of concepts that have been drawn from the laboratory study of motivation, perception, and learning.

## Education

11. EDUCATIONAL PSYCHOLOGY. Mr. Levin. *Alternate years*  
The application of psychology to education. The psychology of learning and psychometrics will be stressed. Projects will be required.  
Prerequisite: Course 1.
12. PRINCIPLES AND METHODS OF SECONDARY EDUCATION. Mr. Shane. *Alternate years*  
A study of the principles of secondary education, with emphasis upon aims and organization. Visits to nearby schools are made.
14. INTRODUCTION TO TEACHING. Mrs. Brodhead. *Each semester*  
Current educational theory and practice. Weekly seminar plus three hours a week (term minimum of 36 hours) assisting in a classroom in the local schools. This course meets the requirement for basic reading instruction.
15. HISTORY OF EDUCATION. Mrs. Brodhead.  
Educational thought in our western culture from the Greeks to the present day. Weekly seminar in which members of the Classics, History, Philosophy and Religion departments participate.
16. STUDENT TEACHING. Mrs. Brodhead.  
Secondary level: In cooperation with Springfield School District and Swarthmore-Rutledge School District, 30 hours of guided observation in the spring followed by six weeks (120 hours) of full-time teaching in the summer school in both remedial and enrichment classes. Students should enroll for this course at the January registration. They must be recommended by the college department whose subject they plan to teach.  
Elementary level: In cooperation with Springfield School District, a six weeks program of full-time teaching (120 hours) under close supervision by master teachers in the Springfield Elementary Summer School which embraces both remedial and enrichment reading and arithmetic, as well as science, geography, and creative writing.  
Prerequisite: Education 14 and recommendation of the department of psychology and education.
17. PROBLEMS IN URBAN EDUCATION. Mrs. Brodhead.  
This course considers the problems of schools in big cities, related to topics such as financial support, community relations, professional staff, curricular changes, pupil personnel. A weekly seminar, individual study, and field investigation in the City of Philadelphia.  
Limited enrollment.

## HONORS SEMINARS

101. PERCEPTION. Mr. Wallach.  
Reading and discussion combined with independent experimental projects. The student is expected to know the basic facts about human perceptual mechanics, particularly visual ones, by the time he has completed this seminar. Specific topics covered are: color vision, grouping and form, depth and distance, size, movement, influences of learning and needs and attitudes, general theory of perception. When time permits, some attention is given to parallel problems in other senses.
102. LEARNING AND BEHAVIOR THEORY. Mr. Nevin, Mr. Thompson.  
The major phenomena of learning and conditioning—taken largely from the animal level—are discussed. An attempt is made to systematize the experi-

mental literature on each topic. The relationship of motivational concepts to learning is discussed and the major theories of learning and some recent mathematical theories are considered. The laboratory acquaints students with problems and methods of experimentation in learning. An opportunity for original research is provided.

104. INDIVIDUAL IN SOCIETY. Mr. Gergen, Mr. Peabody.

The relationship between man and his society. Basic processes including the understanding of other persons, theories of cognitive consistency, group influence and conformity, the psychology of language. Applications to political attitudes, group prejudice. The relation of attitudes and personality. The relation of psychology to the social sciences.

105. PERSONALITY. Mr. Gergen, Mr. Levin.

A scrutiny of attempts to build an objective basis for "understanding the person as a whole." Contrasting theoretical orientations, techniques of observation, and specific problems will be examined. Theoretical orientations: psychoanalysis, factor analysis, learning theory, phenomenology. Observation techniques: interviews, questionnaires, fantasy material. Problems: aggression, need achievement, prediction, psychotherapy, and psychological maturity.

106. DEVELOPMENT. Mr. Levin.

The development of complex psychological processes in the individual will be studied. Problems of intellectual, linguistic, and social development will be stressed. While the focus will be on the child, relevant studies of other species will also be examined. Observing of preschool children will be required.

108. MEMORY, THINKING, LANGUAGE.

An inquiry into human cognitive processes, including human learning, memory functions, thinking, and language phenomena. Topics to be considered will be: principles of association; association and perceptual organization; recognition and recall; interference phenomena; trace theory; attention and mental set; concept formation; problem-solving and insight; symbolic operations; semantic and syntactic processes.

109. COMPARATIVE AND PHYSIOLOGICAL PSYCHOLOGY. Mr. Thompson.

The genetic, developmental, and physiological determinants of animal behavior. The seminar will explore in detail experimental and field studies of behavior in a few selected animal species. Generalizations derived from the study of animal behavior will be brought to bear on problems in human behavior and behavior pathology.

120. THESIS. All members of the department.

May be presented as a substitute for one seminar, provided the student is doing major work in psychology with four seminars, and provided some member of the department is available to undertake the direction of the thesis.

## MASTER'S DEGREE

A limited number of students may be accepted for graduate study toward the Master's degree in psychology. Students receiving the Bachelor's degree from Swarthmore are not normally eligible for this work.

The program of work for the Master's degree requires the completion of four seminars, or their equivalent. One of the seminars must be a research seminar leading to a Thesis. The work of the seminars is judged by external examiners. The requirements for the Master's degree can normally be completed in one year.

## SOCIOLOGY AND ANTHROPOLOGY

ASSOCIATE PROFESSOR: LEON BRAMSON, *Chairman*

ASSISTANT PROFESSOR: STEVEN PIKER‡

INSTRUCTORS: VICTOR NOVICK  
JON VAN TIL

LECTURER: ASMAROM LEGESSE

VISITING LECTURER: OLGA LINARES DE SAPIR

Although Sociology and Anthropology arose initially out of divergent historical traditions, they are engaged in a common task. Studies in the Department are directed toward the discovery of the general principles which help to explain the order, meaning, and coherence of human social and cultural life. To that end, work in the Department will emphasize the comparative analysis of societies and social institutions; the structure and functioning of human communities; the principles of social organization and disorganization; and the conditions which tend to foster continuity and change, consensus and conflict. Emphasis will also be laid on the relevance of Sociology and Anthropology to social problems in the modern age, particularly to the question of the nature, conditions and limits of human freedom.

### REQUIREMENTS AND RECOMMENDATIONS

Course 1-2 is prerequisite to all other work in the department. Beginning with the class of 1969, course majors will customarily write a thesis in their senior year. Course 99 (thesis) and five courses beyond the introductory course are required for majors in the course program. Honors majors may also elect to write theses.

### COURSES

1-2. INTRODUCTION TO SOCIOLOGY AND ANTHROPOLOGY. Staff. *Full course*

An exploration of fundamental factors in human group life and the context of human development in families, communities, castes, classes; folk, peasant and urban societies. Among topics to be studied comparatively are child-rearing, work and occupations, urbanism, social stratification, societal types, and cultural change.

21. CONTEMPORARY SOCIAL PROBLEMS. Mr. Van Til.

An attempt to relate social problems to an analysis of the structure of modern societies. Emphasis will be on values and institutions as determinants of social problems, and on self-fulfilling prophecies regarding inequality, poverty and delinquency. Topics include social disorganization, crime, deviance, and evaluation of proposals for directed social change: education, welfare, structural reform.

Not offered in 1967-68.

22. RACE AND ETHNIC RELATIONS IN THE UNITED STATES. Mr. Van Til.  
*Spring semester*

Ethnic and minority relations in America, their structure and patterns of change. Particular emphasis will be placed on the American Negro: the development of Negro subcultures, effects of racial discrimination on the individual, and

‡ Absent on leave, 1967-68.

social movements arising out of the acculturation process. The experience of other ethnic groups, the melting pot thesis, and the persistence of religious subcultures will also be studied.

23. SOCIETIES AND CULTURES OF LATIN AMERICA. Mrs. Sapir. *Fall semester*  
Relationship of ecology to socio-cultural development in selected South American contexts, including tropical Amazonia, the coastal Andean zones and the Andean highlands. Emphasis will be on tribal (non-peasant) societies and on theoretical issues arising out of the relation of economic surplus, settlement pattern, social organization, and religious ritual.
50. MODERN SOCIAL THEORY. Mr. Bramson.  
The social and intellectual background of the rise of social science, with consideration of selected social theorists and emphasis on the relation of ideology to theory and research. Among the topics discussed are individualism, progress, elitism, racism, collectivism and war.  
Not offered in 1967-68.
51. CITIES AND SOCIETIES. Mr. Van Til. *Alternate years*  
The historical growth of cities, the social structure of urban areas, impact of urbanization on social relations, and emergent ideologies of city life considered from the main perspectives of urban sociology. Topics of special interest include the structure and process of metropolitan life, the consequences of urbanization for rural life and small towns, and the prospects for urban planning.  
Not offered in 1967-68.
56. SOCIAL PSYCHOLOGY. Mr. Gergen. *Fall semester*  
A systematic examination of theory and research relevant to the understanding of social interaction from a psychological viewpoint. Special emphasis will be placed on social perception and its distortion, attitude development and change, conformity, the self and self-presentation, the relationship of personality to social interaction, and social motivation.
61. COMPARATIVE SOCIAL ORGANIZATION. Mr. Novick. *Spring semester*  
Examples of societal types ranging from primitive hunting-and-gathering to pre-industrial urban will be considered. Special emphasis will be given to the important socio-cultural features of each type, ecological determinants of societal types, and patterns of transition from one type to another.
62. POLITICAL SOCIOLOGY. Mr. Gilbert. *Spring semester*  
The relation of politics to basic social structures, processes and traditions. Study of problems, concepts and theories about politics viewed as human behavior. The specific topics will vary from year to year.
63. PSYCHOLOGICAL ANTHROPOLOGY. Mr. Legesse. *Fall semester*  
A study of cultural differences from the standpoint of the socialization process. A comparative analysis of the ways in which patterns of behavior are transmitted through the family and related institutions. An assessment of the significance of this approach for fields of social and cultural anthropology.
65. SOCIETIES AND CULTURES OF AFRICA. Mr. Legesse. *Spring semester*  
A survey of the major traditional institutions of Africa. Special attention will be given to the contributions of African studies to theories of social structure and personality. Representative societies will be discussed in detail, including the Tiv, Nuer, Galla, and Amhara.

99. THESIS. Staff.

Theses will be required of all course majors beginning with the class of 1969. Students are urged to have thesis proposals approved as early as possible during the junior year.

### HONORS WORK

102. SOCIAL STRUCTURE. Mr. Legesse, Mr. Novick, Mrs. Sapir. *Each semester*

The nature of human social organization. Case materials will be drawn from a variety of culture types and areas. Special emphasis will be given to non-Western social structure, and to recent theoretical developments in the analysis of social organization.

103. RACE AND CULTURE. Mr. Van Til. *Alternate years*

A comparative study of the patterns of ethnic and minority relations in society, with consideration of the factors underlying persistence and change. Race and culture will be related through an examination of conflicts of values, social hierarchies, and the maintenance of subcultures. May be taken in addition to Course 22, Race and Ethnic Relations in the United States, only by special permission of the instructor.

Not offered in 1967-68.

104. PSYCHOLOGICAL ANTHROPOLOGY. Mr. Legesse. *Spring semester*

The significance of psychological theories for the analysis of social and cultural systems. Special emphasis will be given to personality and social structure, religious belief systems, and comparative socialization within a variety of cultural settings. May not be taken in addition to Course 63, Psychological Anthropology.

105. MODERN SOCIAL THEORY. Mr. Bramson. *Spring semester*

The social and intellectual background of the rise of social science, with consideration of selected social theorists and emphasis on the relation of ideology to theory and research in sociology.

110. URBAN SOCIOLOGY AND POLITICS. Mr. Gilbert, Mr. Van Til. *Fall semester*

The impact of urbanization on contemporary politics and social structure, from the perspectives of political science and sociology. Emphasis will be placed on empirical study of selected problems, such as physical planning, social welfare, and political organization.

120. THESIS. Staff.

Honors students who choose to do so will customarily write theses in the fall semester of the senior year. Students are urged to have thesis proposals approved as early as possible during the junior year.







*Magill Walk*

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## REFERENCE SECTION

# SWARTHMORE COLLEGE

# SWARTHMORE COLLEGE

## SWARTHMORE, PENNSYLVANIA

### Visiting Examiners—1967

**ASTRONOMY:** PROFESSOR SERGE A. KORFF, *New York University*; DR. KAJ AA STRAND, *U. S. Naval Observatory*; DR. ARNE A. WYLLER, *Bartol Research Foundation*.

**BIOLOGY:** PROFESSOR A. DUNCAN CHIQUOINE, *Hamilton College*; DR. JOHN M. FOSTER, *National Science Foundation*; PROFESSOR FREDERICK J. GOTTLIEB, *University of Pittsburgh*; PROFESSOR DONALD R. GRIFFIN, *Rockefeller University*; PROFESSOR MICHEL RABINOVITCH, *Rockefeller University*; DR. JOHN A. ROMBERGER, *Forest Service, U.S.D.A.*; PROFESSOR WAYNE W. UMBREIT, *Rutgers—The State University*.

**CHEMISTRY:** PROFESSOR JAY ANDERSON, *Bryn Mawr College*; PROFESSOR HAROLD W. HEINE, *Bucknell University*; PROFESSOR CHARLES N. REILLEY, *University of North Carolina at Chapel Hill*.

**CLASSICS:** PROFESSOR BERTHE MARTI, *University of North Carolina at Chapel Hill*; PROFESSOR WESLEY D. SMITH, *University of Pennsylvania*.

**ECONOMICS:** PROFESSOR GEORGE N. HALM, *Fletcher School of Law and Diplomacy*; PROFESSOR EDMUND S. PHELPS, *University of Pennsylvania*; PROFESSOR BERNARD SAFFRAN, *University of California at Berkeley*; PROFESSOR MARTIN SEGAL, *Dartmouth College*.

**ENGINEERING:** PROFESSOR L. PAUL BOLGIANO, JR., *University of Delaware*; PROFESSOR RICHARD L. PESKIN, *Rutgers—The State University*; PROFESSOR STEPHEN S. WOLFF, *Johns Hopkins University*.

**ENGLISH LITERATURE:** PROFESSOR C. L. BARBER, *Smith College*; PROFESSOR DANIEL DODSON, *Columbia University*; PROFESSOR ROBERT HOLLANDER, *Princeton University*; PROFESSOR RICHARD LUDWIG, *Princeton University*; PROFESSOR EDWARD W. TAYLER, *Columbia University*.

**FINE ARTS:** PROFESSOR CHARLES G. DEMPSEY, *Bryn Mawr College*; PROFESSOR LINCOLN F. JOHNSON, JR., *Goucher College*; PROFESSOR CHARLES MINOT, *University of Pennsylvania*.

**HISTORY:** PROFESSOR JEFFREY BUTLER, *Wesleyan University*; PROFESSOR ROBERT D. CROSS, *Columbia University*; PROFESSOR STANLEY MELLON, *Yale University*; PROFESSOR ALEXANDER V. RIASANOVSKY, *University of Pennsylvania*; PROFESSOR EUGENE RICE, *Columbia University*; PROFESSOR CAROLINE ROBBINS, *Bryn Mawr College*; PROFESSOR CHARLES T. WOOD, *Dartmouth College*.

**MATHEMATICS:** PROFESSOR RICHARD C. CLELLAND, *University of Pennsylvania*; PROFESSOR MURRAY GERSTENHABER, *University of Pennsylvania*; PROFESSOR EMIL GROSSWALD, *University of Pennsylvania*; PROFESSOR E. R. MULLINS, JR., *Grinnell College*.

### MODERN LANGUAGES

**FRENCH:** PROFESSOR MICHEL E. GUGGENHEIM, *Bryn Mawr College*; PROFESSOR ARMAND HOOG, *Princeton University*.

**LINGUISTICS:** PROFESSOR HENRY M. HOENIGSWALD, *University of Pennsylvania*.

**SPANISH:** PROFESSOR JOAQUIN GONZÁLEZ-MUELA, *Bryn Mawr College*; PROFESSOR DONALD A. YATES, *Michigan State University*.

**MUSIC:** PROFESSOR ALVIN H. JOHNSON, *University of Pennsylvania*.

**PHILOSOPHY AND RELIGION:** PROFESSOR ALAN ANDERSON, *University of Pittsburgh*; PROFESSOR JOHN R. CASSIDY, *Temple University*; PROFESSOR FREDERICK FERRÉ, *Dickinson College*; PROFESSOR WILLIAM E. KENNICK, *Amherst College*; PROFESSOR WILFRID SELLARS, *University of Pittsburgh*.

**PHYSICS:** PROFESSOR SANBORN C. BROWN, *Massachusetts Institute of Technology*; PROFESSOR STEFAN MACHLUP, *Western Reserve University*.

**POLITICAL SCIENCE:** PROFESSOR PETER BACHRACH, *Bryn Mawr College*; PROFESSOR HOLLAND HUNTER, *Haverford College*; PROFESSOR DUANE LOCKARD, *Princeton University*; PROFESSOR JOSEPH S. NYE, *Harvard University*; PROFESSOR FRANCIS E. ROURKE, *Johns Hopkins University*; PROFESSOR DANKWART A. RUSTOW, *Columbia University*; MR. JEROME N. SLATER, *The Brookings Institution*.

**PSYCHOLOGY:** PROFESSOR RICHARD CRUTCHFIELD, *University of California at Berkeley*; PROFESSOR SYLVIA FARNHAM-DIGGORY, *Carnegie Institute of Technology*; DR. DAVID ROSENHAN, *Educational Testing Service*; DR. BENJAMIN SACHS, *Rutgers—The State University*; PROFESSOR DAVID WILLIAMS, *University of Pennsylvania*; PROFESSOR CARL ZUCKERMAN, *Brooklyn College*.

**SOCIOLOGY AND ANTHROPOLOGY:** PROFESSOR SEYMOUR LEVENTMAN, *University of Pennsylvania*; PROFESSOR JAMES PEACOCK, *Princeton University*.

# DEGREES CONFERRED

June 12, 1967

BACHELOR OF ARTS

*In the Division of the Humanities*

ELIZABETH F. ABEL (English Literature)	JEAN MARY HALLORAN (English Literature)
PENELOPE OWENS ADELMANN * (Religion)	DEBORAH RACHEL HAMERMESH (Mathematics)
HANNAH G. AIZUPITIS (English Literature)	STEPHEN FREDERIC HAMILTON (History)
A. JULIA ALISSANDRATOS (Russian)	ROBIN HANNAY (Fine Arts)
WARD CHRISTOPHER ALLEN (English Literature)	JILL M. HAYS (English Literature)
JERROLD BURTON ALPERN (History)	MARGARET HERITAGE (English Literature)
JANE LAUREN ALPERT (Greek)	MARGARET HEYMAN (History)
LAWRENCE EDWARD ARNSTEIN (English Literature)	NANCY ALLEN HIGH (History)
SUE S. ASHBURN (Music)	MARC E. HOFSTADTER (French)
JANET A. BARRETT (History)	MARGARET ANNE HOLMBERG (Psychology)
JUDY LEE BARTELLA (Fine Arts)	KAETE BRITTIN HONIG (French)
JOAN CLARA BASSIN (English Literature)	CATHERINE ALISON HYDER (Fine Arts)
MARSHALL HOWARD BEIL (History)	CECELIA MARGARET JOHNSON (Religion)
RUTH CLAIRE BERNARD (English Literature)	ZACHARY BRUCE KASS (English Literature)
CHRISTINA CHIKNAS BERRYMAN (Greek)	CHRISTINA POOLE KRESH * (French)
CAROL TINQUE BLAKELY (Psychology)	THOMAS R. LARGE (English Literature)
JOHN CHRISTOPHER BROWN (English Literature)	ULLE LEPASAAR (Fine Arts)
JENNIE BOYD BULL (English Literature)	JOHN CHARLES LEWIS (English Literature)
SUSAN ALISON BUTTS (Latin)	JANE LOUISE LICHTENBERG (English Literature)
ROBERT JAMES CHAMPLIN (Music)	RICHARD HARRISON MARTIN (Fine Arts)
BARBARA ANN CLEAVELAND (History)	STEPHEN BENNETT MAURER (Mathematics)
PRISCILLA ROLLIN COIT (Fine Arts)	THOMAS PETER METCALF (History)
ROBERT DANDRIDGE COOTER (Psychology)	JANET MOSHER MUNNECKE (English Literature)
JANE ANN COPPOCK (Music)	TRUDI ANN MARGIT NADAS (History)
JOSEPHINE BLAIR DEAN (History)	ALEXANDER NEHAMAS (Philosophy)
STEPHEN M. DIAMOND (History)	SAMUEL CHAMBERLIN NEWBURY (English Literature)
JOAN ELIZABETH DICKEY (Fine Arts)	CAROLA NORTON (History)
LISSA WELLS D'ORLANDO (English Literature)	DULANY YOUNG OGDEN (English Literature)
JOHN WYATT DURHAM, III (Greek)	SHERIDAN PHILLIPS (Psychology)
JANINE E. FAY (Fine Arts)	VIVIAN POTTER (Fine Arts)
TONIA FELIX (History)	JEAN EDA POWERS (History)
BARBARA FINCH (English Literature)	WALTER COYTE PRENTICE (History)
CANDIDA MERRILL FRAZE (Fine Arts)	ROBERT BRANT RARDIN, II (Russian)
GREGORY ARTHUR GIBSON (English Literature)	MARK ALAN ROBERTS (French)
SUSAN CLARE GLUCK (History)	FRANCES ELIZABETH ROCKWELL (English Literature)
HARRIET ELLEN GOLDMAN (English Literature)	MIRIAM ROSEN (Fine Arts)
PAMELA WILLARD GORE (German)	
NICOLETTA GRIMOLDI (Latin)	

\* As of the Class of 1966.

CHARLES MICHAEL ROSENBERG (Fine Arts)	MARY BARBARA STUBBS (English Literature)
SUSAN JEAN SCHAAL (Fine Arts)	KENNETH TURAN (History)
DAVID M. SCHAPS (Greek)	RANDALL VICTORIA WARNER (Greek)
SONIA ELLEN SCHLENER (English Literature)	MARIAN RUSK WHITE (Russian)
JOEL HENRY SCHULTZ (Greek)	DOROTHY ELIZABETH WILSON (Fine Arts)
J. DAVID SCOTT (History)	NANCY WORRELL (Spanish)
ROGER SHATZKIN (English Literature)	THOMAS MATTHEW WRIGHT (History)
ANNE LANE SHELDON (English Literature)	VIRGINIA ELIZABETH WRIGHT (English Literature)
ABBOTT SMALL (English Literature)	STEPHEN CAMPBELL YEAZELL (English Literature)
PAUL ALBERT SONBERG (History)	
GEORGE H. STEIN (Mathematics)	

*In the Division of the Social Sciences*

FRANCIS HOPKIRK ACKERMAN (Economics)	HEIDI IRMGARD HARTMANN (Economics)
DONALD J. ADAMS (Sociology-Anthropology)	MICHAEL ERNEST HERBERT (Political Science)
CHARLES RAY BAILEY (History)	STEPHEN BALLINGER HITCHNER, JR. (Economics)
JOHN WALLACE BANCROFT (History)	SANDRA LYNN HOFFERTH (Sociology-Anthropology)
DAVID GREGORY BATTIS (Political Science)	ROBERT TELFORD HOVEY (Psychology)
ELIZABETH JAMES BIXLER (History)	DOUGLAS BENJAMIN HURON (Political Science)
LINDA BETH BLATTENBERGER (Economics)	BARBARA PERRY INGERSOLL (Political Science)
JOHN CHARLES BOOSER (Economics)	GLADYS HUGHES IRISH (Political Science)
ERIC STEPHEN BROWN (Economics)	WILLIAM SHERRILL JACOBS (Economics)
HOWARD JEFFREY BROWN (Political Science)	GEOFFREY STEPHAN JOSEPH (Philosophy)
MARGARET ANNE BURKS (Psychology)	PETER JOACHIM KATZENSTEIN (Political Science)
LUCRETIA ELLEN CHURCHILL (History)	RUSSELL GEORGE KIMURA (Economics)
THOMAS DUDLEY COFFMAN (Political Science)	INGRID FRANCES CATHERINE WIENER KRAUS (History)
WILMER DAYTON COLES, JR. (Economics)	DAVID DENNIS LAITIN (Political Science)
ANDREW D. COOK (History)	JANE LANG (History)
VICTORIA ANN DAILEY (Economics)	THOMAS WALTER LAQUEUR (Philosophy)
GILLIAN HENDRIKA DEAN (Political Science)	DONALD STUART MARRITZ (History)
SHARON DEEVEY (History)	SUSAN TUCKER MCROLF (History)
EDITH EMILIE DUBOSE (Psychology)	EVAN BOWEN METCALF (History)
MARY ELIZABETH ELLIOT (History)	JOYCE LYNNE MILTON (Political Science)
ALAN WINTHROP FAIRBANK (Political Science-International Relations)	MARILYN JOY MOOHR (Political Science)
EDWARD TACHUAN FEI (Political Science)	ROBERT GRANT MURRAY (Economics)
JON L. FLEISCHAKER (History)	ERIC REED NELSON (Economics)
SUSAN ELIZABETH FOSTER (History)	JOHN EDWARD NORMAN (Philosophy)
E. WAYNE FRAZER, JR. (Economics)	RICHARD DAVIES PARKER (History)
GAYE ELLEN GOODMAN (Psychology)	ANTHONY J. PERRI (Political Science)
MARY ELLEN GRAFFLIN (Political Sci- ence-International Relations)	JAMES ROY PREDMORE (History)
JUDITH REED GRAYBEAL (Political Science)	SPENCER COLE PUTNAM (Political Science)
VERNON TOWNES GRIZZARD, III (History)	
JONATHAN ROGERS HARRIS (History)	

ELENOR GIBSON REID (History)  
 KATHARINE RUBIO (Political Science)  
 RAYMOND W. SASS, JR. (Psychology)  
 KAREN ROSE SEASHORE (History)  
 KELVIN LEE SEIFERT (Psychology)  
 MAITLAND STEWART SHARPE  
 (Political Science)  
 PHILIP JAMES SHEA (History)  
 MARK LEE SHERKOW (Political Science-  
 International Relations)  
 CLIFFORD JAY SIMON (Economics)  
 JAMES ALBERT SMITH (Economics)  
 LINFORD RUSSELL SMITH (History)  
 ADRIA STEINBERG (History)  
 LESLIE CYTHERA STEWART (Psychology)  
 SHIGEO TAKENAKA (Political Science-  
 International Relations)

DEBORAH HUCKEL TAYLOR (History)  
 PHYLLIS MAY TEITELBAUM  
 (Psychology)  
 LINDA LOUISE TURNER (History)  
 MENNO VAN WYK (Political Science)  
 ROBERT FREDERICK WEBER  
 (Political Science)  
 PHEBE WHEELER (Political Science)  
 ROGER WIRINGA WHITE \* (Economics)  
 LINDA ANN WILES (Psychology)  
 DANIEL J. WISE (Political Science)  
 KURT GUNTHER GEORG WOLFF, III  
 (Political Science)  
 JOHN CADWALLADER WOOD  
 (Economics)  
 ROBERT HENRY WOODROW, III  
 (Political Science)

*In the Division of the Natural Sciences*

SUSAN ELISE ANDERSEN (Physics)  
 FRANKLIN JAY APFEL (Zoology)  
 JANET MIRIAM BAECKER (Zoology)  
 TERESA LEE BARMATZ (Chemistry)  
 BARBARA JEANNE BELL (Biology)  
 MARILYN LYNEA BLACK (Botany)  
 MEREDITH ANN BROWN (Chemistry)  
 ROD J. CHRONISTER (Zoology)  
 BERNI PATRICIA DAVIS (Chemistry)  
 PETER JAY DELMONTE (Zoology)  
 ELIZABETH ANTONIE DEVECIS (Biology)  
 ROBERT ALLEN DOUGHTY (Zoology)  
 ANDREW LEIGH FABER (Physics)  
 RONALD A. FEIGIN (Zoology)  
 HENRY ARTHUR FELDMAN  
 (Mathematics)  
 JOHANNAH ELLEN FINE (Zoology)  
 LESLIE CAROL FOSTER (Zoology)  
 JEFFREY CARL FREEDMAN (Chemistry)  
 STEVEN G. GOLDBLATT (Chemistry)  
 JUDITH ALLEN GRAHAM (Biology)  
 ROBERT VICTOR GRAVES (Chemistry)  
 H. RICHARD GURINSKY (Physics)  
 LOREN MICHAEL HANAU (Chemistry)  
 STEPHEN ALLEN HEIFETZ (Zoology)  
 THOMAS KNIGHT HODOUS (Zoology)  
 KATHY ANN HUBENET (Zoology)  
 MARK HUBERMAN (Physics)  
 CHARLES MORGAN HUNTER (Chemistry)  
 CAROL ELIZABETH JABLON (Psychology)  
 NEVIN MARGOLIS KATZ (Chemistry)  
 ROBERT W. KNEISLEY (Chemistry)  
 PAULA JEAN LAWRENCE (Biology)  
 WILLIAM TOLIVER LIVINGSTON, III  
 (Psychology)

RICHARD JOHN MEYER (Zoology)  
 WILLIAM A. MITCHELL, III  
 (Psychology)  
 CHARLOTTE SUSAN MUNCH (Botany)  
 RICHARD ARTHUR NEWMAN  
 (Philosophy)  
 HEINER FRIEDRICH WILHELM PAETZOLD  
 (Chemistry)  
 JOHN ARTHUR PANCOAST (Botany)  
 MARY TEMPLE PORTER (Botany)  
 MARGERY POST (Chemistry)  
 EDWARD F. RABE, JR. (Biology)  
 RUDOLF VON BITTER RUCKER  
 (Mathematics)  
 NIELS DANIEL SCHONBECK (Chemistry)  
 JONATHAN W. STEWART (Mathematics)  
 JOHN VAN NESTE TALMAGE, III  
 (Chemistry)  
 MARGARET HELEN TANNER (Zoology)  
 RICHARD BERT VALLEE (Biology)  
 JAN WILLEM VAN DER SANDE (Physics)  
 ISABEL NANCY VREELAND (Biology)  
 ELSA BETH WALDBAUM (Chemistry)  
 PHYLLIS M. WANG (Zoology)  
 ROBERT SEIDEL WEINSTEIN (Zoology)  
 MARK WEISS (Chemistry)  
 MICHAEL DAVID WERTHEIMER  
 (Zoology)  
 LISA ANN WEYMOUTH (Zoology)  
 S. GAIL WILSON (Chemistry)  
 DAVID HAYNES WISE (Zoology)  
 JOHN THORNTON WRIGHT (Psychology)  
 ARNOLD W. YANOF (Physics)  
 RICHARD JAMES YEAGER (Mathematics)

\* As of the Class of 1966.

## BACHELOR OF SCIENCE

### *In the Division of Engineering*

FRANKLIN H. BRIGGS, IV (Electrical Engineering)	HOWARD ROY LAYTON (Mechanical Engineering)
GERALD F. CRAIG (Civil Engineering)	FREDERICK GORDON SMITH, JR. (Civil Engineering)
WARREN STANTON GIFFORD (Electrical Engineering)	CLEMENT TINGLEY (Civil Engineering)
WILLIAM MOYER HAUSER (Mechanical Engineering)	FREDERICK ATTILLA WEBSTER (Civil Engineering)
CHRIS EDWIN HORTEN (Mechanical Engineering)	EUGENE MCKEE WEEKS, II (Mechanical Engineering)
CHARLES RICHARD LANSBERRY (Civil Engineering)	

## MASTER OF ARTS

NAHIDE GUN GOKKAYA	Astronomy
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## HONORARY DEGREES

DOCTOR OF FINE ARTS	EVAN H. TURNER
DOCTOR OF LAWS	KENNETH E. BOULDING
DOCTOR OF LAWS	ROSAMOND CROSS
DOCTOR OF LAWS	WILLIAM W. SCRANTON
DOCTOR OF LAWS	CLAUDE C. SMITH



# AWARDS AND DISTINCTIONS

June 12, 1967

## HONORS AWARDED BY THE VISITING EXAMINERS

### HONORS:

Elizabeth F. Abel, Charles Ray Bailey, John Wallace Bancroft, Janet A. Barrett, David Gregory Battis, Carol Tinqué Blakely, Linda Beth Blattenberger, Eric Stephen Brown, Lissa Wells D'Orlando, Edward Tachuan Fei, Leslie Carol Foster, Jeffrey Carl Freedman, Susan Clare Gluck, Harriet Ellen Goldman, Jean Mary Halloran, Deborah Rachel Hamermesh, Stephen Frederic Hamilton, Heidi Irmgard Hartmann, Gladys Hughes Irish, Carol Elizabeth Jablon, Thomas Walter Laqueur, Richard John Meyer, Marilyn Joy Moohr, Janet Mosher Munnecke, John Edward Norman, Anthony J. Perri, Jean Eda Powers, Mark Alan Roberts, Abbott Small, Adria Steinberg, Richard Bert Vallee, Jan Willem Van der Sande, Mark Weiss.

### HIGH HONORS:

Francis Hopkirk Ackerman, Jane Lauren Alpert, Janet Miriam Baecker, Teresa Lee Barmatz, Ruth Claire Bernard, Jennie Boyd Bull, Robert Dandridge Cooter, Stephen M. Diamond, Andrew Leigh Faber, Henry Arthur Feldman, Warren Stanton Gifford, Nicoletta Grimoldi, Jill M. Hays, Mark Huberman, Douglas Benjamin Huron, David Dennis Laitin, Evan Bowen Metcalf, Alexander Nehamas, Eric Reed Nelson, Carola Norton, Richard Davies, Parker, Miriam Rosen, Sonia Ellen Schlener, Maitland Stewart Sharpe, Philip James Shear, George H. Stein, Phyllis May Teitelbaum, Arnold W. Yanof, Stephen Campbell Yeazell.

### HIGHEST HONORS:

Geoffrey Stephan Joseph, Peter Joachim Katzenstein, Stephen Bennett Maurel, David M. Schaps.

## DISTINCTION IN COURSE AWARDED BY THE FACULTY

Franklin H. Briggs, IV, Lucretia Ellen Churchill, Barbara Ann Cleaveland, Josephine Blair Dean, Peter Jay Delmonte, Robert Allen Doughty, John Wyatt Durham, III, Robin Hannay, William Moyer Hauser, Stephen Ballinger Hitchner, Jr., Marc E. Hofstadter, William Sherrill Jacobs, Jane Lang, Charlotte Susan Munch, Mary Temple Porter, Spencer Cole Putnam, Robert Brant Rardin II, Niels Daniel Schonbeck, Joel Henry Schultz, Mary Barbara Stubbs, S. G. Wilson, David Haynes Wise.

## ELECTIONS TO HONORARY SOCIETIES

### PHI BETA KAPPA:

Elizabeth F. Abel, Francis Hopkirk Ackerman, Janet Miriam Baecker, Teresa Lee Barmatz, Ruth Claire Bernard, Linda Beth Blattenberger, Barbara Ann Cleaveland, Josephine Blair Dean, Stephen M. Diamond, John Wyatt Durham, III, Andrew Leigh Faber, Henry Arthur Feldman, Warren Stanton Gifford, Deborah Rachel Hamermesh, William Moyer Hauser, Stephen Ballinger Hitchner, Jr., Mark Huberman, William Sherrill Jacobs, Geoffrey Stephan Joseph, Peter Joachim Katzenstein, David Dennis Laitin, Jane Lang, Stephen Bennett Maurel, Charlotte Susan Munch, Janet Mosher Munnecke, Eric Reed Nelson, Carola Norton, Jean Eda Powers, Robert Brant Rardin II, Miriam Rosen, David M.

Schaps, Joel Henry Schultz, Philip James Shea, Phyllis May Teitelbaum, S. Gail Wilson, David Haynes Wise, Arnold W. Yanof, Stephen Campbell Yeazell.

SIGMA XI:

Janet Miriam Baecker, Teresa Lee Barmatz, Franklin H. Briggs, IV, Peter Jay Delmonte, Robert Allen Doughty, Andrew Leigh Faber, Henry Arthur Feldman, Leslie Carol Foster, Warren Stanton Gifford, Nahide Gun Gokkaya, Deborah Rachel Hamermesh, William Moyer Hauser, Mark Huberman, Stephen Bennett Maurer, Charlotte Susan Munch, Niels Daniel Schonbeck, Jan Willem Van der Sande, Robert Seidel Weinstein, S. Gail Wilson, David Haynes Wise, Arnold W. Yanof.

SIGMA TAU:

Franklin H. Briggs, IV, Warren Stanton Gifford, William Moyer Hauser.

SWARTHMORE COLLEGE FELLOWSHIP AWARDS

*The Hannab A. Leedom Fellowship to NICOLETTA GRIMOLDI.*  
*The Joshua Lippincott Fellowship to HARRIET ELLEN GOLDMAN.*  
*The John Lockwood Memorial Fellowship to PHEBE WHEELER.*  
*The Lucretia Mott Fellowship to CAROLA NORTON.*

SPECIAL AWARDS \*

*The Ivy Award to FRANKLIN JAY APFEL.*  
*The Oak Leaf Award to ELENOR GIBSON REID.*  
*The McCabe Engineering Award to WILLIAM MOYER HAUSER.*  
*The Sarah Kaighn Cooper Scholarship to RAY P. McCLAIN.*  
*The John Russell Hayes Poetry Prizes: for an original poem, JOHN BENDITT; for a verse translation, JOEL SCHULTZ.*  
*The Lois Morrell Poetry Awards: MIRIAM A. FRIEDLANDER.*  
*The William Plumer Potter Public Speaking Fund Awards:*  
The Potter One-Act Play Contest: prizes awarded to LAWRENCE ARNSTEIN, MELISSA CANNON, JEFFREY JONES, and JUDITH McNALLY.  
The Potter Short Story Contest: first prize, THOMAS LARGE, second prize, TERESA HEALY, third prize, ERIC CLEVER.  
*The A. Edward Newton Library Prize to MARC HOFSTADTER.*  
*The Phi Beta Kappa Prize to MICHAEL ALEXANDER.*  
*The Scott Award to ROGER F. WOOD.*  
*The Katherine B. Sicard Prize to BARBARA GOULDER.*

\* A description of each of these awards can be found in another section of the catalogue.

## Enrollment of Students by Classes—1966-67

	<i>Men</i>	<i>Women</i>	<i>Total</i>
Seniors .....	133	113	246
Juniors .....	117	90	207
Sophomores .....	143	132	275
Freshmen .....	149	123	272
Total Undergraduates .....	542	458	1,000
Special Students .....	4	5	9
Graduate Student .....	0	1	1
Totals .....	546	464	1,010

## Geographical Distribution—1966-67

New York .....	186	Kansas .....	2
Pennsylvania .....	164	North Dakota .....	2
New Jersey .....	82	Idaho .....	1
California .....	55	Louisiana .....	1
Massachusetts .....	55	Oklahoma .....	1
Connecticut .....	44	Canal Zone .....	2
Maryland .....	42	Puerto Rico .....	1
Ohio .....	37		
Virginia .....	31	Total United States .....	967
Delaware .....	22	Colombia .....	5
Illinois .....	22	Canada .....	4
Michigan .....	21	France .....	4
District of Columbia .....	20	Mexico .....	3
North Carolina .....	17	Brazil .....	2
Florida .....	16	England .....	2
Colorado .....	11	Greece .....	2
Wisconsin .....	11	Italy .....	2
Minnesota .....	10	Japan .....	2
Tennessee .....	10	Peru .....	2
Texas .....	10	Afghanistan .....	1
Washington .....	10	Algeria .....	1
Maine .....	8	Chile .....	1
Missouri .....	7	Ecuador .....	1
New Hampshire .....	7	Germany .....	1
Georgia .....	6	Ghana .....	1
Indiana .....	6	Liberia .....	1
Kentucky .....	6	Malawi .....	1
South Carolina .....	6	Netherlands .....	1
Iowa .....	5	Panama .....	1
Oregon .....	4	Seychelles .....	1
Rhode Island .....	4	Switzerland .....	1
Vermont .....	4	Taiwan .....	1
Arizona .....	3	Thailand .....	1
Hawaii .....	3	Turkey .....	1
Nebraska .....	3		
New Mexico .....	3	Total from abroad .....	43
West Virginia .....	3	Grand Total .....	1,010
Alabama .....	2		

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# Plan of the Grounds of Swarthmore College

## Map of College and Key

- |    |   |    |   |
|----|---|----|---|
| 1  | <i>Wharton Hall</i>                                   | 29 | <i>Kappa Sigma Pi Fraternity Lodge</i>              |
| 2  | <i>Sproul Observatory</i>                             | 30 | <i>Worth Dormitory</i>                              |
| 3  | <i>Hall Gymnasium</i>                                 | 31 | <i>Woolman House</i>                                |
| 4  | <i>Parrish Hall</i>                                   | 32 | <i>Tau Alpha Omicron Fraternity Lodge</i>           |
| 4A | <i>Parrish Hall Annex</i>                             | 33 | <i>Bond Memorial and Lodges</i>                     |
| 5  | <i>Hockey Fields</i>                                  | 34 | <i>Bartol Foundation</i>                            |
| 6  | <i>Tennis Courts</i>                                  | 35 | <i>Clothier Memorial</i>                            |
| 7  | <i>Beardsley Hall</i>                                 | 36 | <i>Scott Outdoor Auditorium</i>                     |
| 8  | <i>Trotter Hall</i>                                   | 37 | <i>Employees' Houses</i>                            |
| 9  | <i>McCabe Library</i>                                 | 38 | <i>Lamb-Miller Field House</i>                      |
| 10 | <i>College Library and Friends Historical Library</i> | 39 | <i>Service Building</i>                             |
| 11 | <i>Student Arts Center</i>                            | 40 | <i>Edward Martin Building and Animal Laboratory</i> |
| 12 | <i>Students Observatory</i>                           | 41 | <i>Bassett House</i>                                |
| 13 | <i>The Benjamin West House</i>                        | 42 | <i>Palmer Hall</i>                                  |
| 14 | <i>The Meeting House</i>                              | 43 | <i>Pittenger Hall</i>                               |
| 15 | <i>Professors' Residences</i>                         | 44 | <i>Roberts Hall</i>                                 |
| 16 | <i>The President's House</i>                          | 45 | <i>Prep Gymnasium</i>                               |
| 17 | <i>Willetts Dormitory</i>                             | 46 | <i>Mary Lyon</i>                                    |
| 18 | <i>Pierre S. duPont Science Building</i>              | 47 | <i>Clothier Fields</i>                              |
| 19 | <i>Heating Plant</i>                                  | 48 | <i>Scott Foundation Building</i>                    |
| 20 | <i>Robinson House</i>                                 | 49 | <i>Hydraulic Laboratory</i>                         |
| 21 | <i>The Sharples Pool</i>                              | 50 | <i>Ashton House</i>                                 |
| 22 | <i>Whittier House</i>                                 | 51 | <i>Sharples Dining Hall</i>                         |
| 24 | <i>Hicks Hall</i>                                     | 52 | <i>Worth Health Center</i>                          |
| 25 | <i>The Penna. R. R. Swarthmore Station</i>            | 53 | <i>Barn</i>   |
| 26 | <i>Phi Omicron Psi Fraternity Lodge</i>               | 54 | <i>Hallowell Dormitory</i>                          |
| 27 | <i>Delta Upsilon Fraternity Lodge</i>                 | 55 | <i>Dana Dormitory</i>                               |
| 28 | <i>Phi Sigma Kappa Fraternity Lodge</i>               |    |   |



*Plan of the Grounds  
of  
Swarthmore College*

