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# SWARTHMORE COLLEGE BULLETIN

CATALOGUE ISSUE  
1959-1960



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SWARTHMORE - PENNSYLVANIA

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



## Honors in Engineering Sciences at Swarthmore

As the Honors program in Engineering Sciences enters its second year, we take this means of again calling the new program to the attention of prospective students, secondary school counselors, and other readers of the college catalogue.

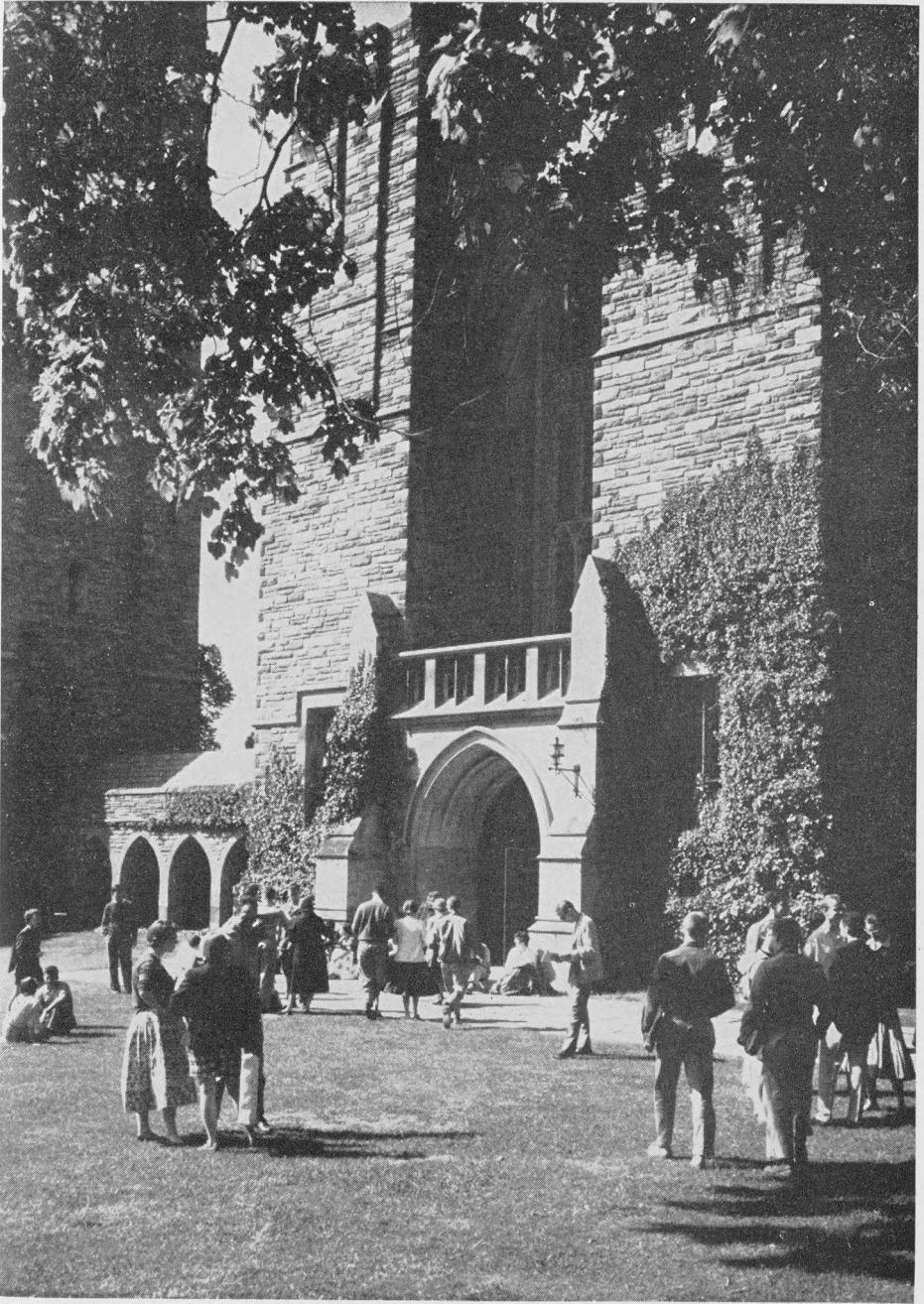
Swarthmore's Engineering curricula are designed for the student of high ability who wishes to combine an intensive and analytical study of engineering principles with the educational advantages of a liberal arts college. In addition to the Honors degree, Bachelor of Science degrees are awarded in Civil, Electrical, and Mechanical Engineering.

The new Honors program, inaugurated in 1958, constitutes a fourth option in Engineering, open to qualified students who have completed the sophomore year. The new curriculum leads to the Bachelor of Science degree with Honors, High Honors, or Highest Honors in Engineering Sciences. Although the degree does not specify a major field such as Civil, Electrical, or Mechanical Engineering, the curriculum is planned to enable the student to prepare for graduate work in one of these fields.

Two features of the Engineering Science Honors program are noteworthy, in addition to its being part of the College's well-known Honors plan. First, it cuts across traditional departmental lines, emphasizing classical and contemporary subject matter that is basic to all fields of engineering. Second, as implied by its title, the program is designed for the student wishing to explore deeply the scientific foundations of modern engineering. We believe that this type of program not only best prepares the able student for creative work in a profession now advancing with explosive speed; it also makes the best use of engineering as the focus of a broad education.

Many readers of the college catalogue will be familiar with the Honors plan of study, first established at Swarthmore in 1922. Under this plan, the student is freed from traditional classroom routine and is encouraged to engage in independent study, carrying his work to an advanced level along lines set by his particular interests and abilities. The plan of Honors study is described on pages 58-60 of the accompanying catalogue. The new program of Honors work in Engineering is fully discussed under the statement of the Division of Engineering, page 89.

Students preferring to concentrate in a particular branch of engineering may apply to major in Civil, Electrical, or Mechanical Engineering at the end of the sophomore year. Details are set forth on pages 89-101 of the catalogue. It is also possible to arrange a five-year program leading to both the Bachelor of Arts and Bachelor of Science degrees.



*Clothier Memorial*



*Parrish Hall*

# SWARTHMORE COLLEGE BULLETIN

CATALOGUE ISSUE

1959-1960

SWARTHMORE, PENNSYLVANIA

Volume LVII      Number 1      September 1959

## Directions for Correspondence

For information about:

### GENERAL COLLEGE POLICY

Courtney Smith, *President*

### ADMISSIONS AND SCHOLARSHIPS

For men: Robert A. Barr, Jr., *Assistant Dean*

For women: Ann E. C. Passoth, *Assistant Dean*

### RECORDS, TRANSCRIPTS AND CATALOGUES

John M. Moore, *Registrar*

### FINANCIAL INFORMATION

Edward K. Cratsley, *Vice-President*

G. Caroline Shero, *Assistant Controller*

### VOCATIONAL PLACEMENT AND GUIDANCE

Maralyn Orbison, *Director*

### ALUMNI AFFAIRS AND PUBLIC RELATIONS

Joseph B. Shane, *Vice-President*

### GENERAL INFORMATION

Maralyn Orbison, *Director of News Office*

## 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*  
*Assistant to the American Secretary, Aldon Duane Bell*  
*Secretary, Elsa Palmer Jenkins*



## Table of Contents

	PAGE
CALENDAR .....	4
PERSONNEL .....	7
The Corporation and The Board of Managers .....	8
Alumni Association Officers and Alumni Council .....	11
The Faculty .....	13
Divisions and Departments .....	20
Standing Committees .....	21
Administrative Officers and Assistants .....	22
INTRODUCTION TO SWARTHMORE COLLEGE .....	26
Admission .....	30
Expenses .....	33
Student Aid and Scholarships .....	34
Educational Resources .....	43
College Life .....	47
Student Community .....	50
THE EDUCATIONAL PROGRAM .....	53
Program for Freshmen and Sophomores .....	55
Program for Juniors and Seniors .....	57
Reading for Honors .....	58
Pre-Medical Program .....	60
Faculty Regulations .....	62
Requirements for Graduation .....	64
Advanced Degrees .....	64
Awards and Prizes .....	66
Fellowships .....	67
COURSES OF INSTRUCTION .....	69
Astronomy .....	70
Biology .....	72
Chemistry .....	78
Classics .....	82
Economics .....	86
Engineering .....	89
English Literature .....	102
Fine Arts .....	106
History .....	109
International Relations .....	113
Mathematics .....	114
Modern Languages and Literatures .....	117
Music .....	124
Philosophy and Religion .....	127
Physical Education for Men .....	132
Physical Education for Women .....	133
Physics .....	135
Political Science .....	138
Psychology and Education .....	143
Russian Studies .....	148
REFERENCE SECTION .....	149
Visiting Examiners .....	150
Degrees Conferred .....	151
Awards and Distinctions .....	155
Enrollment Statistics .....	157
Selected Publications About Swarthmore College .....	158
Index .....	159
PLAN OF COLLEGE GROUNDS .....	164

# 1959

OCTOBER	NOVEMBER	DECEMBER
S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

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# 1961

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# College Calendar

1959

## Fall Semester

September 16-19	Freshman placement days
September 19	Registration
September 21	Classes and honors seminars begin
October 6	Meeting of the Board of Managers
November 3	Executive Committee of the Board of Managers
November 14	Mid-semester reports due
November 26-29	Thanksgiving recess
December 1	Annual Meeting of the Board of Managers
December 19	Christmas recess begins, 12: 00 noon

1960

January 4	Christmas recess ends, 8: 00 a. m.
January 12	Classes and seminars end
January 13-16	Review period for course students
January 15	Registration for spring semester
January 18	Honors seminars begin for spring semester
January 18	Mid-year examinations begin
January 27	Mid-year examinations end

## Spring Semester

February 1	Classes begin
February 2	Executive Committee of the Board of Managers
March 1	Executive Committee of the Board of Managers
March 26	Mid-semester reports due
March 26	Spring recess begins, 12: 00 noon
April 4	Spring recess ends, 8: 00 a. m.
April 5	Meeting of the Board of Managers
April 30	Honors seminars end
May 3	Executive Committee of the Board of Managers
May 11	Written honors examinations begin
May 14	Classes end
May 16	Enrollment in classes for fall semester
May 16-18	Review period for course students
May 19	Course examinations begin
May 21	Written honors examinations end
May 26-28	Oral honors examinations
May 28	Course examinations end
May 30-June 1	Senior comprehensive examinations
June 3	Meeting of the Board of Managers
June 4	Alumni Day
June 5	Baccalaureate Day
June 6	Commencement Day

# College Calendar (Tentative)

1960

## Fall Semester

September 21-24	Freshman placement days
September 24	Registration
September 26	Classes and honors seminars begin
October 4	Meeting of the Board of Managers
November 1	Executive Committee of the Board of Managers
November 19	Mid-semester reports due
November 24-27	Thanksgiving recess
December 6	Annual Meeting of the Board of Managers
December 20	Christmas recess begins, 5: 00 p. m.

1961

January 4	Christmas recess ends, 8: 00 a. m.
January 17	Classes and seminars end
January 20	Registration for spring semester
January 18-21	Review period for course students
January 23	Honors seminars begin for spring semester
January 23	Mid-year examinations begin
February 1	Mid-year examinations end

## Spring Semester

February 6	Classes begin
February 7	Executive Committee of the Board of Managers
March 7	Executive Committee of the Board of Managers
March 25	Mid-semester reports due
March 25	Spring recess begins, 12: 00 noon
April 3	Spring recess ends, 8: 00 a. m.
April 4	Meeting of the Board of Managers
May 2	Executive Committee of the Board of Managers
May 6	Honors seminars end
May 17	Written honors examinations begin
May 20	Classes end
May 22	Enrollment in classes for fall semester
May 22-24	Review period for course students
May 25	Course examinations begin
May 27	Written honors examinations end
June 1-3	Oral honors examinations
June 3	Course examinations end
June 5-7	Senior comprehensive examinations
June 9	Meeting of the Board of Managers
June 10	Alumni Day
June 11	Baccalaureate Day
June 12	Commencement Day

The Corporation

Board of Managers

PERSONNEL

OF

SWARTHMORE COLLEGE

## The Corporation

- CLAUDE C. SMITH, *President*  
1617 Land Title Building, Philadelphia 10, Pa.
- PHILIP T. SHARPLES, *Vice-President*  
23rd and Westmoreland Streets, Philadelphia 40, Pa.
- ELEANOR STABLER CLARKE, *Secretary*  
Crumwald Farm, Wallingford, Pa.
- JOSEPH B. SHANE, *Assistant Secretary*  
Swarthmore College, Swarthmore, Pa.
- E. LAWRENCE WORSTALL, *Treasurer*  
Broad and Chestnut Streets, Philadelphia 1, Pa.
- EDWARD K. CRATSLEY, *Assistant Treasurer*  
Swarthmore College, Swarthmore, Pa.

## Board of Managers

### *Ex officio*

COURTNEY SMITH, Swarthmore College, Swarthmore, Pa.

### *Emeriti*

- RUTH POTTER ASHTON, 409 Elm Avenue, Swarthmore, Pa.
- ELISABETH HALLOWELL BARTLETT, 1922 Mount Royal Terrace, Baltimore 17, Md.
- ELSIE PALMER BROWN, 1622 Twenty-ninth Street, N.W., Washington 7, D. C.
- ISAAC H. CLOTHIER, JR., 801 Market Street, Philadelphia 5, Pa.
- MARY LIPPINCOTT GRISCOM, 314 East Central Avenue, Moorestown, N. J.
- EDITH WILSON JACKSON, 317 North Chester Road, Swarthmore, Pa.
- NICHOLAS KELLEY, 70 Broadway, New York 4, N. Y.
- BARCLAY WHITE, 3337 Market Street, Philadelphia 4, Pa.

### *Life Members*

- ELEANOR STABLER CLARKE, Crumwald Farm, Wallingford, Pa.
- HADASSAH M. L. PARROT, 1025 Westview Street, Philadelphia 19, Pa.
- CLAUDE C. SMITH, 1617 Land Title Building, Philadelphia 10, Pa.
- HELEN GAWTHROP WORTH, 805 Augusta Road, Westover Hills, Wilmington 6, Del.

### *Term Expires December, 1959*

- BOYD T. BARNARD, 914 Philadelphia National Bank Building, Philadelphia 7, Pa.
- GEORGE B. CLOTHIER, 1418 Packard Building, Philadelphia 2, Pa.
- HILDA LANG DENWORTH, 301 Elm Ave., Swarthmore, Pa.
- THOMAS B. MCCABE, Front and Market Streets, Chester, Pa.
- ANNE ENGLE TAYLOR, 8240 Fairview Road, Philadelphia 17, Pa.
- WILLIAM H. WARD, 630 Strath Haven Avenue, Swarthmore, Pa.
- JOSEPH H. WILLITS, North Greenwich Road, Armonk, New York
- \*CLEMENT M. BIDDLE, JR., 230 Oakridge Avenue, Summit, New Jersey
- \*ELIZABETH CARVER PRESTON, 60 Dogwood Lane, Swarthmore, Pa.

---

\* Nominated by the Alumni Association.

*Term Expires December, 1960*

H. THOMAS HALLOWELL, JR., Highland and Kenmore Avenues, Jenkintown, Pa.  
C. NORMAN STABLER, 230 West Forty-first Street, New York, N. Y.  
HOWARD S. TURNER, 103 Lebanon Hills Drive, Pittsburgh 28, Pa.  
NORMAN H. WINDE, Ridley Creek Road, R. D. 2, Media, Pa.  
\*ESTHER RIDPATH DELAPLAINE, 6402 West Halbert Road, Bethesda 14, Md.  
\*RICHARD H. McFEELY, George School, Bucks County, Pa.

*Term Expires December, 1961*

ELINOR ROBINSON PENNOCK, 2300 Willard Street, Wilmington 6, Del.  
KATHRYN SONNEBORN READ, 5407 Atlantic Avenue, Ventnor, N. J.  
PHILIP T. SHARPLES, 23rd and Westmoreland Streets, Philadelphia 40, Pa.  
E. LAWRENCE WORSTALL, 33 Dudley Avenue, Lansdowne, Pa.  
\*MORRIS L. HICKS, 205 College Avenue, Swarthmore, Pa.  
\*RUTH JACKSON BOONE, 7420 Wyndale Lane, Chevy Chase 15, Md.

*Term Expires December, 1962*

RICHARD C. BOND, 1300 Market St., Philadelphia, Pa.  
ARTHUR F. BURNS, 2 Tudor City Place, New York, N. Y.  
VIRGINIA STRATTON CORNELL, Central Valley, N. Y.  
CHARLES C. PRICE, III, 118 Hilldale Rd., Lansdowne, Pa.  
ALFRED H. WILLIAMS, Regency Rm., Wanamaker Bldg., Philadelphia 7, Pa.  
\*ROBERT M. BROWNING, 7305 Emlen St., Philadelphia 19, Pa.  
\*SUE THOMAS TURNER, East Valley Rd., Alfred Station, N. Y.

COMMITTEES OF THE BOARD

*The President is ex-officio a member of every Committee*

*Executive*

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ELEANOR STABLER CLARKE  
HILDA LANG DENWORTH  
H. THOMAS HALLOWELL, JR.  
THOMAS B. McCABE  
HADASSAH M. L. PARROT

PHILIP T. SHARPLES  
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JOSEPH H. WILLITS  
NORMAN H. WINDE  
E. LAWRENCE WORSTALL  
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ESTHER RIDPATH DELAPLAINE  
HILDA LANG DENWORTH  
HADASSAH M. L. PARROT

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HOWARD S. TURNER  
JOSEPH H. WILLITS  
HELEN GAWTHROP WORTH

\* Nominated by the Alumni Association.

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ROBERT M. BROWNING

VIRGINIA STRATTON CORNELL  
MORRIS L. HICKS  
KATHRYN SONNEBORN READ  
ANNE ENGLE TAYLOR

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PHILIP T. SHARPLES

C. NORMAN STABLER  
WILLIAM H. WARD  
ALFRED H. WILLIAMS  
E. LAWRENCE WORSTALL

### Student Activities

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CLEMENT M. BIDDLE, JR.  
ELEANOR STABLER CLARKE  
RICHARD H. McFEELY  
ELIZABETH CARVER PRESTON

CHARLES C. PRICE, III  
KATHRYN SONNEBORN READ  
HOWARD S. TURNER  
SUE THOMAS TURNER  
NORMAN H. WINDE

### Nominating

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H. THOMAS HALLOWELL, JR.  
THOMAS B. McCABE

HADASSAH M. L. PARROT  
WILLIAM H. WARD  
HELEN GAWTHROP WORTH

### Development

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BOYD T. BARNARD  
ROBERT M. BROWNING  
ELEANOR STABLER CLARKE  
GEORGE B. CLOTHIER

MORRIS L. HICKS  
THOMAS B. McCABE  
HADASSAH M. L. PARROT  
HOWARD S. TURNER  
WILLIAM H. WARD



## Alumni Association Officers

1959-1961

- President*, ROBERT H. WILSON '31, 603 Harvard Avenue, Swarthmore, Pa.  
*Vice-President for Men*, WILLIAM POOLE '30, 215 Edgewood Drive, Alapocas, Wilmington 3, Del.  
*Vice-President for Women*, ANN LAPHAM FRAZER '38, 146 Scenic Road, Springfield, Pa.  
*Secretary*, KATHARINE WARREN COLES '32, 517 Walnut Lane, Swarthmore, Pa.

## Alumni Council

### Zone A

#### TERM EXPIRES

#### JUNE

- 1960 ROBERT B. CLOTHIER '27, 401 Cornell Ave., Swarthmore, Pa.  
H. MERLE MULLOY '24, Winding Lane, R.D. 3, Media, Pa.  
HARRY M. SELLERS '22, 31 N. Whitehall Road, Norristown, Pa.  
1961 CLIFFORD R. GILLAM, JR. '47, 2015 Hemlock Road, Norristown, Pa.  
GILBERT B. MUSTIN, JR. '42, 211 Cornell Ave., Swarthmore, Pa.  
1962 JOHN ABRAMS '34, 2312 Kenilworth Road, Ardmore, Pa.  
ROBERT H. ASPLUNDH '52, 3144 Manor Road, Huntingdon Valley, Pa.  
1960 LEE WEISS FRANK '21, 1800 Pine Street, Philadelphia 3, Pa.  
MARGARET L. MACLAREN '49, 317 N. Chester Road, Swarthmore, Pa.  
HELEN COLES WOOD '17, 36 Lakeview Drive, Moorestown, N. J.  
1961 CHRISTINE ROBINSON TAYLOR '36, Box 542, Coatesville, Pa.  
LOUISE STUBBS WILLIAMS '34, 40 Dogwood Lane, Swarthmore, Pa.  
1962 BETTY BITTLE JOHNS '38, 420 S. Edgmont Street, Media, Pa.  
CATHARINE EMHARDT MCCOOK '30, 7811 St. Martin's Lane, Philadelphia 18, Pa.

### Zone B

- 1960 ROBERT B. REDMAN '30, 111 N. Walnut St., Apt. 108, East Orange, N. J.  
1961 JAMES L. CRIDER, JR. '33, Peach Hill Road, Darien, Conn.  
GEORGE A. WRIGHT, JR. '41, 12 Burrows Drive, Rochester 10, N. Y.  
1962 LEWIS S. AYARS, JR. '24, 24 Drumlins Terrace, Syracuse 10, N. Y.  
ROBERT F. LEWINE '34, 117 E. 81st Street, New York 28, N. Y.  
1960 MARGARET MEEKER BUSHNELL '45, 120 Heights Road, Ridgewood, N. J.  
1961 ELEANOR YEARSLEY BENNETT '40, 105 North Woods Road, Manhasset, N. Y.  
LILY TILY RICHARDS '29, R. D. 2, Homeward Lane, Weston, Conn.  
1962 MARY GRISCOM COLEGROVE '42, 175 Evandale Road, Scarsdale, N. Y.  
BEVERLY MILLER LLOYD-JONES '52, 132 N. Arlington Ave., East Orange, N. J.

### Zone C

- 1960 ARTHUR F. F. SNYDER '40, 5 Westwood Road, Wellesley 81, Mass.  
ELIZABETH NEWCOMB RAYNER '31, 823 Boston Post Road, Weston, Mass.

### Zone D

- 1961 E. ROSS CLINCHY '41, 10504 Glenhaven Drive, Silver Spring, Md.  
1962 E. WINSLOW COUNCILL '44, 510 Seneca Road, Richmond 26, Va.  
1961 ELINOR P. GRIEST '43, 1405 35th St., N. W., Washington 7, D. C.  
1962 ANNA RIDGWAY LANG '31, 16 Granite Road, Alapocas, Wilmington 3, Del.

### Zone E

- 1960 PORTER R. WRAY '34, 256 Woodhaven Drive, Pittsburgh 28, Pa.  
MARGARET SHOEMAKER DIETZ '42, 401 Chatham Drive, Kettering 9, Ohio

Zone F

- 1961 SELDEN Y. TRIMBLE, IV '28, 2700 S. Virginia St., Hopkinsville, Ky.
- ELIZABETH MALCOLM MURRAY '41, 57 Fairway Drive, Mountain Brook, Ala.

Zone G

- 1961 DAVID W. STICKNEY '31, 1298 N. Green Bay, Lake Forest, Ill.
- 1962 CHARLES A. EBERLE, JR. '40, 229 Rosemont, Webster Groves, Mo.
- 1961 ELIZABETH BLAIR COCHRAN '35, 739 E. Longwood Drive, Lake Forest, Ill.
- 1962 MARY KEAY ADAMS '46, 2706 34th St., Des Moines, Iowa

Zone H

- 1960 GEORGE C. BOND '42, 1230 Wabash Street, Pasadena 3, Calif.
- 1962 JOHN H. MCLAGAN '50, 1545 S. Columbine, Denver, Colo.
- 1960 ELIZABETH GEDDES BAKER '34, 72 Heather Drive, Atherton, Calif.
- 1962 SUE WHITE HULL '43, 5107 Gaynor Avenue, Encino, Calif.

## The Faculty

- COURTNEY SMITH, *President* ..... 324 Cedar Lane  
 B.A., M.A., Ph.D., Harvard University; LL.D., University of Pennsylvania;  
 LL.D., Temple University; L.H.D., Bucknell University.
- EDWARD K. CRATSLEY, *Vice-President (Finance), Controller, and Professor of Eco-  
 nomics* ..... 925 Strath Haven 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 Pro-  
 fessor of Education* ..... Cunningham House  
 B.A., Swarthmore College; M.A., University of Pennsylvania.
- SUSAN P. COBBS, *Dean and Professor of Classics* ..... West House  
 B.A., Randolph-Macon Woman's College; M.A., New York University; Ph.D.,  
 University of Chicago.
- WILLIAM C. H. PRENTICE, *Dean and Professor of Psychology* .... 603 Elm Avenue  
 B.A., Swarthmore College; M.A. and Ph.D., Harvard University.
- JOHN M. MOORE, *Associate Dean, Registrar and Professor of Philosophy,*  
 2 Whittier Place  
 B.A., Park College; B.D., Union Theological Seminary; M.A., Harvard Univer-  
 sity; Ph.D., Columbia University.
- GILMORE STOTT, *Associate Dean, Financial Aid Officer, and Lecturer in Philosophy,*  
 318 Dartmouth Avenue  
 B.A. and M.A., University of Cincinnati; B.A. and M.A., Oxford University;  
 M.A. and Ph.D., Princeton University.
- ROBERT A. BARR, JR., *Assistant Dean for Admissions* ..... 120 South Chester Road  
 B.A., Swarthmore College.
- ANN E. C. PASSOTH, *Assistant Dean for Admissions* ..... Swarthmore College  
 B.A., Swarthmore College.

### EMERITI

- LYDIA BAER, *Associate Professor Emeritus of German* ..... Anna Maria Island, Fla.  
 B.A., Oberlin College; M.A. and Ph.D., University of Pennsylvania.
- ALFRED MANSFIELD BROOKS, *Professor Emeritus of Fine Arts* ... Gloucester, Mass.  
 B.A. and M.A., Harvard University; M.A., Indiana University.
- EDWARD H. COX, *Professor Emeritus of Chemistry* . . . c/o U. S. Embassy, Paris, France  
 B.S., Earlham College; M.A., Harvard University; Docteur és Science, L'Uni-  
 versité de Genève, Docteur honoris causa, L'Université de Montpellier.
- HENRY JERMAIN MAUDE CREIGHTON, *Professor Emeritus of Chemistry,*  
 Tigh-Solas, Glen Margaret, Nova Scotia, Canada  
 B.A., M.A. and LL.D., Dalhousie University; M.Sc., University of Birmingham;  
 D.Sc., Das eidenössische Polytechnikum, Zürich; D.Sc. Swarthmore College.
- PHILIP MARSHALL HICKS, *Professor Emeritus of English Literature* ... Avondale, Pa.  
 B.A. and M.A., Swarthmore College; Ph.D., University of Pennsylvania.
- EVERETT L. HUNT, *Dean Emeritus and Professor Emeritus of English,*  
 221 N. Princeton Avenue  
 B.A., Huron College; M.A., University of Chicago; D.Litt., Huron College.
- WOLFGANG KÖHLER, *Professor Emeritus of Philosophy and Psychology,*  
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- LIBRARY: Lafore, *Chairman*.  
Hoffman, Klees, Philips, Rhys, Shaw, Tolles, Weber, Willis.
- MASTER OF ARTS: Wallach, *Chairman*.  
Brinkmann, Elmore, Fehnel, March, McCrumm.
- PRE-MEDICAL PROGRAM: Madison, *Chairman*.  
Bowie, Brinkmann, Coolidge, Foster, Meinkoth, Spies, Stott.
- PUBLIC AFFAIRS RESEARCH: Pennock, *Chairman*.  
Albertson, Brown, Cratsley, Wilcox.
- RESEARCH: North, *Chairman*.  
Cohn, Cratsley, Elmore, Fehnel, Morrill, Pennock, Wallach.
- SCHEDULE OF CLASSES: Moore, *Chairman*.  
Haight, Moll, Newlin, Rhys, Riesenber, Rosen.
- STUDENT AFFAIRS: Prentice, *Chairman*.  
Beik, Cobbs, Stott, Swing, Tolles.
- TRAVEL ALLOWANCE: van de Kamp, *Chairman*.  
Nachmias, J. Rosenberg, Walker, E. Wright.
- USE OF COLLEGE FACILITIES BY OUTSIDE ORGANIZATIONS: Cook, *Chairman*.  
Davisson, Horn, MacAdam, Prager, Rath, Shane, Stanton, Stetson.
- SECRETARY TO THE FACULTY: Jenkins.

## Administrative Officers and Assistants

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*President*, COURTNEY SMITH, B.A., M.A. and Ph.D., Harvard University; LL.D., University of Pennsylvania; LL.D., Temple University; L.H.D., Bucknell University.

*Assistant to the President*, ALDON DUANE BELL, B.A., University of Oklahoma; B.A., Oxford University.

*Secretary*, MARTHA H. DECROUEZ, B.S., University of Minnesota.

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B.A., College of Wooster; M.B.A. and D.C.S., Harvard University.

*Vice-President—Public Relations and Alumni Affairs*, JOSEPH B. SHANE.

B.A., Swarthmore College; M.A., University of Pennsylvania.

*Secretaries*, DORIS S. MUSGRAVE, MILDRED A. SCOTT.

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WILLIAM C. H. PRENTICE, B.A., Swarthmore College; M.A. and Ph.D., Harvard University.

#### *Associate Dean:*

JOHN M. MOORE, B.A., Park College; B.D., Union Theological Seminary; M.A., Harvard University; Ph.D., Columbia University.

#### *Associate Dean and Financial Aid Officer:*

GILMORE STOTT, B.A. and M.A., University of Cincinnati; B.A. and M.A., Oxford University; M.A. and Ph.D., Princeton University.

#### *Assistant Deans:*

ROBERT A. BARR, JR., B.A., Swarthmore College.

DEBORAH P. MACADAM, B.A., Swarthmore College.

ANN E. C. PASSOTH, B.A., Swarthmore College.

#### *Administrative Assistants:*

MARGARET W. MOORE, B.A., Park College; M.A., Ph.D., Columbia University.

HELEN WHITEWAY.

#### *Consultant in Reading and Language:*

HELEN HALL, B.A., Wellesley College; M.A., Swarthmore College; Ph.D., University of Pennsylvania.

#### *Head Residents in Dormitories:*

ANN E. C. PASSOTH, Willets Hall, B.A., Swarthmore College.

JACQUELINE L. SCHROEDTER, Worth Hall, B.A., University of Arizona.

MARTHA P. SHANE, Robinson House; B.A., Swarthmore College.

VIRGINIA VON FRANKENBERG, Parrish Hall; B.A., University of Nebraska.

MAYME R. WILLIAMS, Willets Hall.

#### *Secretaries to the Deans:*

EMILY BONSALE.

MARGARET CAMPBELL, B.A., Smith College.

MYRTLE R. KEENY, B.A., Dickinson College.

FRANCES WILLS SLAUGH, B.A., Swarthmore College.

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*Secretaries*, MARJORIE L. WEBB, B.A., University of Delaware.  
ROSAMOND W. GARRETT, B.A., Wilson College.

## LIBRARY STAFF

### *College Library*

*Librarian*: CHARLES B. SHAW, B.A., M.A., and L.H.D., Clark University.  
*Technical Services Librarian*: MARTHA A. CONNOR, B.S., M.A., University of Pennsylvania; B.S. in L.S., Drexel Institute.  
*Assistant Librarians*:  
*Cataloging*: ELIZABETH L. HARRAR, B.A., University of Delaware; M.A., University of Pennsylvania; B.S. in L.S., Drexel Institute.  
ELIZABETH S. SHARPLESS, B.A., Swarthmore College; B.S. in L.S., Drexel Institute.  
*Order*: MARY C. KERBAUGH, B.A., University of Pennsylvania; M.S. in L.S., Drexel Institute of Technology.  
*Assistants*: GAIL C. TICKNOR, B.MUS., New England Conservatory of Music; ANN MANGRUM; DORIS PITMAN MOIST.  
*Readers Services Librarian*: HOWARD H. WILLIAMS, B.A., Lake Forest College; M.A., and B.S. in L.S., Columbia University.  
*Assistant Librarians*:  
*Circulation*: DORIS BEIK, B.A., and B.S. in L.S., New York State College for Teachers.  
*Periodicals*: MARY G. TAIT, B.A., Wells College; B.S. in L.S., Drexel Institute.  
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### *Friends Historical Library*

*Director*: FREDERICK B. TOLLES, B.A., M.A., and Ph.D., Harvard University; D.Litt., Haverford College.  
*Assistant Director*: DOROTHY G. HARRIS, B.A., Wellesley College; B.S. in L.S., Drexel Institute; M.A., University of Pennsylvania.  
*Secretarial Assistant*: BETTY LIVERIGHT.  
*Cataloger*: MILDRED HIRSCH, B.S. in L.S., Columbia University.  
*Swarthmore College Peace Collection*:  
*Curator*: MARJORIE V. EDWARDS, B.A., Swarthmore College.  
*Secretarial Assistant*: SALLY F. CHAMBERS.

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CLEMENT M. BIDDLE	.....	New York, N. Y.
ANNA PETTIT BROOMELL	.....	Philadelphia, Pa.
HENRY J. CADBURY	.....	Haverford, Pa.
ANNA GRISCOM ELKINTON	.....	Swarthmore, Pa.
LAVERNE FORBUSH	.....	Baltimore, Md.
LUCRETIA FRANKLIN	.....	McNabb, Ill.
JAMES R. FRORER	.....	Wilmington, Del.
WILLIAM HUBBEN	.....	Philadelphia, Pa.
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*Assistant Dietitian*, BILLIE J. BURNETT.

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*Alumni Recorder*, GENEVIEVE M. WOLFE.  
*Secretaries*, ELNORA COX SWARTZ, PAULINE M. CARROLL.

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*Secretary*, MILDRED STRAIN.

### HEALTH SERVICE

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Diplomate, American Board of Internal Medicine.  
*Consulting Psychiatrists*:  
LEON J. SAUL, B.A. and M.A., Columbia University; M.D., Harvard University.  
J. W. LYONS, B.A., University of Scranton; M.D., University of Pennsylvania.  
Diplomates, American Board of Psychiatry and Neurology (P).

### Nurses:

PEGGY BURNS, R.N., MARY MCCULLOUGH, R.N., E. ELIZABETH MCGEARY, R.N., ELSE SHAW.

**INTRODUCTION**  
**TO**  
**SWARTHMORE COLLEGE**

## Introduction to Swarthmore College

Swarthmore College, founded in 1864 by members of the Religious Society of Friends, is a small co-educational college situated eleven miles southwest of Philadelphia. In accordance with the traditions of its Quaker background, Swarthmore students are expected to prepare themselves for full, well-rounded lives as individuals and as responsible citizens through exacting intellectual study supplemented by a varied program of sports and extra-curricular activities.

The college campus contains about 300 acres of rolling wooded land in the borough of Swarthmore in Delaware County, Pennsylvania. The borough of Swarthmore is a small residential suburb within half an hour's commuting distance of Philadelphia on the West Chester branch of the Pennsylvania Railroad. Situated near the intersection of U. S. Route 1 (Baltimore Pike) and Pennsylvania State Highway 320, Swarthmore is easily accessible by car.\* 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

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 a direct outgrowth of our democratic principles. Democracy is based on the infinite worth of each individual. It can operate successfully only when men are willing to seek together a common good. It depends upon knowledge and understanding of the complex problems of modern society. The debt of our educational system to democracy is equalled only by the debt of democracy to education.

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 in this way can it be most effective. Only by such selection can it contribute to the diversity and richness of educational opportunity which is a part of the American heritage and the American strength.

### THE RELIGIOUS TRADITION

Swarthmore College was founded by the Religious Society of Friends and it seeks to illuminate the life of its students with the spiritual principles of

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\* To reach the college from the New Jersey Turnpike, motorists should leave by Exit 3, proceed across the Walt Whitman Bridge, take Pa. Route 291 past the airport to Route 420, turn right on 420 to U. S. Route 1, turn left on Route 1 and go about a mile to its intersection with Route 320. Turn left on 320 and follow arrows to the college.



that Society. Although it has been non-sectarian in control since the beginning of the present century and although the children of Friends are in a minority, 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.

### THE COMMUNITY LIFE

Swarthmore is a small college by deliberate policy. Its enrollment in normal years is about 900 students, of whom 425 are women and 475 are men. It is semi-rural in location, residential and co-educational in character. These features create an ideal environment for personal growth. Co-education provides the most natural environment for both men and women, who in their common work and play come to value each other for their true worth. Almost all of the students live in the college dormitories and eat together in the dining room. A large number of faculty houses are within campus boundaries, making it possible for students to have valuable social contacts with their professors outside the classroom. The residential character is the basis for a community life in which the ideals of the college influence every member. Growth in emotional maturity, necessary both for personal satisfaction and for effective action, is an integral part of the total educational program.

For this reason the college encourages a wide variety of extra-curricular activities. Participation in sports has many values, social as well as individual. Membership in student organizations is important. In practising parliamentary procedure and in facing the victories and defeats of elective office, students learn to live together, ironing out the clash of personalities and the friction of different views. They learn the effectiveness of enthusiasm and the frustration of indifference. They learn to soften their uncritical intolerance as they struggle to live successfully together. They learn the meaning of responsibility as they become responsible for their activities.

### THE EDUCATIONAL PROGRAM

Swarthmore's educational program is based on the philosophy that self-discovery and self-development are more valuable than the simple demon-

strative method of teaching. Therefore, whenever it is possible, students are encouraged to make their own analyses, based on original source material or on laboratory experiments.

Believing also that a liberal education is based on knowledge of many areas of human experience, the college requires that freshmen and sophomores take a wide variety of courses. This plan allows them to test their ability in subjects they have already studied and to explore new fields. By the end of their sophomore year, students are expected to make two decisions: first, what their field of concentration will be for the last two years; and second, whether they prefer to take "Honors work" or to continue their study in regular courses.

Honors work, more fully described on pages 58 to 60, is a plan of study open to juniors and seniors who have shown independence and responsibility in their academic work. They are freed from classroom routine and meet with their instructors in small weekly seminar groups for discussion and evaluation of their work. Since an Honors student pursues only one major and one related minor subject during a semester, this system facilitates greater concentration and greater independence than is possible under the usual academic routine. The development of the Honors Program and seminar method was begun under President Aydelotte in 1922 and, because of its success, has been widely imitated in other institutions.

#### 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 mosaic 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 our educational program. For many students it provides an enriching and exciting intellectual experience. It has as its main ingredients freedom from class work, maximum latitude for the development of individual responsibility, concentrated work in broad fields of study, and close association with faculty members in small seminars. The Honors program and the Course program are parallel 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.

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 they never contemplated when they shaped the College in the middle of the nineteenth century. Swarthmore, if it is to remain alive, must be forever changing. And many people are continually engaged in shaping its destiny—the Board of Managers, administration, faculty, students, alumni, parents, and the community as a whole. 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 following: from men, to Robert A. Barr, Jr., Assistant Dean for Admissions; from women, to Ann E. C. Passoth, Assistant Dean for Admissions.

### 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.

In the competition for admission preference is given to the children of Friends and alumni who can meet the requirements. It is also 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.

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 program preparatory to advanced liberal study. Applicants are selected on the following evidence:

1. Record in secondary school.
2. Recommendation of the school principal or headmaster and of others who know the applicant.
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 varied interests, types, and backgrounds.

## PREPARATION

The College does not require a set plan of secondary school courses as preparation for its program. The selection 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 arithmetic, algebra, and plane geometry.
  - 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, ancient and modern; music, art, architecture.

*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, advanced algebra, geometry and trigonometry.

*Languages:* English, Latin, Greek, German, French, Spanish, 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

Applications must be filed in the office of the Deans by February 15 of the year in which the candidate wishes to be admitted. An application fee of \$10.00, which is not refundable, is required of all candidates.

All applicants for admission are required to take the Scholastic Aptitude Test and three Achievement Tests given by the College Entrance Examination Board.

The Achievement Test in English Composition is required of all candidates; the other two Achievement Tests are chosen by the candidate from two different fields. Candidates for engineering must take the test in Advanced Mathematics.

In 1959-60 these tests will be given in various centers throughout this country and abroad on December 5, January 9, February 6, March 12, May

21 and August 10. Applicants are normally expected to take three Achievement Tests in March of their senior year. They may take the Scholastic Aptitude Test in December, January, February or March. Scholarship candidates are asked to take the Aptitude Test in December or January. Those who wish to take the tests *for practice* at the end of the Junior year are encouraged to do so. All such applicants must repeat the tests in their Senior year, however, in order to give themselves the advantage of maximum preparation.

Application to take the test 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 take the test in any of the following western states, territories, and Pacific areas—Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, Alaska, Hawaii, 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 27896, Los Angeles 27, 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. Information concerning financial aid will be found on pages 33 to 41.

Applicants should take the initiative in arranging to have an interview with a representative of the College. Those who can do so are urged to make an appointment to visit the College for this purpose. If this is not possible, applicants should request a meeting with a college representative in their own area.

Notices of the action of the Admissions Committees will be mailed about May 1.

#### ADVANCED STANDING

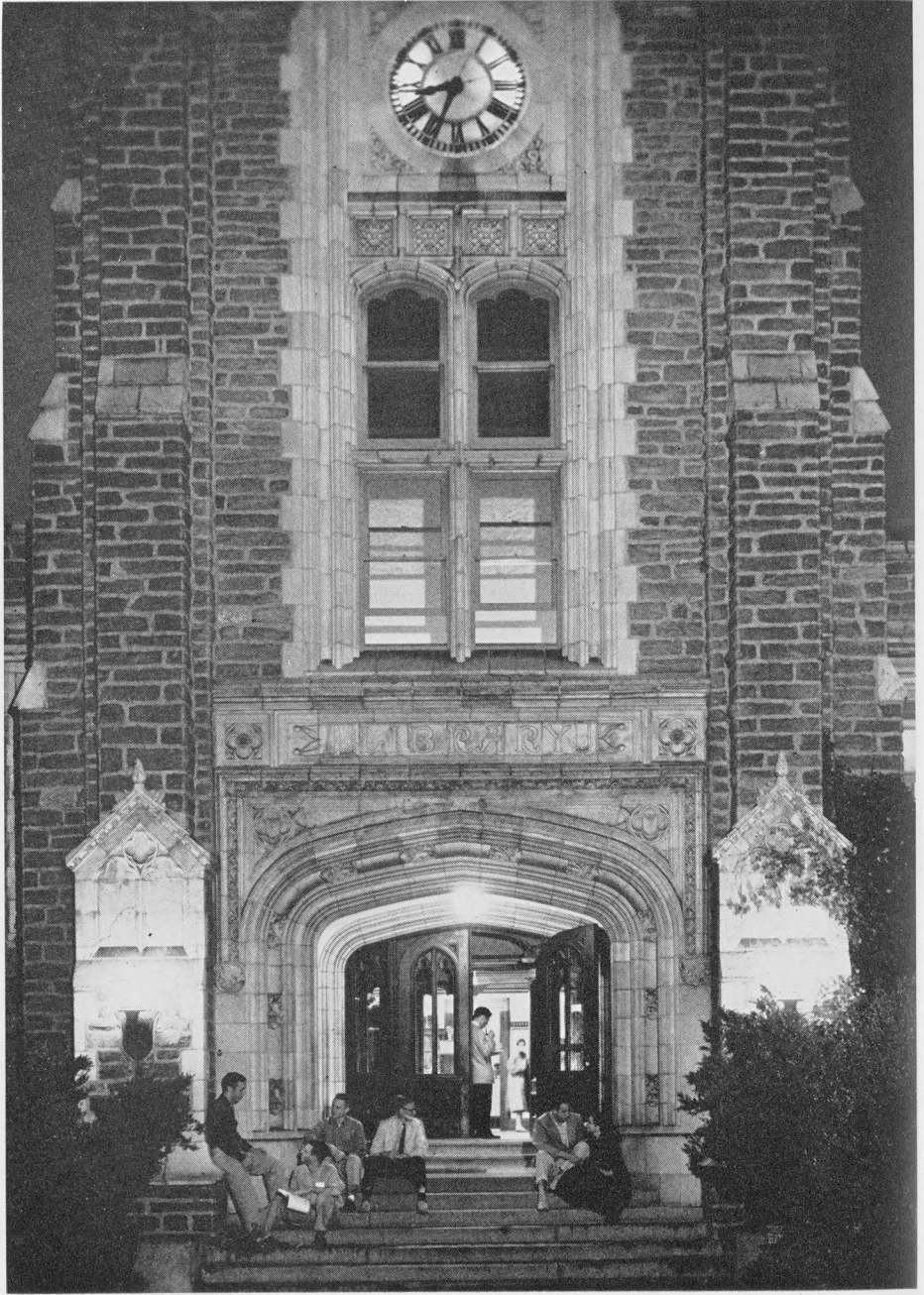
For favorable consideration, applicants for advanced standing must have had a good scholastic record in the institution from which they wish to transfer and must present full credentials for both college and preparatory work, including a statement of honorable dismissal. They must take the Scholastic Aptitude Test given by the College Entrance Examination Board if this test has not been taken previously.

As a general practice, students are not admitted to advanced standing later than the beginning of the sophomore year. Four terms of study at Swarthmore College constitute the minimum requirement for a degree, two of which must be those of the senior year.

Freshmen may apply for advanced standing or placement in particular courses if they have taken college level courses in approved schools and the Advanced Placement Tests of the College Entrance Examination Board.



*Interior, Clothier Memorial*



*The College Library*



## Expenses

Charges for the academic year 1959-60 (two semesters) :

Board, room and tuition .....	\$2,070*
General fee .....	130
	<hr/>
Total charges .....	\$2,200

While a general charge for board, room and tuition is made, this may be divided into \$1,250 for tuition and \$820 for board and room. The general fee of \$130 per year covers the costs of student health, library and laboratory fees, athletic fees, arts and crafts, and the support of several other extra-curricular activities.

An additional deposit of \$25 per semester is required of each student, payable in advance, to cover incidental bills. Students may charge purchases at the college bookstore, and certain other charges agreed to by the Business Office. When this deposit has been exhausted a new one will be required immediately. Any unused balance is returned at the time of graduating or leaving college.

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 Shero, Assistant Controller.

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

\* 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.

certain alternative plans. The cost is two to six percent greater than when payments are made in cash in advance. Details of the plans will be 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 \$5.00 per year (12 months) for women and \$10.00 for men. The combined accident and sickness policy is available at an annual cost of \$18.00 for women and \$22.00 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.

#### Scholarships and Student Aid

The college awards 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 sixty-five scholarships are awarded each year, carrying stipends varying from \$200 to \$1800 annually. Seventy-five freshman scholarships, three of which are designated for students in the field of engineering, provide stipends up to a maximum figure of \$1800. The average stipend is at present in the neighborhood of \$800 annually. Awards are based upon school or college record, and upon the financial need of the family as revealed in confidential statements to the Scholarship Committee through the agency of the College Scholarship Service. 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.

During the current academic year the college has granted over \$200,000 in scholarships. About one-third of that sum is provided by special gifts and the endowed scholarships listed below. Applicants are not required to apply for specific scholarships but will be considered for financial aid either from endowed scholarships or from general college scholarship funds.

GRANTS-IN-AID, to a limited number, may be awarded to students with financial need and average scholastic standing who could not earn all their need without serious detriment to their academic work.

COLLEGE EMPLOYMENT affords opportunity to earn money by regular work at current wage rates in the dining room, offices, laboratories, 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. Last year over four hundred students secured work through the office. Many students earn from eight to ten dollars a week and still maintain an excellent scholastic standing.

#### SCHOLARSHIPS FOR MEN

**The GEORGE F. BAKER SCHOLARSHIPS.** The George F. Baker Scholarships, awarded for the first time in 1950, have been given to the college as part of a national scholarship program. They are the gift of the George F. Baker Foundation and will be awarded to three freshman men for the year 1959-60. The actual amount of the scholarships, in part determined by financial need, will be a maximum of \$1,800 for each year of the student's college career. Students will be chosen for these awards primarily on the basis of achievement and promise of leadership in business, government and the professions.

**OPEN SCHOLARSHIPS FOR MEN.** Swarthmore College awards annually five four-year scholarships to men entering the freshman class. These scholarships, based on the general plan of the Rhodes Scholarships, are given to candidates who, in the opinion of the Committee of Award, rank highest in scholarship, character and personality. The amount of the annual award varies from \$200 to \$1800 according to the financial need of the winner.

**The THOMAS B. MCCABE ACHIEVEMENT AWARDS,** established by Thomas B. McCabe '15, are awarded to freshman men from the Delmarva Peninsula and the State of Maine who give promise of leadership. In making selections, the Committee will place emphasis on ability, character, personality, and service to school and community. One or two awards, providing an annual grant of \$1,200, will be made to residents of Delaware or the Eastern Shore counties of Maryland or Virginia. One award, providing a maximum annual grant of \$1,800, will be made to a resident of the State of Maine.

**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 will be 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 \$500 or \$1,000 for each of his last two years in college, the amount varying according to need.

**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 En-

gineering and, therefore, students who plan to major in engineering will given preference. The stipend provides a maximum of \$1,500 a year for four years.

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 with a maximum grant of \$1,800.

The AARON B. IVINS SCHOLARSHIP is awarded annually to a young man of the graduating class of Friends Central School, Overbrook, Philadelphia. This scholarship, awarded by the faculty of Friends Central School, and subject to the approval of Swarthmore College, has a maximum value of \$900.

The HOWARD COOPER JOHNSON SCHOLARSHIP, established by Howard Cooper Johnson '96, provides a stipend of approximately \$500 a year. It 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 shown by participation in out-of-doors sports or in other ways. It has a maximum value of \$500.

The MILLER-FLOUNDERS SCHOLARSHIP of \$500 per year is awarded to a freshman man who resides in and has attended school in Delaware County, Pennsylvania. To be eligible for the award the student must have clearly demonstrated leadership in scholastic achievement and in extra-curricular activities during his high school program. The scholarship is usually awarded in alternate years and is renewable provided a satisfactory record is maintained.

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. The annual stipend is \$375. 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 value of this scholarship is approximately \$225 annually.

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 scholarship will pay a maximum of \$600.

The PETER MERTZ SCHOLARSHIP carries a stipend of approximately \$500 a year for four years and 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.

The ANTHONY BEEKMAN POOL SCHOLARSHIP. This scholarship, carrying a stipend of \$350 annually, 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.

#### SCHOLARSHIPS FOR WOMEN

OPEN SCHOLARSHIPS FOR WOMEN. Mr. and Mrs. Daniel S. White, of the Class of 1875, on the occasion of the Fiftieth Reunion of that class, established three open competitive scholarships for women. These scholarships are given to candidates who, in the opinion of the Committee of Award, rank highest in scholarship, character and personality. The amount of the award varying from \$200 to \$1,500 is based upon the financial need.

The ALUMNAE SCHOLARSHIP, established by the Philadelphia and New York Alumnae Clubs, is awarded on the same basis as the Open Scholarships. It is awarded for one year and has a maximum value of \$500.

The ANNIE SHOEMAKER SCHOLARSHIP is granted annually to a young woman of the graduating class of Friends Central School, Overbrook, Philadelphia. This scholarship, awarded by the faculty of Friends Central School, and subject to the approval of Swarthmore College, has a maximum value of \$900.

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 amount of the scholarship is approximately \$800 per year.

The GEORGE K. AND SALLIE K. JOHNSON FUND provides \$450 a year, to be used in granting 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 about \$725. This amount is given as a scholarship to a young woman student in Swarthmore College, preferably to a relative of the donor.

The HARRIET W. PAISTE FUND provides a scholarship of approximately \$500 a year 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 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 value of this scholarship is approximately \$325 annually.

The JESSIE STEVENSON KOVALENKO SCHOLARSHIP FUND, the gift of Michel Kovalenko in memory of his wife, provides an annual income of \$650. This sum 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 the members and friends of the Kappa Alpha Theta Fraternity at Swarthmore, is awarded annually to a woman student. The award amounts to approximately \$225 annually.

The MARY WOOD FUND provides approximately \$65 a year and may be awarded to a young woman who is preparing to become a teacher.

#### SCHOLARSHIPS OPEN TO MEN AND WOMEN

The MIDWEST SCHOLARSHIPS, carrying a maximum stipend of \$1,800, are awarded each year to one man and one woman applicant who reside 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 KATHLEEN H. AND MARTIN M. DECKER FOUNDATION SCHOLARSHIP is awarded annually to young men and women preparing themselves in the field of Engineering or the Biological, Chemical, or Physical Sciences. The Scholarship Committee in making its selections will have regard for candidates who rank high in scholarship, leadership, and character. At least one scholarship will be given each year with a maximum grant of \$1,000.

The MARSHALL P. SULLIVAN SCHOLARSHIP FUND, established by Crum and Sullivan, Inc. in memory of Marshall P. Sullivan of the Class of 1892, provides \$1,000 annually for one or more scholarships. Preference will be given to graduates of George School, but if no suitable candidate appears 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. This scholarship provides \$800 a year and the appointment is usually made for the junior or senior year.

The E. HIBBERD LAWRENCE SCHOLARSHIP provides approximately \$700 a year for a scholarship to an incoming freshman man or woman who ranks high in scholarship, character, and personality and who has need for financial assistance.

The EDWARD CLARKSON WILSON SCHOLARSHIP. A 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 approved by the faculty of the school, on the basis of high character and high standing in scholarship.

The CLASS OF 1915 SCHOLARSHIP FUND was established on the occasion of the Twenty-fifth Reunion of the Class and provides an income of approximately \$550. This sum is to be awarded either to freshmen or other students, with preference given to descendants of the members of the Class of 1915.

The CLASS OF 1930 SCHOLARSHIP is awarded annually to a young man or woman who is in need of financial assistance. Preference is given to incoming freshmen but other students are eligible. The scholarship provides \$500 annually.

The CLASS OF 1931 SCHOLARSHIP FUND was established on the 25th reunion of the class. It provides a scholarship up to a maximum of \$1,000 to a man or woman who has need for financial assistance and who ranks high in scholarship, character and personality. Preference is given to entering freshmen who are children of members of the class of 1931.

The EDWARD S. BOWER MEMORIAL SCHOLARSHIP, established by Mr. and Mrs. Ward T. Bower in memory of their son, Class of '42, provides a stipend of approximately \$600 annually to a man or woman student who ranks high in scholarship, character, and personality, and who has need for financial assistance.

The DANIEL UNDERHILL SCHOLARSHIP, given by Daniel Underhill '94, in memory of his grandfather, Daniel Underhill, member of the first Board of Managers, provides \$500 annually for a deserving student in need of financial aid.

The WESTINGHOUSE ACHIEVEMENT SCHOLARSHIP of \$500 per year is awarded to a high ranking major in electrical or mechanical engineering for the senior year.

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 annual income amounts to approximately \$450.

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. This 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 Meeting of Friends, it is not to be confined to them when suitable persons in membership cannot be found. The value of this scholarship is approximately \$675 annually.

The PHEBE ANNA THORNE FUND provides an income of approximately \$3,325 for scholarships for students needing pecuniary assistance 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, amounting to \$250, 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, or of the North High School, Columbus, Ohio. The scholarship provides a maximum grant of \$500 a year.

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 show need of financial assistance and who are descendants of Amand and Margaret White Lafore. The value of this scholarship is approximately \$500 a year.

The JAMES E. MILLER SCHOLARSHIP. Under the will of Arabella M. Miller approximately \$200 is available annually for students of Delaware County (with preference for residents of Nether Providence Township).

The CHI OMEGA SCHOLARSHIP provides an award of approximately \$325 annually to a member of the freshman class who is in definite need of financial aid. Preference is given to daughters or sons of members of this fraternity.

The DELTA GAMMA SCHOLARSHIP provides an annual income of approximately \$135. This sum is to be awarded to a blind student at Swarthmore.



more College in need of financial assistance. 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 of approximately \$300 annually to a member of the freshman class who is in need of financial aid. Preference is given to relatives of members of the Fraternity.

The SAMUEL WILLETS FUND. This fund provides an annual income of approximately \$7,000 for scholarships. A portion of the fund is assigned for scholarships in the name of Mr. Willets' children, Frederick Willets, Edward Willets, Walter Willets, and Caroline W. Frame.

The I. V. WILLIAMSON SCHOLARSHIPS. These scholarships provide an income of about \$2,000 annually. 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 income from each of the following funds is awarded at the discretion of the college to students needing financial aid:

The BARCLAY G. ATKINSON SCHOLARSHIP FUND.

The REBECCA M. ATKINSON 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 MARK E. REEVES SCHOLARSHIP FUND.

The FRANK SOLOMON MEMORIAL SCHOLARSHIP FUND.

The MARY SPROUL SCHOLARSHIP FUND.

The HELEN SQUIER SCHOLARSHIP FUND.

The JOSEPH T. SULLIVAN SCHOLARSHIP FUND.

The DEBORAH F. WHARTON SCHOLARSHIP FUND.

The THOMAS WOODNUTT SCHOLARSHIP FUND.

#### SPECIAL LOAN FUNDS

Several loan funds are administered by a committee to which application should be made through the financial aid officer. Students in good standing who have a demonstrated financial need and who do not receive sufficient scholarship or other assistance to provide for that need are encouraged to apply for loans which are repayable after the completion of the student's higher education. Amounts vary according to need, though the college follows the principle that students should avoid heavy indebtedness which might

prove detrimental to their own plans and progress. Loans are not normally made to freshmen.

The CLASS OF 1913 LOAN FUND.

The CLASS OF 1916 LOAN FUND.

The JOHN A. MILLER LOAN FUND.

The PAUL M. PEARSON LOAN FUND.

The SWARTHMORE COLLEGE STUDENT LOAN FUND.

The ELLIS D. WILLIAMS FUND.

## 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 exceptional facilities for work in psychology, zoology, botany, and pre-medical studies. The Pierre S. du Pont Science Building, scheduled for completion early in 1960, will provide superior accommodations for chemistry, mathematics, and physics.

The SWARTHMORE COLLEGE LIBRARY, in part the gift of Andrew Carnegie, contains reading rooms, offices and a collection of 199,000 volumes. Some 5700 volumes are added annually. About 942 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. An addition providing storeroom for 150,000 volumes was erected in 1935. 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 497 private presses.

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

The BIDDLE MEMORIAL LIBRARY is an attractive fireproof structure of stone and steel given by Clement M. Biddle, '96, in memory of his father, Clement M. Biddle, who served for over twenty years as a member of the Board of Managers or as an officer of the Corporation of the College. This building houses the Friends Historical Library, which includes the Swarthmore College Peace Collection.

The FRIENDS HISTORICAL LIBRARY, founded in 1870 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 Friends. The library is a depository for records of Friends Meetings belonging to Philadelphia Yearly Meeting. More than 1,000 record books have been deposited; many of them have been reproduced on microfilm, for which a reading machine is 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 20,000 volumes. About 125 Quaker periodicals are currently received. There is also an extensive collection of photographs of meeting houses and pictures of representative Friends. 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 750 peace periodicals published in the United States and abroad over the past 140 years; approximately 150 such periodicals in eleven languages are currently received from twenty-five countries. This collection is the official depository for the archives of the leading peace organization in the United States. A more complete description of the Collection will be found in the *Guide to Swarthmore College Peace Collection*, published by the College and available for loan 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 country and other countries who are leaders in statesmanship, education, the arts, sciences, learned professions and business, in order that the faculty, students and college community may be broadened by a closer 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 nine 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.

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.

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.

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 and tree peonies, and a great variety of lilacs, rhododendrons, azaleas, daffodils, irises, herbaceous peonies, hemerocallis and chrysanthemums. Many donors have contributed

generously to the collections. (For full information see *Bulletin of Swarthmore College*, Vol. xxxvii, No. 5.)

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, 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 has built up a collection of paintings, drawings, and prints, which are exhibited, where space permits, in the college buildings. The lecture owes its name to an American artist, who was born in a house which still 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 Plummer 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 Shakespearean 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. They are made available at regular hours to all members of the college community by a student committee which administers the Potter Room in Bond, where most of the collection and amplifiers are housed. 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 in the Potter Room.

## 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 six 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; Woolman House; and one building on the former Mary Lyon School property.

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. Sharpless Worth, ex-'73, as a memorial to their parents; Robinson 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 are asked to leave college immediately after their last examinations in the spring so that their rooms may be used by Commencement visitors.

#### *Dining Rooms*

All students, both men and women, have their meals in two adjoining College Dining Rooms in Parrish Hall. The dining rooms are closed during all 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 devotional 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, and Chester. The Swarthmore Meeting House is located on the campus. Students are cor-

dially invited to attend its meeting for worship on Sunday. Extra-curricular groups with faculty cooperation exist for the study of the Bible and exploration of common concerns in religion.

An assembly of the college, called Collection, is held at 10:00 a. m. every Thursday in Clothier Memorial; attendance of students is required. This is regularly a period of silence according to the Friendly tradition and reading. Lasting from one-half to 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 physician holds daily office hours at the college, where students may consult him without charge. A student must report any illness to the college physician, 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.

There are two infirmaries, one for men and one for women. The infirmary for men is in Section F of Wharton Hall; the women's infirmary is at the east end of Parrish Hall. A registered nurse is in charge of each under the direction of the college physician.

Each student is allowed ten days care in the infirmaries per term without charge unless the services of a special nurse are required. After ten days a charge of \$3.00 per day is made. Students suffering from a communicable disease or from illness which makes it necessary for them to remain in hospital must stay in the infirmary for the period of their illness. A charge is made for special expensive medicines and certain immunization procedures, but ordinary medicines are furnished without cost.

The medical and infirmary 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



students participating in athletics and is recommended for all others. (For details see p. 32.)

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.

### *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 is planned to give students job experience in various fields.

### *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, the Viewbook, 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 to each student.

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.

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 freshman hall. There are also student proctors in each of the men's dormitory sections. A group of

students cooperate with proctors and counselors in helping the Deans the placement program conducted during the freshman week.

Special problems may be referred by the Deans to the college physician or to the consulting psychiatrists.

## THE STUDENT COMMUNITY

### *Student Conduct*

In general the association of men and women in academic work and social life is to be governed by good taste and accepted practice rather than elaborate rules. The Society of Friends has historically been conservative on social matters, and its influence within the college community is one of the important factors in making Swarthmore what it is. Certain rules, however, are of sufficient importance to deserve attention here:

1. The possession and use of liquor on the campus is forbidden, and drunken conduct.

2. The use or possession of firearms or other dangerous weapons is not permitted.

3. No undergraduate may maintain an automobile while enrolled at College without special permission. The administration of this rule is in the hands of a Student-Faculty committee, which authorizes cars for the use of student organizations, and in some cases for special needs such as jobs dependent upon cars. 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.

4. It is college policy to discourage premature marriages by ruling that two undergraduates marry, only one may remain in college. Some exceptions have been provided in the case of veterans and upperclass students. Information about them may be obtained from the Office of the Deans.

College rules which affect the entire student community are discussed and formulated by the Student Affairs Committee, which is composed of members of the college administration, faculty, and 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 the coordination of student activities and the expression of student opinion in matters of college policy.

Committees of the Council include the Budget Committee, which regulates the distribution of funds to student groups; the Community Service Committee, which administers welfare projects; the Elections Committee, which selects

vises 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 Council: Collection, Cooper Foundation, Men's Athletics and Student Affairs.

### *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 by 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 as coming under the jurisdiction of the *Student Judiciary Committee*. The *Student Judiciary Committee*, its members selected from the other two committees, serves on cases involving the car rule, on those 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 two Deans. It deals with cases referred or appealed from the other Committees or with any cases 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 chairmen of certain important committees: Judiciary, which maintains social regulations; Vocational, which assists the women's Vocational Director; Somerville, which arranges the program for Somerville Day, on which alumnae are invited to return to the College, and fosters student-alumnae relations.

### *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. No credit is given for work in so varied fields as sculpture, play-writing, publishing the college newspaper, playing in the orchestra. However, the college 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.

Extra-curricular musical activities at Swarthmore are numerous and well supported. The college chorus is led by Professor Swing, and the college orchestra by Professor Spies. There are chamber music groups, madrigal groups, and public performances of the musical works of students in composition. There is an excellent college record collection, there are facilities for private practice, and there are student tickets for the Philadelphia Orchestra. The Cooper Foundation presents a distinguished group of concerts each year.

There are faculty advisers or special instructors for the Little Theatre Club, Print Club, the Camera Club, the Sculpture Group, the drawing and painting groups, the creative writers, and the modern dancers. Many of the student groups for the discussion of public affairs, the integration of the sciences, the presentation of student radio programs, and the editing of college publications conduct their own affairs with occasional advice from the faculty.

### *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 a good thing to have as many students as possible competing on its intercollegiate teams.

### *Fraternities*

There are four national fraternity chapters at Swarthmore: Delta Upsilon, Kappa Sigma, Phi Kappa Psi, Phi Sigma Kappa, and one local fraternity, Tau Alpha Omicron. 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 and normally about half of the freshman men decide to affiliate with one of the five chapters.

### *Student Activities Bulletin*

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

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 and the former, in the Division of the Humanities, the Social Sciences and the Natural Sciences. Eighty percent of resident study which is normally completed in four years leads 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 training. Its purpose is to give the student the best foundation for his future vocation. It gives a liberal and versatile individual. A liberal education is a comprehensive education which develops the mind and spiritual values.

It is necessary for most students to choose between a general education and a specialization. Particular skills may be required for certain vocations but a broad background of general education is necessary for those who are engaged in fields where 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 program and the student here selected should be advised with this large purpose.

For this reason, 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 pre-requisites. Two full courses or their equivalent in half courses constitute the normal program for each of the first two years. Each course represents from eight to twelve hours of work a week, including class meetings, laboratory periods and individual preparation.

The program for each class student shows 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 studies by the seminar method. At the end of his senior year he must take a

## 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, 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 broader experience in the scope of their experience. Particular skills may afford readier 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 larger purpose.

For this reason, 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. Five full courses or their equivalent in half courses constitute the normal program for each of the first two years. Each course represents from eight to twelve hours of work a week, including class meetings, laboratory periods and individual preparation.

The program for upper class students affords a choice between two modes of study: Honors Work, leading to a degree *with Honors*, and General Courses. An Honors student concentrates on three related subjects which he studies by the seminar method. At the end of his senior year he must take

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\* For groupings of departments, see page 20.

attery of eight examinations on the work of his seminars, set by outside examiners. (The system will be explained more fully below.)

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 89. 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. 132-134) and must attend the Collection exercises of the college (see p. 48).

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

## Program for Freshmen and Sophomores

The curriculum for the first two years is designed primarily to contribute to a student's general education by giving him an introduction to the methods of thinking and the content of knowledge in a variety of fields important to liberal education.

1. The traditional humanistic studies—those studies through which man learns to understand himself and his relationship to his fellows as individuals, and the enduring values in human experience.
2. The social sciences—those studies through which man learns to understand the nature of organized society, past and present, and his relationship to it.
3. The natural sciences—those studies through which man learns to understand his physical environment, both organic and inorganic, outside of his own individual and social being.

Each student shall meet the following general requirements, ordinarily during the first two years:

1. A year-course to be chosen from Astronomy 1-2, Biology 1-2, Chemistry 1-2, Physics 1-2, Mathematics 1-2, and Mathematics 3-4.
2. Two year-courses to be chosen from Economics 1-2, History 1-2, and Political Science 1-2. For students in the Divisions of Engineering and the Natural Sciences the requirement shall consist of one year-course.

3. For students in the Humanities and Social Science divisions, four courses to be chosen as follows:

One half-course in literature (English or foreign).

One half-course in Fine Arts, Music, or Religion.

Two half-courses (from different departments) in History, Philosophy, or Psychology.

For students in the Engineering and Natural Science divisions, four courses in at least two departments:

Two half-courses to be chosen from literature (English or foreign), Fine Arts, Music, or Religion.

Two half-courses to be chosen from History, Philosophy, or Psychology.

History can be used as an option here by students in any division who have not chosen History 1-2 to satisfy requirement 2 above.

Pre-medical students with a major in the Humanities or the Social Sciences may substitute a second half-course in literature for the second requirement above in order to satisfy medical school requirements.

4. All students except those majoring in engineering must include in their program sufficient work in a modern or classical language to complete course 4 or its equivalent. This 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.

Students entering college with special preparation in any one of the subjects may apply for exemption. No student may take more than four courses in any one department during the first two years except in special circumstances. Applications for exceptions must 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 ten full courses.

It is expected that, after completion of the minimum courses 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 in those subjects which have most interested him and to other courses which will increase the range of his knowledge. He should decide, as early as possible in his sophomore year, upon two or three subjects in which he would like to major and should consult the statements of the departments concerned as to required and recommended courses and supporting subjects. In special cases he is advised to take not more than one semester of work in any subject beyond the first course.

The requirement in foreign language (either classical or modern) is such that an exceptionally well prepared freshman may demonstrate completion of it before entering college by his rating in an Achievement



Test given by the College Entrance Examination Board. The results of the tests indicate, however, that most students need to devote from one to four terms to further language study. The desired standard is normally met on the basis of four year's work in high school, or of three or two years' work in high school followed by one or two terms in college. If a student fulfills the requirement with a language which he begins in college, he will need to study it for four terms. If he fulfills it with a language begun elsewhere his progress toward the degree of competence demanded is measured by a placement test. This may be one of the achievement tests of the College Entrance Examination Board which he has taken as a requirement for admission. Additional placement tests are given when necessary by the Swarthmore departments of language.

Physical education is required of all students (except veterans) in the first two years. The requirements are stated in full on p. 63 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 completion of eighteen full courses, or equivalent, with a minimum average of C, normally constitutes the course requirement for a degree. Under certain circumstances this may be reduced to seventeen. A student may carry extra work after the freshman year with the approval of his course adviser and of the Committee on Academic Requirements, provided that his record in the previous year has been satisfactory.

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 Aydelott, is a distinctive part of Swarthmore's educational life. It seeks to free from the limitations of classroom routine those students whose maturity, interests, and capacity suit them for independent work. While the program is designed to be 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 studies only two subjects during a semester, thereby avoiding the fragmentation of interest that may result from a program of four or more courses with daily assignments and frequent examinations. The content of the subject matter field is correspondingly broader, permitting a wide range of research 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. In this program he undertakes to subject himself at the end of two years to Honors work to examinations in all of the eight fields studied. In each field 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 examination 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 the student, in order to clarify and enlarge the basis of their judgment and 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 one hour 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 through papers, discussion, or laboratory experiment. Each student has an individual responsibility for the assimilation of the whole of the material and correspondingly searching in his scrutiny of ideas presented by his fellows and by his instructor. The student is expected to devote half of his work 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.

Division of Mathematics and 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 transfer 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 or were not permitted 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 in-

licated 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 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 Honors examinations set at that time for the fields they have studied. Trial papers, however, are read by their instructors, not by the visiting examiners. On the basis of the showing made in these examinations a 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 lower grades for the work they have done while reading for Honors, but will graduate without taking examinations over the fields 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 Distinction, 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, what he shall be given a degree in Course.

#### PRE-MEDICAL PROGRAM

All students who are considering the possibility of attending medical (or dental) school after graduation from Swarthmore should register their names with the Chairman of the Committee on Pre-Medical Education at the first opportunity. Information and advice on general requirements and on the special requirements of specific medical schools may be obtained either the student or his adviser from this committee. In addition, it is the function of the committee to prepare a statement of evaluation and recommendation to each medical school to which the student may be applying, 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 value 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 1-2 or 3-4, Physics 1-2, English (two semester courses). 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 comparative anatomy (Zoology 11). 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.

#### FOREIGN STUDY

Students who wish to study abroad should consult with the dean and the chairman of their major department and plan a specific program which must be approved by the departments concerned. A copy of this program should be filed in the Registrar's office. Examinations must ordinarily be taken upon return to Swarthmore if credit is desired, but these examinations may be waived if satisfactory evidence is presented that examinations were successfully passed abroad.

#### 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.

Instruction in Public Speaking is given weekly by Mrs. Lange in a non-credit course. Students are asked to prepare and deliver formal and informal speeches, introductions, presentations, and to take part in round-table discussions. Frequent recordings of each student are made to aid in self-criticism.

## 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 of 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 four 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* fair work, *D* poor work 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 during 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 special 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 completed 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

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 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 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 a 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 on students who have met the following requirements for graduation:

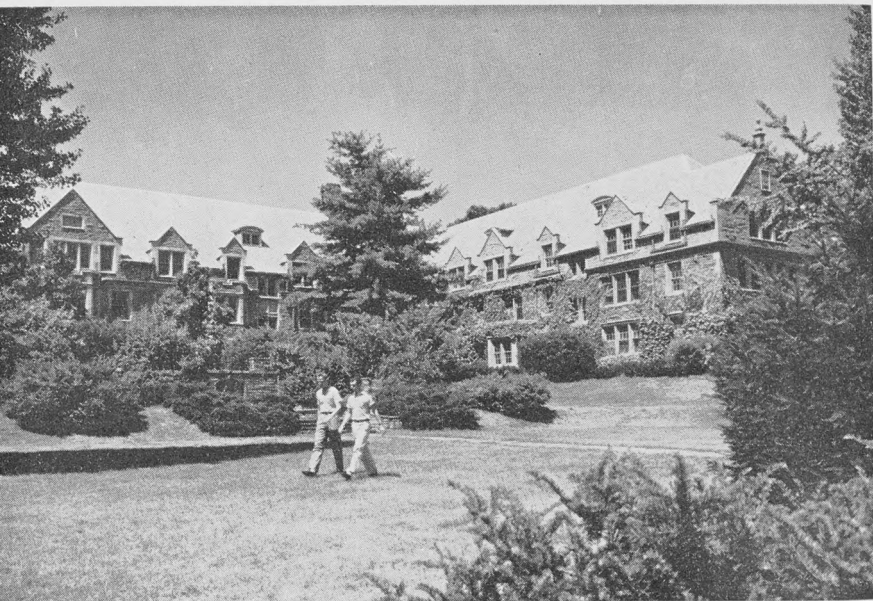
1. The candidate must have completed eighteen full courses or ten courses and eight seminars with an average grade of C.
2. He must have complied with the course requirements for the first two years.
3. He must have met the requirements in the major and supporting courses during the last two years.
4. He must have passed satisfactorily the comprehensive examination in his major field or met the standards set by visiting examiners for a degree with honors.
5. He must have completed four terms of study at Swarthmore College, two of which have been those of the senior year.
6. He must have completed the physical education requirements set forth on page 63 and in the statements of the Physical Education Departments.
7. He must have attended the Collection exercises of the College in accordance with the regulations (see page 48).
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 on students subject to the following requirements:

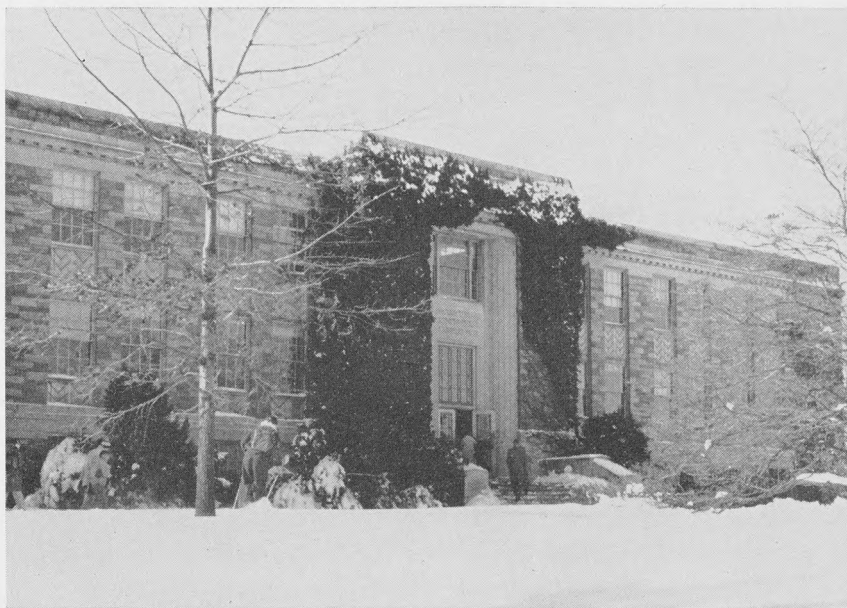




*Wharton Hall, a Dormitory for Men*



*Worth Dormitory for Women*



*Martin Biological Laboratory*



*Trotter Hall*

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 \$1,000 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 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 JOHN W. NASON AWARD, a gift of a friend of the College in honor of the Eighth President, is presented, normally at Commencement, to one or more members of the total staff of the College, or to members of their families, who have made a distinctive contribution, beyond the scope of their normal duties, to the life of the College community. The Award is made by the Instruction and Libraries Committee of the Board of Managers upon the advice of the President of the College and consists of a formal citation and a monetary award of \$1,000.

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 Scholarship 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 and 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 in 1915, is to be presented each year to the outstanding engineering student of 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 CRANE PRIZE, a memorial to Charles E. Crane, Jr., of the Class of 1936, is an award of about \$25, given for the purchase of philosophy books, and presented annually to the junior who, in the opinion of the department, has done the best work in Philosophy, particularly in the junior year.

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 Contest awards for the best prepared speeches on topics of current interest. The WILLIAM PLUMMER POTTER PUBLIC SPEAKING FUND, established in 1907, sponsors the Potter Public Speaking Contest. This fund also provides awards for a Poetry Reading Contest, held normally in the fall semester, and the One-Act Play Contest, held in the spring semester.

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.

### **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 \$500, founded by the bequest of Hannah A. Leedom.

The JOSHUA LIPPINCOTT FELLOWSHIP of \$600, founded by Howard Lippincott, of the Class of 1875, in memory of his father.

The JOHN LOCKWOOD MEMORIAL FELLOWSHIP of \$600, founded by bequest of Lydia A. Lockwood, New York, in memory of her brother, 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 Lite Society and sustained by the contribution of its life members, has yielded an annual income since its foundation of \$525. It is awarded each year by a committee of the faculty (selected by the society), with the concurrence of the life members of the society, to a young woman graduate 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 Lite 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 joint committee of the faculty and the society (elected by the society) with the concurrence of the life members of the society to a woman graduate of Swarthmore College who has entered or plans to enter elementary or secondary school work. The recipient of the award is to pursue a course of study fitting her for more efficient work 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 proposes to pursue graduate study and scholarly work.

## 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

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*

INSTRUCTOR AND RESEARCH ASSOCIATE: FRANK HOLDEN

RESEARCH ASSOCIATE: SARAH L. LIPPINCOTT

RESEARCH ASSISTANT: JACQUELINE L. SCHROEDTER

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 the development of more comprehensive theories. The advanced courses consider some of these problems in detail; the order in which they may be taken depends upon the extent of the student's mastery of mathematics and physics.

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. This instrument has been in continuous operation since 1912 and provides a valuable and steadily expanding collection of photographs. A number of 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.

Advanced study in conjunction with the research program of the Observatory may be arranged in consultation with the Director of the Sproul Observatory. The Sproul Observatory contains a six-inch visual refractor, a nine-inch photographic telescope, and a transit instrument. 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, beginning one hour after sunset.

### 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. These courses are prerequisite for further work in astronomy. Three class periods each week, practical work may be arranged.

### 3. INTRODUCTION TO MATHEMATICAL ASTRONOMY. Mr. van de Kamp.

Spherical astronomy; celestial navigation. The two body problem; energy concepts; Bohr atom. Galactic rotation. Other problems.

### 4. INTRODUCTION TO PRACTICAL ASTRONOMY. Staff.

Celestial sphere and coordinates. Precession. Stellar motions. Photographic astrometry. Positional observations. Method of least squares.



11. **DOUBLE STARS.** Mr. van de Kamp.  
The two body problem. Theory and observational technique of visual, spectroscopic and eclipsing binaries. Special attention is given to the photographic study of both resolved and unresolved astrometric binaries. The masses of binary components and of unseen companions.  
Prerequisite: Mathematics 11-12.
12. **PHOTOGRAPHIC ASTROMETRY.** Mr. van de Kamp.  
The long-focus refractor. Photographic technique, measurement and reduction of photographic plates. Choice of reference stars. Attainable accuracy. Application to the problems of parallax, proper motion, mass-ratio, and perturbations. Resolved and unresolved astrometric binaries; orbital analyses.  
Prerequisites: Mathematics 3-4, and Astronomy 1-2.
14. **GALACTIC AND EXTRAGALACTIC STRUCTURE.** Mr. van de Kamp.  
Fundamental data. Interstellar matter, nebulae, stars. Variable stars. Structure and rotation of the galactic system. Extragalactic objects. The concept of populations. Age, origin and evolution of the universe.  
Prerequisites: Mathematics 3-4, and Astronomy 1-2.
15. **READING COURSE IN ASTRONOMY.** Mr. van de Kamp.  
Extensive and detailed study of the literature of various fields and topics.  
Students who intend to pursue astronomy as a major subject in course should have Astronomy 1-2 during the freshman or sophomore year; advanced courses in Astronomy selected from the list given above, combined with work in mathematics and physics, constitute the further requirement.

### HONORS SEMINARS IN ASTRONOMY

Prerequisites for admission to honors seminars in Astronomy, either as a major or as a minor, are the completion of the following courses: Mathematics 11-12, Astronomy 1-2, a course in general Physics, reading knowledge of French, German, or Russian.

101. **DOUBLE STARS.**
102. **PHOTOGRAPHIC ASTROMETRY.**
104. **GALACTIC AND EXTRAGALACTIC STRUCTURE.**
110. **THESIS.** Mr. van de Kamp, staff.  
Participation in a research project of Sproul Observatory.

### GRADUATE WORK

In conformity with the general regulations for work leading to the Master's degree (see page 64), 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, *Chairman*  
NEAL A. WEBER

ASSOCIATE PROFESSORS: LAUNCE J. FLEMISTER ‡  
LUZERN G. LIVINGSTON ‡  
NORMAN A. MEINKOTH

ASSISTANT PROFESSORS: WILLIAM C. DENISON  
KENNETH S. RAWSON

INSTRUCTORS: LEKH R. BATRA  
ALBURT M. ROSENBERG

LECTURER: SARAH C. FLEMISTER ‡

Through its elementary course, the Department of Biology introduces the student to a comprehensive view of those principles, problems and phenomena common to organisms, with animals and plants interpreted on a comparative basis. The advanced courses in the Biological Sciences (except Genetics) deal specifically with plant biology (botany), or animal biology (zoology) and are listed under these respective headings.

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 major in biology, botany, or zoology. Students in course should include the following supporting subjects in their programs, in addition to the full courses in their major subject: chemistry, including one semester in organic chemistry, one course in physics, one course in mathematics and a modern language (German or Russian preferred) through course 4. 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, but any program must be approved in advance by the department.

## 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 animals and plants 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. Evidence for and against theories of evolution will be discussed.

Two lectures and one discussion period, one three-hour laboratory per week. Credit is not given for a single semester of this course.

‡ Absent on leave, 1959-60.

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.

## Botany

16. DEVELOPMENTAL PLANT ANATOMY.

*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 two three-hour laboratory periods per week.

Prerequisite: Biology 1-2.

18. SURVEY OF THE PLANT KINGDOM. Mr. Denison. *Alternate years, fall semester*

A comparative study of the structure, reproduction, and life habits of the algae, fungi, mosses, and lower vascular plants from a phylogenetic viewpoint. Particular attention is given to current concepts of evolutionary relationship from the standpoints of both comparative morphology and paleobotanical evidence.

Two lectures and two laboratories or field trips per week.

Prerequisite: Biology 1-2.

65. FIELD BOTANY.

*Alternate years, spring semester*

A study of the classification of the principal groups of plants emphasizing field identification and economic, biological and cultural significance. The final lectures are concerned with the fundamentals of plant ecology.

Three lectures, one field trip, and one laboratory per week plus one or more weekend field trips.

Prerequisite: Biology 1-2.

67. PLANT PHYSIOLOGY.

*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, Chemistry 1-2, Organic Chemistry desirable.

68. BIOLOGY OF BACTERIA.

*Alternate years, fall 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, and classification of bacteria.

Two lectures and two laboratory periods per week.

Prerequisites: Biology 1-2, Chemistry 1-2, Organic Chemistry desirable.

69. TAXONOMY OF SEED PLANTS. Mr. Batra. *Alternate years, spring semester*

A study of the principal families of seed plants emphasizing those forms occurring naturally or under cultivation, in the temperate and subtropical portions of eastern North America. The fundamentals of systematics are discussed but not stressed.

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

Prerequisite: Biology 1-2.

Botany 65 and 69 are intended as alternative courses. Students who have taken one course may not ordinarily take the other for credit.

## HONORS WORK

The seminars given each year vary according to the choices of the students and convenience of the department.

111. PLANT PHYSIOLOGY.

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

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

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.

113. GENETICS.

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.

114. TAXONOMY AND DISTRIBUTION OF FLOWERING PLANTS. Mr. Batra.

An extension of the area covered in course 69. Emphasis is placed on the methods used in recognizing and evaluating taxa. Ordinarily Biology 20 or 113 should precede this seminar. Seminar discussions and field work, supplemented by laboratory work.

115. MICROBIOLOGY.

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.

116. MYCOLOGY. Mr. Denison.

A study of the morphology of the principal groups of the fungi with emphasis on their relationships with other living organisms and their use as tools in the study of fundamental biological processes. The seminar discussion is supplemented by a full day of laboratory work each week.

## Zoology

11. COMPARATIVE VERTEBRATE ANATOMY. Mr. Weber, Mr. Meinkoth.

*Fall semester*

This course normally follows General Biology. It deals with the comparative and unique aspects of the anatomy of the integument, skeleton, muscular, digestive, respiratory, circulatory, excretory, reproductive and nervous systems of the various vertebrate types. Classification, phylogeny and adaptive radiations are considered with stress placed on anatomical adaptations to the various habitats. The protochordates, lamprey, dogfish and cat are studied as representative forms in the laboratory. The course has three lecture and two laboratory meetings per week. This course is among those required by medical schools.

12. VERTEBRATE PHYSIOLOGY. *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.
51. HISTOLOGY. *Fall semester*  
 This course consists of a detailed study of the microscopic structure of vertebrate tissues, together with the functions of such tissues. In the laboratory the student examines both prepared and living material, and becomes familiar with the principles of microtechniques. Three lectures and two laboratory periods per week.  
 Prerequisites: 1-2, 11.
52. EMBRYOLOGY. Mr. Enders. *Spring 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 two laboratory periods per week.
53. ENTOMOLOGY. Mr. Weber. *Spring semester*  
 The study of insects and their relatives, their morphological and physiological adaptations and their effect on man. Each student will prepare a study collection from field trips.
54. BIOLOGY OF PARASITISM. *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.  
 Prerequisite: 11 Comparative Vertebrate Anatomy.
55. FIELD ZOOLOGY. Mr. Weber. *Fall semester*  
 Emphasis is on the living animals as they occur in nature, their systematics, relationships to the environment, habits and distribution. Most of the work will be done on field trips.
56. INVERTEBRATE ZOOLOGY. Mr. Meinkoth. *Alternate years, fall semester*  
 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.  
 Prerequisite: 11 Comparative Vertebrate Anatomy.
57. COMPARATIVE PHYSIOLOGY. *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, one conference and two laboratory periods per week.  
 Prerequisites: Comparative Anatomy and Organic Chemistry.
58. PHYSIOLOGICAL ECOLOGY. *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, one conference and two laboratory periods per week.  
 Prerequisite: 57 Comparative Physiology.

59. CYTOLOGY.

*Alternate years, 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, observes the characteristics of cells as units, and as parts of organized tissues. Three lectures and two laboratory periods per week.

Prerequisites: Biology 1-2, Biology 11 or 20, Chemistry 1-2.

61. BIOLOGY FOR SENIORS. Mr. Enders.

*Spring semester*

A course designed to integrate the student's knowledge in abstract sciences with living animals, both captive and wild, and to give an opportunity to work in some phase of Biology of interest to him.

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.

70-71. FUNDAMENTALS OF SYSTEMATICS. Academy of Natural Sciences.

This course presents the study of variation, speciation, and the evolution of taxonomic categories. It acquaints the student with the use of the methods and techniques of cytology, genetics, statistics, and plant and animal distribution in solving taxonomic problems. Each student will attack an individual problem in the taxonomy of some group of plants or animals.

One hour lecture, 4 hours laboratory. Saturdays 8-1.

## HONORS WORK

Honors students majoring in Zoology must take four seminars in the department and a minor of two seminars in another department within the division. Some freedom is offered in the selection of the two seminars, or four half courses, which normally would fulfill a second minor.

Students anticipating an honors program in Zoology must complete in the first two and a half years the following: Biology 1-2 and Zoology 11, Chemistry 1-2, Mathematics 3-4, and Physics 1-2. In addition, to qualify for minor seminars in other departments indicated, Chemistry requires Chemistry 28-29, Mathematics and Physics require Mathematics 11-12, and Psychology requires Psychology 1, and another half course.

Prerequisites for students in the Honors Program with a minor in Zoology consist of three half courses in Biology and Zoology (including 1-2). In addition, the student requires a full course in Physics and a half course in Organic Chemistry.

*Seminars:* The following seminars prepare students for examinations for a degree with Honors.

101. BIOLOGY OF PARASITISM.

An intensified version of Course 54 with emphasis on individual student projects and an acquaintance with both the classic problems and the current literature dealing with the phenomenon of parasitism.

102. CYTOLOGY.

A study of the structure and function of the cell. Living material will be examined and the modern microscopical techniques employed in the laboratory.

103. EMBRYOLOGY. Mr. Enders.

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.

104. COMPARATIVE PHYSIOLOGY.

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 for this seminar are courses in Comparative Anatomy and Organic Chemistry. Offered in the Fall term.

106. ENTOMOLOGY. Mr. Weber.

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 and independent work on one topic.

107. INVERTEBRATE ZOOLOGY.

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.

110. SPECIAL TOPICS. The 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

PROFESSOR: WALTER B. KEIGHTON, JR., *Chairman*

ASSOCIATE PROFESSORS: EDWARD A. FEHNEL  
DUNCAN G. FOSTER  
GILBERT P. HAIGHT, JR.

INSTRUCTORS: WILLIAM JAMES SHEPPARD  
PETER T. THOMPSON

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

Both lecture and seminar approaches are used in presenting the subject matter. The techniques and practices of the science are dealt with during the laboratory periods. Usually the course laboratory periods last from three to four hours.

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

1. Students with a primary interest in the humanities or social sciences, who view chemistry as a scientific study of general educational value. Chemistry 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 and Mathematics 3-4 in their freshman year; Chemistry 21, 22, 29, Mathematics 11, 12 and Physics 1, 2 in their sophomore year; Chemistry 30, 31, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100 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 to meet their needs. Others, including those who expect to practice chemistry as a profession, are advised to take, in addition to the above courses, Mathematics 51, 52 and Physics 11, 12, and in the senior year, Chemistry 56 and 65. The latter curriculum—together with the general college requirements outlined on pages 54 to 57—satisfies the minimum requirements of the American Chemical Society for professional training in chemistry. Major students are expected to have a reading knowledge of German before graduation.\*

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\* Students who have completed the foreign language requirement in another language may satisfy this requirement by taking German 7-8.



1. INTRODUCTION TO CHEMISTRY. Mr. Haight and Staff. *Fall semester*

A study of the central concepts and basic principles of chemistry, including atomic theory, kinetic-molecular theory, atomic structure, the kinds of chemical change and the laws governing them. The chemistry of the non-metals is introduced. No previous training in chemistry is required. Students who enter college with exceptional training in chemistry are encouraged to take a placement examination during freshman orientation week. If found to be sufficiently well prepared they may omit all or part of the introductory course.

One semester. Prerequisite for all other courses in Chemistry.

Two lectures, a recitation, and one laboratory period weekly.

2. INTRODUCTION TO CHEMISTRY. Mr. Haight and Staff. *Spring semester*

This course is a continuation of Chemistry 1, with particular attention to the development and application of the principles studied in Chemistry 1. Emphasis is on the use of the periodic classification of the elements and the chemistry of the elements. In the laboratory the principles of chemical equilibrium are applied to qualitative analysis.

One semester. Prerequisite: Chemistry 1.

Two lectures, a recitation, and one laboratory period weekly.

11. ELEMENTARY PHYSICAL CHEMISTRY. Mr. Keighton. *Spring semester*

A one-semester course dealing with elementary kinetics, equilibrium, the chemistry of solutions and the colloidal state. This course is terminal, designed for students who are not majoring in chemistry or who do not require the more intensive study of physical chemistry provided by Chemistry 61-62.

One semester. Prerequisite: Chemistry 2, Mathematics 2.

Three lectures or recitations weekly.

26. QUANTITATIVE ANALYSIS I. Mr. Foster and Mr. Haight. *Fall semester*

The theory and practice of volumetric analysis. Acid-base, oxidation-reduction, precipitation and complex formation methods are studied, and the application of the laws of chemical equilibrium to analytical methods. Laboratory work consists in the analysis of unknowns illustrating these principles.

This course may be taken as a terminal course by students for whom only one semester of analytical chemistry is required (e.g., pre-medical students).

One semester. Prerequisite: Chemistry 2.

Two lectures or conferences and two laboratory periods weekly.

27. QUANTITATIVE ANALYSIS II. Mr. Foster and Mr. Haight. *Spring semester*

The theory and practice of gravimetric analysis. Separation methods, coprecipitation, electrolysis, photometry, some aspects of instrumentation and an introduction to gas analytical methods are studied, with illustrative unknowns and laboratory exercises.

One semester. Prerequisite: Chemistry 26.

Two lectures or conferences and two laboratory periods weekly.

28-29. ORGANIC CHEMISTRY. Mr. Fehnel and Mr. Sheppard. *Full course*

This course is a prerequisite for admission to the Honors Seminar in Organic Chemistry. The first semester is devoted largely to a consideration of aliphatic compounds and the second to aromatic compounds. In addition, some elementary aspects of the chemistry of alicyclic and heterocyclic compounds, biologically interesting materials, dyes and plastics are included. Synthetic methods in organic chemistry are emphasized.

Two semesters. Prerequisite: Chemistry 2.

Three lectures and one laboratory period weekly.

56. **ADVANCED ORGANIC CHEMISTRY.** Mr. Fehnel and Mr. Sheppard. *Fall semester*  
Selected topics in organic chemistry, including resonance and molecular orbital theory, reaction and mechanisms, molecular rearrangements, stereochemistry, radicals and other topics of current interest. The laboratory periods are devoted to qualitative organic analysis and to library and problem work in connection with the identification and characterization of organic compounds.  
One semester: Prerequisite: Chemistry 28-29.  
Three lectures and two laboratory periods weekly.

61-62. **PHYSICAL CHEMISTRY.** Mr. Keighton and Mr. Thompson. *Full course*  
The principles of theoretical 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. In the laboratory the student uses a variety of physical chemistry apparatus.  
Prerequisites: Quantitative analysis, calculus, and general physics.  
Three lectures and one laboratory period weekly.

65. **ADVANCED INORGANIC CHEMISTRY.** Mr. Haight. *Spring semester*  
The periodic classification of elements is studied from the point of view of the 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.  
One semester. Prerequisite: Chemistry 61 either previously or concurrently.  
Three lectures or conferences and one laboratory period weekly.

69. **SPECIAL TOPICS.** Staff. *Fall and spring semesters*  
An elective half-course, which provides an opportunity for qualified advanced students to undertake original investigations in the field of chemistry. The course is designed to give the student practical experience in the application of the scientific method to the solution of a research problem, to develop facility in the use of advanced laboratory techniques, and to stimulate interest in current developments in chemical research. A thesis is required in lieu of a final examination. Students who propose to take this course should consult the appropriate instructor.  
One semester.  
One conference and approximately ten hours of laboratory work weekly.

## HONORS WORK

Before admission to honors work the chemistry major will have completed Chemistry 1, 2, 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. **PHYSICAL CHEMISTRY.** Mr. Keighton and Mr. Thompson. *Each semester*  
The gaseous, liquid, and solid states, solutions, colloids, elementary thermodynamics, chemical equilibria, electrochemistry, the kinetics of chemical reactions.  
Prerequisites: Quantitative analysis, calculus, and general physics.  
One four-hour seminar and one seven-hour laboratory period weekly for one semester.

105. QUANTITATIVE ANALYSIS. Mr. Foster and Mr. Haight. *Fall semester*

Essentially the content of courses 26 and 27, designed to prepare honors candidates for an honors examination.

Prerequisite: Chemistry 2.

One seminar and twelve hours of laboratory work weekly.

106. ADVANCED ORGANIC CHEMISTRY. Mr. Fehnel and Mr. Sheppard. *Fall semester*

A more intensive study of the same general area covered in Chemistry 56, including laboratory work in qualitative organic analysis. A reading knowledge of German is helpful, although not essential.

Prerequisite: Chemistry 29 and senior standing.

One seminar and six hours of laboratory weekly.

108. VALENCE AND MOLECULAR STRUCTURE. Mr. Haight and Mr. Thompson. *Spring semester*

The hydrogen atom, the periodic table and atomic structure, types of bonding, properties of bonds, chemistry of the transition metals, coordination compounds, acid-base and oxidation-reduction mechanisms. Laboratory: study of reaction kinetics and equilibria in inorganic systems.

Prerequisite: Physical Chemistry 62 or 101.

One seminar and six hours of laboratory weekly.

## Classics

PROFESSOR: SUSAN P. COBBS

ASSOCIATE PROFESSORS: HELEN F. NORTH, *Chairman*  
MARTIN OSTWALD

The Department of Classics offers courses in Greek and Latin that are designed to develop a capacity for the fruitful study of works written in those languages. Knowledge of Greek is particularly valuable for students of modern literature, philosophy, or the Christian religion; a knowledge of Latin, for students of the roman languages, mediaeval history, or law.

Another group of courses (numbered from 31 on) deals with the history of Greeks and Romans and with various aspects of their culture that have been of special significance for the modern world. These courses presuppose no knowledge of Greek or Latin languages and are open without prerequisites to all students.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS

Greek or Latin may be offered as the major subject either in course or in honors 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 seminars for a major student and one of them for honors seminars for a minor student.

Major students in Honors work may substitute for one of the four seminars normally required in this department the seminar in Ancient Philosophy given by the Department of Philosophy or the seminar in Linguistic Science or a thesis. Students of Latin may substitute a seminar in Greek for one of their seminars in Latin (or vice versa).

## 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.

11, 12. INTERMEDIATE GREEK. Miss North. *Full course*

Selections from Homer, a play of Euripides, and Plato's *Apology* are read.

13, 14. GREEK PROSE AUTHORS. Miss North, Mr. Ostwald. *Full course*

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. The course will be offered only when required.

15, 16. GREEK POETS. Miss North, Mr. Ostwald. *Full course*

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

## Latin

### 1-2. ELEMENTARY LATIN. Miss Cobbs.

*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. The course will be offered only when required.

### 3, 4. INTERMEDIATE LATIN. Mr. Ostwald, Miss North.

*Full course*

The course is primarily concerned with the reading of Virgil's *Aeneid*. For the benefit of students who have had only two years of preparatory Latin, a brief introductory period is devoted to a review of the fundamentals of Latin grammar. Credit is given for each semester.

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

*Full course*

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. Ostwald.

*Fall semester*

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

### 14. ROMAN RHETORIC AND ORATORY. Miss North.

*Spring semester*

The course includes the study of Greek and Roman rhetorical theory and the reading of representative speeches of Cicero. It also considers the influence of rhetorical education on Roman literature, particularly that of the Empire.

## Ancient History and Civilization

### 31. HISTORY OF GREECE. Mr. Ostwald.

*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. The course is normally given in alternate years.

### 32. HISTORY OF ROME. Mr. Ostwald.

*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. The course is normally given in alternate years.

### 33. GREEK LITERATURE IN TRANSLATION. Miss North.

*Fall semester*

The works read in this course include the *Iliad*, Hesiod's *Works and Days*, much of Greek tragedy and comedy, selections from the historians, the lyric and elegiac poets, and the Ionian physicists, and, in its entirety, the *Republic* of Plato. These works are considered both from the point of view of literary criticism and in relation to their influence on the development of western thought.

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 and are selected from those masterpieces written in the Latin language which possess significance for the history of literature of Western Europe and which retain their value when read in translation. They include, from the classical period, such major authors as Cicero, Lucretius, Virgil, Livy, and Seneca; from the Latin Fathers, St. Jerome and St. Augustine; and from the Middle Ages, Boethius, Prudentius, Bede, the figures of the Carolingian Renaissance, and the writers of Mediaeval Latin history and secular poetry. The course is given when there is sufficient demand. Usually 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 which have served as material for writers and artists from ancient times to the present. Plays, both ancient and modern, based on the more influential myths are studied and a study is made of the manner in which the themes have been handled in painting and sculpture of various periods. Special attention is given to the study of stories from mythology by recent writers. The course is normally given in alternate years.

### HONORS SEMINARS

101. LATIN LANGUAGE. Miss North.

This seminar serves as an introduction to classical philology, stressing the history of the Latin language in its development from Indo-European to the Vulgar Latin period. It also includes practice in reading and writing Latin, and an introduction to epigraphy and palaeography. The seminar will be given in the fall semester of 1959-60 but will be discontinued thereafter.

102. LATIN HISTORIANS. Mr. Ostwald.

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. The seminar is given in the spring semester.

103. LATIN EPIC. Miss North.

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

104. LATIN COMEDY AND SATIRE. Mr. Ostwald.

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 spring semester.

105. MEDIAEVAL LATIN. Miss North.

The seminar studies the principal types of mediaeval Latin literature (including religious and secular poetry, history and chronicle, saints' lives, satire, philosophy) with some attention to their origins in late antiquity and their influence on the early Renaissance.

111. GREEK PHILOSOPHERS. Mr. Ostwald.

This seminar is primarily devoted to the study of Plato, which is supplemented by study of the pre-Socratic philosophers and of Aristotle and the Hellenistic schools. The seminar is given in the fall semester.

112. GREEK HISTORIANS. Miss North.

The greater part of the work of this seminary is devoted to Herodotus and Thucydides, but portions of Xenophon's *Hellenica* and of Polybius are also studied. The seminar is given in the spring semester.

113. 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 fall semester.

114. GREEK DRAMA. Mr. Ostwald.

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: CLAIR WILCOX, *Chairman*

EDWARD K. CRATSLEY

FRANK C. PIERSON

ASSOCIATE PROFESSORS: JOSEPH W. CONARD †

WILLIS D. WEATHERFORD †

VISITING ASSOCIATE PROFESSOR: EDWARD C. FEI

ASSISTANT PROFESSOR: WILLIAM H. BROWN, JR.

LECTURER: HELEN M. HUNTER

The courses in economics are designed: first, to acquaint the student with institutions and processes through which the business of producing, exchanging, distributing goods and services is organized and carried on; second, to train 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 4, 21, and 22. Students intending to major in economics are advised to take courses 3 and 4 and Political Science 1-2. Majors in course are required to take courses 50 and 51 in the junior year. Majors in honors are advised to take seminars 103, either 101 or 102.

1-2. INTRODUCTION TO ECONOMICS. Messrs. Brown, Fei, Pierson, Wilcox, and Hunter. *Full course*

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. *Spring 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. *Fall semester*

The purpose of this course is to make the student a critical user of statistics. Topics covered include frequency distributions, sampling, index numbers, and economic time series.

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.

50. ECONOMIC THEORY. Mr. Brown. *Fall semester*

Determination of prices in theory and in practice. Distribution of income. Determination of the level of income and employment.

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† Absent on leave, 1959-60.



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. Brown. *Fall semester*  
 Revenues and expenditures of Federal, state, and local governments. Principles of taxation. Borrowing and debt management. Fiscal policy.  
 Not offered in 1959-60.
53. BUSINESS ADMINISTRATION. Mr. Cratsley. *Spring semester*  
 Problems confronting the business executive: organization, management, marketing, merchandising, risk and insurance. Case studies of business policy.  
 Not offered in 1959-60.
54. BUSINESS FINANCE. Mr. Brown. *Spring semester*  
 Corporate finance, investment banking, and the securities markets.
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 1959-60.
56. SOCIAL ECONOMICS. Mr. Weatherford. *Spring semester*  
 The extent, consequences, and causes of poverty, inequality, and insecurity. An appraisal of reforms: social insurance, medical care, public housing, rural development.  
 Not offered in 1959-60.
- 57-58. PUBLIC CONTROL OF BUSINESS. Mr. Wilcox. *Full course*  
*Fall semester:* maintenance of competition in American industry; moderation of competition in agriculture, extractive industries, and distributive trades.  
*Spring semester:* regulation of public utilities, transport, and communications. Public ownership and operation of industry.
59. BUSINESS CYCLES. Mr. Pierson. *Spring semester*  
 Analysis of business fluctuations and long-term economic change. Public policies for stabilization and growth.
60. INTERNATIONAL ECONOMICS. Messrs. Conard and Wilcox. *Spring semester*  
 Theory and practice of international trade. Balance of payments, foreign exchange, national commercial policies, international investment, and foreign aid.  
 Not offered in 1959-60.
61. COMPARATIVE ECONOMIC SYSTEMS. Mr. Fei. *Fall semester*  
 A comparative study of the economic systems of the Soviet Union, China, India, the United Kingdom, and the United States.

The following courses offered by the department cannot be counted toward a major in economics. They will not be offered in 1959-60.

21. INTRODUCTION TO INDIA. Mr. Weatherford. *Fall semester*  
 A survey of the economic, political, and social structure of modern India. The background of present problems and the prospect for future development.
22. URBAN SOCIAL PROBLEMS. Mr. Weatherford. *Spring semester*  
 A study of some of the major social problems of the modern metropolis as seen in Philadelphia. Readings and discussions are supplemented by first-hand contacts in the city.

## HONORS WORK

101. FINANCE. Mr. Brown. *Spring semester*  
Revenues and expenditures of Federal, state and local governments. The principles of taxation. Problems of the Federal debt. Corporation finance, investment banking, and the securities markets. Public regulation of financial practice.
102. ECONOMIC STABILITY AND GROWTH. Mr. Pierson. *Fall semester*  
The theory of cyclical fluctuations and secular growth. Money and bank. Monetary and fiscal policy. Labor unions, collective bargaining, and wage-pressure. The control of inflation.
103. ECONOMIC THEORY. Mr. Conard. *Fall 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. *Spring semester*  
The maintenance of competition in American industry. The moderation of competition in agriculture, the extractive industries, and the distributive trade. The regulation of public utilities, transport, and communications. Public ownership and operation of industry.
105. INTERNATIONAL ECONOMICS. Messrs. Fei 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. Fei. *Spring semester*  
Economic organization, resource allocation, and growth in an advanced planned economy: the USSR. Economic development in a backward planned economy: China. Economic development in a backward mixed economy: India. An advanced socialist-welfare economy: the United Kingdom. The changing economic structure of the United States.

## Division of Engineering

SAMUEL T. CARPENTER, *Chairman*

*(The staff members of the Division of Engineering are listed under their respective departments)*

The professional practice of engineering requires skill and resourcefulness in applying scientific knowledge and methods to the solution of problems of ever growing technical complexity. The successful engineer will, in addition, possess an understanding of the socio-economic forces which bear upon his work, an appreciation of the cultural and humanistic aspects of the society in which he lives, and a sound working knowledge of human relations. Our program meets these objectives by providing the student with technical knowledge in a setting of scientific rigor, together with the foundation of a liberal education. The student is educated in the professional disciplines of the engineer such as critical analysis, and in humanistic studies and the communication of ideas, as well as training in the natural and engineering sciences.

Three educational plans are open to engineering students at Swarthmore.

- (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 such as administration or economics, pre-medical, physics, etc.

A candidate for a degree in Engineering must meet the general requirements of the College as specified for the Division of Engineering (pp. 54-57) and the requirements of the particular department or program in which he is a major. Thus curricular plans for the first two years must take two objectives into consideration: (1) the technical 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 90) will meet the needs of the usual engineering student in any one of the three plans and will clear the way for the professional work of the junior and senior years. Modifications of the basic program, as well as those of the major departments, 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 three Departments 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 departments of Engineering; (3) to developing special interests. After completing the basic program of the first two years, student follows the curriculum outlined on the following pages under the particular department in which he is a major.

### (2). The Honors Program in Engineering Sciences

The Division of Engineering offers an Honors program 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 91. 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. Details of the program are given on page 91 following.

### (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 such as Economics or Mathematics. It is also possible to effect a four-year engineering plan with a minor in another field such as Chemistry or pre-medical sciences.

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

## BASIC ENGINEERING CURRICULUM OF THE FIRST TWO YEARS

### *First Semester*

First Year Mathematics  
Physics  
Chemistry or Elective  
Engineering Graphics  
Elective

Calculus  
Mechanics I  
Materials and Shop Processes  
Elective or Chemistry  
Elective

### *Second Semester*

#### *Freshman Year*

First Year Mathematics  
Physics  
Chemistry or Elective  
Engineering Measurements  
Elective

#### *Sophomore Year*

Calculus  
Mechanics II  
Electric and Magnetic Circuits  
Elective or Chemistry  
Elective

## GENERAL COURSES \*

GE1. ENGINEERING GRAPHICS. Staff. *Fall semester*

Descriptive geometry with emphasis on spatial visualization and the solution of engineering problems by graphical methods. Engineering drawing with emphasis on methods for describing the shape of an object by the use of projections and freehand sketches.

Two class periods and two three-hour drawing room periods per week.

GE11. MATERIALS AND SHOP PROCESSES. Staff. *Fall semester*

Study of the structure and properties of engineering materials. Relation of crystalline structure to microscopic properties; the reaction of materials to temperature change, stress and strain; corrosion theories; comparison of theoretical with laboratory test results; experimental techniques; introduction to the operation and function of machine tools. Laboratory period each week.

\* Except as noted, the following courses are open to all students in the College.

GE12. ENGINEERING MEASUREMENTS. Staff. *Spring semester*

A study of the basic procedures and mathematical principles required in making, interpreting and using measurements for engineering purposes, including linear and angular measurements, leveling, traversing, and triangulation, as well as the measurement of thermodynamic, fluid and electrical quantities. Three recitations and one three-hour laboratory each week.

GE52. INDUSTRIAL MANAGEMENT. Staff. *Spring semester*

Study of organization and management of industrial enterprises; historical background and evolution of present-day scientific practices; significance of arrangement of physical plant, production control, financial policies, wage payment, and personnel relations. Open to all juniors and seniors.

Three class periods and one laboratory each week; field trips to local industry.

GE57. ENGINEERING ECONOMY AND OPERATIONS RESEARCH. Mr. Carpenter. *Spring semester*

The principles of engineering economy and operations research as applied to defining optimal economic solutions of industrial problems. Annual cost methods, present worth, discounted costs, inventory control, probability principles with random number solutions, queuing theory, linear programming, scheduling, transportation and allocation theory.

Open to all juniors and seniors.

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

### HONORS PROGRAM 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. A student in this program may follow his interest in Civil, Electrical, or Mechanical Engineering by the election of optional seminars in the senior year. The program is unique and suited for those planning a future career in professional engineering, research, or college teaching.

Two seminars are taken each semester of the junior and senior year, for a total of eight. Six of the eight seminars are prescribed, while two are elective. 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.

The normal program of seminars is shown below. Descriptions of the seminars in Mathematics and Physics will be found in the listings of those departments.

All Engineering Science seminars include from one-half to a full day of laboratory each week.

#### *Fall Semester*

#### *Spring Semester*

#### *Junior Year*

ES101 Mechanics of Solids  
M 103 Advanced Analysis

ES102 Electrodynamics  
ES103 Thermodynamics

#### *Senior Year*

ES104 Fluid Mechanics

PH104 Modern Physics

Elective seminar to be chosen from:

Elective seminar to be chosen from:

ES105 Linear Systems  
ES106 Structural Mechanics  
ES107 Mechanical Design

EE102 Electronics  
ES108 Earth Science  
ES109 Thesis

## ENGINEERING SCIENCE SEMINARS

### ES101. MECHANICS OF SOLIDS.

Mechanics and analysis of deformable bodies treating elastic and plastic stress 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. Prerequisite: Mechanics I and II; Mathematics 11, 12.

### ES102. ELECTRODYNAMICS.

Electromagnetic field theory and linear circuit theory. Static and dynamic field theory through Maxwell's Equations, using the applicable vector analysis. Electromagnetic fields in magnetic and dielectric materials and the nature of electromechanical energy transfer. The circuit theory includes transient and steady state analysis of linear networks. The relation of circuit behavior to pole and zero locations in the  $s$ -plane is emphasized.

### ES103. 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, heat transfer.

### ES104. FLUID MECHANICS.

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

### ES105. LINEAR SYSTEMS.

Analysis and synthesis of electrical and electromechanical linear systems such as electric networks and servomechanisms. The following are typical of the analytical methods emphasized: differential equations, the Laplace transformation, system functions  $h(t)$  and  $H(s)$ , poles and zeroes, superposition integral, complex loci, analog simulation, matrix operations.

Prerequisite ES102—Electrodynamics.

### ES106. 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 application of vector and tensor approaches, and series solution. Ground motion and structural dynamics. Model analysis.

Prerequisite: ES101—Mechanics of Solids.

### ES107. MECHANICAL DESIGN.

Motion, velocity and acceleration in linkwork and gearing. Design of castings, fastenings, gears, shafting and frames. Design of elements under rotational stress. Vibration analysis. Fundamentals of lubrication. Design of machine assemblies.

### ES108. 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, Darcy's law, seepage equation of seepage, precipitation runoff relationships, are introduced in the analysis of engineering problems.

ES109. THESIS. Elective, upon approval of the Engineering Division of an acceptable field of original investigation.

EE102. ELECTRONICS. (See Department of Electrical Engineering.)

## Civil Engineering

PROFESSOR: SAMUEL T. CARPENTER, *Chairman*

ASSOCIATE PROFESSOR: M. JOSEPH WILLIS

ASSISTANT PROFESSORS: CLARK P. MANGELSDORF  
CHARLES W. NEWLIN

The work of the Civil Engineer involves design, research, management, and construction, in the following fields: buildings, bridges, aircraft, soils and foundations, hydraulics and hydroelectric power, city and regional planning, sanitation and public health, highways, airports, railways, and other projects of a public or private nature, with their economic justification. The basic curriculum also provides a foundation for those interested in aeronautical structures, architectural engineering, naval architecture, engineering mechanics, industrial management and sales.

Emphasis is placed on the broad scientific and humanistic education required for an understanding of fundamental principles, based on the conviction that those possessing such a background will contribute most to the future progress of the profession.

Students electing the Honors Program in Engineering Sciences may prepare for graduate work in Civil Engineering by electing ES106 Structural Mechanics and ES108 Earth Science.

### STANDARD PROGRAM FOR COURSE STUDENTS

#### *Fall Semester*

#### *Spring Semester*

#### *Junior Year*

CE51 Mechanics III  
EE51 Instrumentation and Control  
ME51 Thermodynamics I  
Math 51 Advanced Calculus

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

#### *Senior Year*

CE53 Adv. Structural Theory  
CE55 Civil Engineering Design I  
CE57 Hydraulic & Sanitary Engineering  
Physics 51 Atomic and Nuclear Physics  
(or Elective)

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

CE11 MECHANICS I. Mr. Carpenter

*Fall semester*

Concept and definition of force, scalar, and vector quantities, combination and resolution of forces; principle of moments and couples; graphical and analytical conditions for equilibrium; stress diagrams, cables; centroids of areas, volumes, and masses; area and volume theorems. Open to students who have taken Mathematics 3-4. (3 recitations and 1 3-hour laboratory per week.)

CE12 MECHANICS II. Mr. Willis.

*Spring semester*

Principles of dynamics, motion of a particle, Newton's laws, general equation of motion, rectilinear motion, displacement, velocity, speed, and acceleration; simple harmonic motion, free and forced vibration; inertia forces, work and energy, momentum and impulse; curvilinear motion; kinetic energy of rotation; relative motion, angular momentum; combined translation and rotation.

Prerequisite: CE11 and Mathematics 11. (3 recitations and 1 3-hour laboratory per week.)

\* Required beginning with the Class of 1962.

CE51 MECHANICS III. Mr. Newlin.

*Fall semester*

This course deals with the internal stresses and changes of form which always occur when forces act upon solid bodies. The mechanics involved in the design of simple engineering structures is presented so that the student may realize the problems which must be solved in order to secure the required strength and stiffness in such structures. The laboratory work of this course is planned to clarify the theoretical considerations of beams, columns, combined stress, torsion and methods of strain measurement.

Prerequisite: CE11, Mechanics I, and Mathematics 12. (3 recitations and 3-hour laboratory per week.)

CE52 STRUCTURAL THEORY. Mr. Mangelsdorf.

*Spring semester*

Analysis of determinate and indeterminate structures. A study of stresses in truss and rigid frame systems, influence lines.

Prerequisite: CE51 Mechanics of Materials. (3 recitations and 1 3-hour laboratory per week.)

CE53 ADVANCED STRUCTURAL THEORY. Mr. Carpenter.

*Fall semester*

A study of indeterminate structural systems and advanced structural theory. Structural models.

Prerequisite: CE52 Structural Theory. (3 recitations and 1 3-hour laboratory per week.)

CE54 SOIL MECHANICS AND FOUNDATIONS. Mr. Newlin.

*Spring semester*

The properties of soils, including the fundamentals of the structure of clay, flow through porous media, consolidation, compaction and shear strength. The fundamentals, combined with engineering geology and the principles of mechanics are applied to slope stability, settlement analysis, foundation design and analysis of loads on retaining walls and bulkheads.

Prerequisite: CE51 or equivalent. (3 recitations and 1 3-hour laboratory per week.)

CE55 CIVIL ENGINEERING DESIGN—I. Mr. Carpenter, Mr. Newlin.

*Fall semester*

An introduction to the design of structures. Fundamental stress analysis, considerations of structural members and connections for metallic, concrete, and timber structures, including buildings, bridges, and aircraft.

Prerequisite: CE52 Structural Theory or equivalent. (2 recitations and 2 3-hour laboratories per week.)

CE56 CIVIL ENGINEERING DESIGN—II. Mr. Carpenter, Mr. Newlin.

*Spring semester*

A continuation of Civil Engineering Design I. Planning, analysis, and design of engineering structures and foundations. Additional topics in concrete work, ordinary and pre-stressed reinforcement. Ultimate design theory.

Prerequisite: CE55 Civil Engineering Design—I. (2 recitations and 2 3-hour laboratories each week.)

CE57 HYDRAULIC AND SANITARY ENGINEERING. Mr. Willis.

*Fall semester*

An introduction to the fundamentals of hydrology, including precipitation—runoff relationships, ground water flow, the routing and hydraulics of surface flow through channels and reservoirs. Fundamentals are related to Civil Engineering activities, especially river basin development, water supply, and drainage. Introduction to the principles of water and sewage treatment is included.

Prerequisite: ME54, Fluid Mechanics. (3 recitations and 1 3-hour laboratory per week.)



CE58 SPECIAL TOPICS. Staff.

Required course with subject matter dependent on a group need or interest. Past groups have studied advanced soil mechanics, theory of elasticity, transportation, advanced hydraulics, or structural mechanics.

The laboratory period is devoted to the principles and practice of civil engineering measurements through a study of photogrammetry, map projections, curves and earth work, celestial observations, field layout, and related topics of importance to the professional civil engineer. (Effective class of 1962.)

CE69 CIVIL ENGINEERING THESIS. Staff.

The time allotted to a civil engineering thesis is generally one semester. The subject matter of the thesis must be approved by the department chairman six weeks before the beginning of the semester. Excellent facilities exist for independent investigations in structures, soils, and materials.

## Electrical Engineering

PROFESSORS: HOWARD M. JENKINS, *Chairman*  
JOHN D. MCCRUMM

ASSOCIATE PROFESSOR: CARL BARUS

ASSISTANT PROFESSOR: DAVID L. BOWLER

Electrical Engineering deals with the development and application of principles of electricity and allied physical sciences in the broad fields of conversion, transmission, control, and utilization of electrical energy for the purposes of transmitting power and communicating intelligence. The program in Electrical Engineering gives full recognition to the natural sciences basic to the profession. It also includes considerable work in the Humanities and Social Sciences, since the needs of the profession are best served by engineers who are vitally aware of the society in which they live.

The educational objective is served by placing emphasis on analytic processes, experimental evidence and by the exploitation of mathematical methods to facilitate the application of physical principles to engineering problems. Since many problems can best be solved by making certain simplifications, the students are encouraged to examine problems critically and to make such simplifying assumptions where appropriate without destroying the significance of the results. The importance of the presentation of work is also stressed, a student being required to gain proficiency in communicating the results of his work clearly, completely and in well-organized form. The courses in Electrical Engineering are each a series of inquiries dealing with the fundamental concepts of electrical phenomena and are designed to inculcate in the student confidence in analytical methods and competence to apply basic principles to new engineering situations.

Students applying for a major in Electrical Engineering will normally have followed the basic engineering program outlined on page 90 during their first two years. Upon satisfactory completion of this program will fulfill the curricular prerequisites of the Department. In special cases, the Department will consider applications from students who have pursued a different program but who will have completed at least the following courses or their equivalents: Math 3, 4 and 11, 12; Physics 1, 2; CE11, 12 or Physics 11, 12; and EE12. It is expected that students will maintain a "C" average or better in each of the required electrical courses.

### STANDARD PROGRAM FOR COURSE STUDENTS

#### *First semester*

EE53 Circuit Theory I  
EE55 Engineering Analysis  
EE59 Electronics  
ME51 Thermodynamics

#### *Second semester*

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

#### *Senior Year*

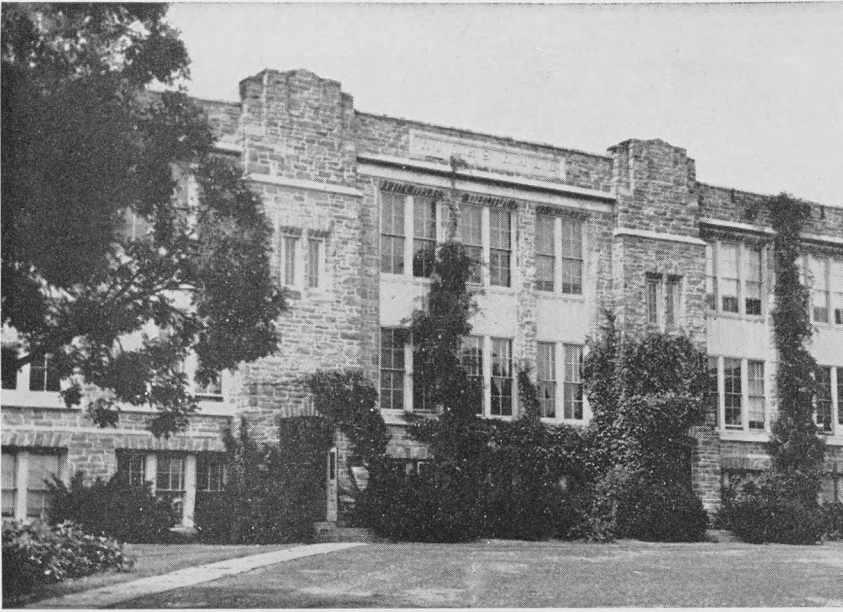
EE57 Electrical Machinery I  
EE61 Waves and Transmission Lines  
Ph51 Atomic and Nuclear Physics  
Elective

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

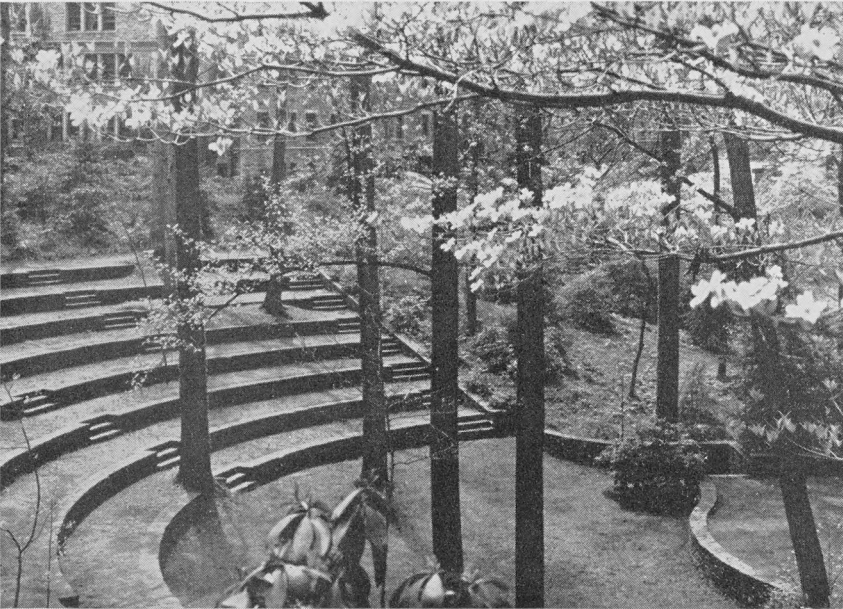
\* Required beginning with the Class of 1962.



*Friends Meeting House*



*Hicks Hall, An Engineering Building*



*Arthur Hoyt Scott Auditorium*

## EE12 ELECTRIC AND MAGNETIC CIRCUITS.

*Spring semester*

The experimental and theoretical basis of electricity and magnetism; elementary electrostatics and magnetostatics; voltage, current, power, energy. Bilateral and linear networks. Induced electromotive forces; capacitance and inductance; problems in ferro-magnetism. Transients in simple circuits.

Three class periods per week; one laboratory each week.

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

## EE51 INSTRUMENTATION AND CONTROL.

*Fall semester*

A study of the fundamentals of electronics and electronic circuits, control and regulation devices, particularly those involved in measuring systems and in servomechanisms; designed primarily for engineering majors.

Three class periods per week; one laboratory each week.

Prerequisite: EE12 Electric and Magnetic Circuits.

## EE52 ELECTRICAL APPARATUS.

*Spring semester*

Theory of direct-current generators and motors; fundamentals of control for direct current machines. Topics include flux, generated voltage, armature reaction, commutation, torque, speed, voltage and speed regulation, losses, efficiency, and effects of control on motor characteristics. Relations of simple harmonic electromotive forces and currents, power, power factor; single phase circuits; polyphase circuits, balanced and unbalanced. The construction, characteristics, and operation of alternators, induction motors, transformers, synchronous motors.

Three class periods per week; one laboratory each week.

Prerequisite: EE51 Instrumentation and Control.

## EE53 CIRCUIT THEORY I

*Fall semester*

Transient and steady-state analysis of electric circuits. Treatment is based on the differential equations of the circuit and the circuit impedance as a function of the complex frequency variable.

Three class periods per week; one laboratory each week.

Prerequisite: EE12 Electric and Magnetic Circuits, or Physics 1 and 2.

## EE54 CIRCUIT THEORY II.

*Spring semester*

Further study of electric networks, using the Laplace transformation and other mathematical methods. Synthesis of impedances containing two element-types is included.

Three class periods per week; one laboratory each week.

Prerequisites: EE53 Circuit Theory I, and EE55 Engineering Analysis, or equivalents.

## EE55 ENGINEERING ANALYSIS.

*Fall semester*

Formulation and application of the method of engineering analysis based upon fundamental physical laws, mathematics, and practical engineering considerations. Emphasis is placed on the professional approach to the analysis of bona fide engineering problems. A study is made of the common physical and mathematical aspects shared by different systems such as mechanical, thermal, and electrical. The theory and application of ordinary differential equations is systematically covered. The Laplace transformation is developed and applied.

Three class periods per week; one laboratory each week.

Prerequisites: EE12 Electric and Magnetic Circuits, and Integral Calculus.

EE56 FIELD THEORY.

Spring sem

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 per week; one laboratory each week.

Prerequisites: EE53 Circuit Theory I, and EE55 Engineering Analysis I, or equivalent.

EE57 ELECTRICAL MACHINERY I.

Fall sem

Physical aspects of electromechanical energy conversions; conversions and principles of such conversions; basic concepts of machine performance and the analysis of rotating electrical machinery and transformers; D-C machines, analysis of performance and applications.

Three class periods per week; one laboratory each week.

Prerequisite: EE53 Circuit Theory I.

EE58 ELECTRICAL MACHINERY II.

Spring sem

Synchronous machines, performance, effects of saturation and saliency; polyphase induction machines; fractional horsepower motors; rotating control devices; self-synchronous machines; electrical transients and the dynamics of coupled systems.

Three class periods per week; one laboratory each week.

Prerequisite: EE57 Electrical Machinery I.

EE59-60 ELECTRONICS.

Full c

Electronic circuit analysis and signal theory. Transistors, vacuum tubes, and other devices are treated by the use of linear and piecewise-linear models and by graphical analysis. Transient and steady-state circuit theory, normally studied concurrently, is extensively applied. Typical topics in signal theory include noise, modulation, sampling, signal flow analysis and information theory.

Credit for the first semester alone will be given by special arrangement.

Three class periods per week; one laboratory each week.

Prerequisite: EE53 Circuit Theory I, preceding or concurrent.

EE61 WAVES AND TRANSMISSION LINES.

Fall sem

Application of Maxwell's equations to electromagnetic wave problems. Transmission lines are treated from both field and circuit viewpoints. Other topics include wave propagation and reflection, waves in lossy media, waveguide, cavity resonators, antennas and radiation.

Three class periods per week; one laboratory each week.

Prerequisite: EE56 Field Theory.

EE62 PHYSICAL ELECTRONICS.

Spring sem

A study of the physical principles underlying the operation of electronic devices. The material studied includes: particle dynamics, conduction in metals and semiconductors, thermionic emission, space charge theory, semiconductor junctions and transistors, dielectric and magnetic materials, photoelectric phenomena and gaseous conduction.

Three class periods per week; one laboratory each week.

Prerequisite: Physics 51 Atomic and Nuclear Physics.

#### EE64 SERVOMECHANISMS.

*Spring semester*

An introduction to automatic control systems using Laplace transform techniques. System design is studied by means of the Nyquist diagram and frequency response methods. Other topics include compensation networks, multiple input systems, Nichols charts, the root-locus method. Applications are made to space vehicle guidance, process control and, in general, to systems requiring control of position, torque, temperature, etc.

Open to senior Electrical or Mechanical Engineering majors, or others with equivalent background.

#### EE71 ELECTRICAL ENGINEERING THESIS.

An engineering thesis may be substituted for a course by special arrangement with the staff.

### HONORS

The two following seminars are offered by the Department to prepare in part for examinations for a degree with Honors. Students who plan to take honors seminars in Electrical Engineering should note that Circuit Theory I and II is a desirable preparation for these seminars (although not a prerequisite if a seminar in Electricity and Magnetism has been taken).

#### EE102. 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; microwave tubes. The seminar is accompanied by a full-day laboratory.

#### EE103. SERVOMECHANISMS.

A systematic investigation of the characteristics of closed cycle control systems and their components. The mechanisms may be any combination of electrical, thermal, mechanical or hydraulic systems. Synthesis rather than analysis is stressed, thus requiring use of the more powerful methods of the Laplace transform, and a study of transfer function loci and equations in the complex domain. Modern techniques are employed; extensive reading in the literature is expected of each student. There is one full-day laboratory per week, in addition to the seminar.

## Mechanical Engineering

PROFESSOR: WILLIAM J. COPE, *Chairman* ‡

ASSOCIATE PROFESSOR: BERNARD MORRILL, *Acting Chairman*

ASSISTANT PROFESSOR: PHILIP C. PRAGER

INSTRUCTOR: TOSHIYUKI FUKUSHIMA

The curriculum in Mechanical Engineering is planned to develop the student the scientific training for positions in manufacturing industries, with organizations engaged in power production, and in the field of transportation. Based upon the fundamental sciences of physics, chemistry, and mathematics, the program aims to provide a background for the solution of the variety of problems related to the design, construction and operation of engineering equipment used in industrial establishments. The arrangement of courses is intended also to prepare mechanical engineers for professional activities as those which deal with fabrication of products and the eventual assumption of managerial responsibilities, as well as research and development work leading to new products.

Coincident with the need for a broad and fundamental technical training, all in the engineering profession should be conscious of the impact upon society resulting from their efforts. To stimulate this awareness, students are encouraged to choose electives in the Humanities and Social Sciences throughout their undergraduate careers.

Students electing the Honors Program in Engineering Sciences may prepare for graduate work in Mechanical Engineering by including two of the following seminars: ES107 Mechanical Design, EE102 Electronics, or ES109 Thesis.

### STANDARD PROGRAM FOR COURSE STUDENTS

#### *Fall Semester*

CE51 Mechanics III  
EE51 Instrumentation and Control  
ME51 Thermodynamics I  
EE55 Engineering Analysis

#### *Spring Semester*

EE52 Electrical Apparatus  
ME52 Thermodynamics II  
ME54 Fluid Mechanics  
EL10 Writing and Speaking \*

#### *Junior Year*

#### *Senior Year*

ME53 Thermodynamics III  
ME55 Adv. Fluid Mechanics  
ME63 Kinematics and Design  
Elective

ME62 Adv. Strength of Materials  
ME64 Engineering Design  
GE52 Industrial Management  
Elective

ME51 THERMODYNAMICS I. Mr. Prager.

Energy and first law of thermodynamics; application of general energy equation to steady-flow and non-flow processes; properties of liquids; vapors, gases; reversible cycles; second law of thermodynamics; entropy.

Three class periods per week; one three-hour laboratory each week.

Prerequisite: Integral Calculus.

‡ Absent on leave, 1959-60.

\* Required beginning with the Class of 1962.



**ME52 THERMODYNAMICS II. Mr. Prager.**

Extension of ME51; application of thermodynamic principles to problems in air conditioning, combustion, steam generation and refrigeration. Analysis of modern steam power plant cycles, expansion of steam in nozzles and turbines, energy balance calculations. Introduction to the principles of heat transfer.

Three class periods per week; one three-hour laboratory each week.

Prerequisite: ME51.

**ME53 THERMODYNAMICS III. Mr. Prager.**

Analysis of gas cycles with special emphasis on Otto, Diesel and Brayton cycles; behavior of real gases and mixtures; general thermodynamic equations; combustion of liquid and gaseous fuels; gas compression. Study of application of fundamental principles as demonstrated in design, test and operation of spark-ignition and compression-ignition engines, gas turbines and compressors, and jet engines.

Three class periods per week; one three-hour laboratory each week.

Prerequisites: ME51 Thermodynamics, and ME54 Fluid Mechanics.

**ME54 FLUID MECHANICS. Mr. Fukushima.**

An introductory course in fluid statics; kinematics; equation of continuity; steady flow energy and momentum; dynamics of an ideal fluid; dimensional analysis and similitude; incompressible flow in closed conduits and compressibility phenomena.

Three class periods per week; one three-hour laboratory each week.

Prerequisites: Integral Calculus, ME51 Thermodynamics.

**ME55 ADVANCED FLUID MECHANICS. Mr. Fukushima.**

Extension of ME54. Theory of fluid mechanics in turbomachinery, jets, lubrication; fluid dynamics leading to Navier-Stokes equation, Euler's equation, potential flow theory; boundary layer theory and drag on immersed bodies; one dimensional compressible flow.

Three class periods per week; one three-hour laboratory each week.

Prerequisites: ME54 Fluid Mechanics, EE55 Engineering Analysis.

**ME62 ADVANCED STRENGTH OF MATERIALS. Mr. Fukushima.**

Review of stress and strain leading to equilibrium equations and generalized Hooke's Law; thick cylinders; torsion; beams on elastic foundations; energy methods; theories of failure under stress; influence of stress concentration and working stresses.

Three class periods per week; one three-hour laboratory each week.

Prerequisites: CE51 Mechanics III, EE55 Engineering Analysis.

**ME63 KINEMATICS AND DESIGN. Mr. Morrill.**

A study of the complex motions and velocities of machine linkwork and gearing; design of cams, screws, fastenings, belts, straight and curved frames, gears and shafting.

Three class periods per week; one three-hour laboratory each week.

Prerequisite: EE55 Engineering Analysis, CE51 Mechanics III.

**ME64 ENGINEERING DESIGN. Mr. Morrill.**

Extension of ME63; lubrication and bearing design; design of machine assemblies. Vibration analysis; including dynamics of a particle, single and several degrees of freedom, beams and shafts, Lagrange equations, vibrations in elastic media.

Three class periods per week; one three-hour laboratory each week.

Prerequisite: ME63 Kinematics and Design.

**ME71 MECHANICAL ENGINEERING THESIS. Staff.**

With departmental approval, an undergraduate may undertake a thesis project as a portion of the program in the senior year.

## English Literature

PROFESSORS: GEORGE J. BECKER, *Chairman*  
ELIZABETH COX WRIGHT

ASSOCIATE PROFESSOR: FREDRIC KLEES

ASSISTANT PROFESSORS: DAVID COWDEN  
DANIEL G. HOFFMAN  
SAMUEL L. HYNES ‡

INSTRUCTORS: JOHN S. COOLIDGE  
ALEX ZWERDLING

LECTURER: BARBARA PEARSON LANGE

This department might more properly be called the Department of Literature in English, since it offers a study both of literature originally written in the English language and of works translated from other tongues. Literature is considered as a fine art, as a cultural record, and as a guide to the student's interpretation of his own experience in life. The program of courses and seminars comprises several approaches to the subject: the intensive study of the work of major writers, examination of the literature produced in certain limited periods, the historical development of the major literary types, and the grouping of various types or forms on the basis of their subject matter or point of view. The general purposes of this study are the broadening of the student's understanding and enjoyment of literature, the development of a basis for intelligent criticism, and the provision of a foundation for further study in the field. Stress is also laid upon accurate reading and writing through critical explication of texts and criticism of student papers.

### REQUIREMENTS FOR MAJORS IN COURSE

The work of the major in course consists of at least eight semester courses in the department. It is recommended that majors take The Development of English Literature (3-4) in the freshman year, one of the type courses (21-26) during the sophomore year, Chaucer or Milton in the junior year, and Shakespeare and Problems in Literary Study in the final year. The comprehensive examination at the end of the senior year is based on this body of work, but also includes questions on other courses offered by the department for those prepared in those fields.

### COURSES

1. MODERN LITERATURE. Staff. *Each semester*  
An introduction to the critical study of the principal types of literature. Materials are drawn chiefly from literature in English since the first World War. This course is not open to students who elect 3-4. Either 1 or 3-4 is prerequisite to all other literature courses offered by the department.
- 3-4. THE DEVELOPMENT OF ENGLISH LITERATURE. Staff. *Full course*  
An introduction to literary study by means of the traditional materials of English literature from the Renaissance to the twentieth century.  
Recommended for English majors; not open to students taking course 1.

‡ Absent on leave, 1959-60.

- 5, 6. ENGLISH FOR FOREIGN STUDENTS. Mrs. Lange.  
Individual and group work on an advanced level for students from non-English backgrounds.
10. WRITING AND SPEAKING. Staff. *Each semester*  
Analysis, organization, and effective presentation of complex subject matter in both speech and writing. Open only to students for whom the course is a requirement or for whom it is recommended by their advisers.
12. THE SEVENTEENTH CENTURY. Mr. Hoffman. *Spring semester*  
Study of the major literary currents and figures of the period.
14. THE EIGHTEENTH CENTURY. Mr. Coolidge. *Spring semester*  
The developing sensibility and literary forms of the period.
16. THE ROMANTIC PERIOD. Mrs. Wright. *Spring semester*  
Studies in poetry, the novel, and the essay from about 1790 to 1820, with attention to the new materials and forms of romanticism.
18. VICTORIAN LITERATURE. Mr. Cowden. *Spring semester*  
The important ideas and literary currents of the period.  
NOTE: These four period courses are open in the spring of the freshman year to students who have taken Modern Literature. The combination of one of these courses and Modern Literature will be considered as equivalent to 3-4 for students who wish to proceed to a major in the department.
- 21, 22. ENGLISH POETRY. Mrs. Wright.  
A study of the development of English poetry from its beginnings, with consideration of the principles of poetic criticism and a detailed examination of the work of two or three poets. Primarily for sophomores.
- 23, 24. THE ENGLISH NOVEL. Mr. Cowden.  
The first semester emphasizes the chronicle form of novel prevalent from Fielding to Trollope; the second semester emphasizes developments in technique and content since Meredith. Credit is given for either semester, but students desiring both should take them in regular sequence. Primarily for sophomores.
25. COMEDY. Mr. Klees. *Fall semester*  
Dramatic comedy in its various forms, with particular attention to the Elizabethan, Restoration, and modern periods. Primarily for sophomores.
26. TRAGEDY. Mr. Klees. *Spring semester*  
Dramatic tragedy from the Agamemnon trilogy to *Death of a Salesman*, with emphasis on Elizabethan and modern American tragedy. Primarily for sophomores.
42. SHAKESPEARE. Staff. *Each semester*  
A study of the major plays. Not open to freshmen or to English majors.
- 51, 52. LITERATURE IN AMERICA. Mr. Hoffman.  
A study of the major American writers from Puritan times to the early 20th century. Open to juniors and seniors.
53. RENAISSANCE COMPARATIVE LITERATURE. Mr. Coolidge. *Fall semester*  
Emphasis on the assimilation of the classical tradition by English and other European literatures during the Renaissance. Open to juniors and seniors.
54. MODERN COMPARATIVE LITERATURE. Mr. Becker. *Spring semester*  
The rise and decline of the realistic movement as seen through the study of European and American works since Flaubert. Open to juniors and seniors.

55. CHAUCER. Mr. Klees. *Fall semester*  
 Reading of *Troilus and Criseyde*, *The Canterbury Tales*, and some of the minor poems in the original Middle English, with greater attention to the literary than to the linguistic aspects. Open to juniors and seniors.
56. MILTON. Mr. Coolidge. *Spring semester*  
 Study of the main body of Milton's works with particular emphasis on *Paradise Lost*. Open to juniors and seniors.
58. SPECIAL TOPICS. Staff.  
 From time to time intensive courses will be offered in fields not covered by the regular program. Open only to juniors and seniors.
- 61-62. SHAKESPEARE. Staff. *Fall semester*  
 A 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 taking the course.
- 63-64. PROBLEMS OF LITERARY STUDY. Staff. *Spring semester*  
 Group meetings of departmental majors held in the second semester of the senior year for the purpose of reviewing, integrating, and supplementing the major program. Under exceptional circumstances a student applying to the department by November 15 of his senior year may be allowed to substitute a thesis to be written under the direction of a member of the department.

## HONORS WORK

*Prerequisites:* The course requirements for a major in Honors are the same as for a major in course, either The Development of English Literature (3-4) or Modern Literature (1) and one of the period courses (12, 14, 16, 18).

The election of one or two additional courses in the sophomore year is highly recommended.

For acceptance as a minor in the department, two semester courses are required.

*Program:* Majors in Honors must take four seminars in the department, including Shakespeare. Minors in Honors may enroll in any two or three seminars which seem best suited to the purposes of their whole program. No student may take more than two seminars in Group II.

*Seminars:* The following seminars prepare for examinations for a degree with Honors:

### Group I

101. SHAKESPEARE. Staff. *Each semester*  
 A 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. Klees. *Fall semester*  
 A reading of Chaucer's poems in the original Middle English, with particular attention to *Troilus and Criseyde* and *The Canterbury Tales*.
104. MILTON. Mr. Coolidge. *Spring semester*  
 An examination of the poetic achievement of John Milton.
106. DRAMA. Mr. Klees. *Spring semester*  
 A study of comedy and tragedy in the Greek, Elizabethan, and modern periods with a consideration of the various forms these types take from one age to another.

108. RENAISSANCE POETRY. Mrs. Wright. *Spring semester*  
The basic elements of poetic expression, thought, imagery, and sound, are studied in poems from the Spenserian and Metaphysical strains.

109. THE ENGLISH AUGUSTANS. Mr. Coolidge. *Fall semester*  
The interests, sensibility, and literary practice of such figures as Dryden, Swift, Pope, Fielding, Johnson.

### *Group II*

111. ROMANTICISM. Mr. Zwerdling. *Fall semester*  
A study of the romantic movement in England. The concentration will be on the five major poets, but some attention will also be given to critical theory and the varieties of prose expression.

113. THE ENGLISH NOVEL. Mrs. Wright and Mr. Cowden. *Each semester*  
An examination of changing forms in the modern English novel, with emphasis on selected works outside the Victorian tradition.

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. PROBLEMS IN AMERICAN LITERATURE. Mr. Hoffman. *Spring semester*  
A study of the themes, forms and aesthetic premises of selected writings, and their relations to the cultural situations in which they were created.

118. MODERN POETRY. Mr. Hynes and Mr. Hoffman. *Spring semester*  
A 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, with whom he has periodic consultations.

## Fine Arts

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

INSTRUCTOR: LEE JOHNSON

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. However, instruction in such work is available under the extracurricular Arts and Crafts Program.

### REQUIREMENTS AND RECOMMENDATIONS

*Prerequisites:* Majors in course and majors and minors in honors must take the first half courses, Fine Arts 1 and 2. This requirement must be fulfilled before the Junior year. For other students the prerequisite for all other courses is one semester of the Introduction to Art History, either Fine Arts 1 or 2. Fine Arts 11, Design, Drawing and Painting, while not a prerequisite, is recommended as a foundation for other Fine Arts courses and seminars.

*Sequence of Courses:* Whenever possible, majors will take courses in their numerical order. For other students courses need not be taken in numerical sequence.

*Majors in Course:* The program of a major consists of at least eight half courses (including Fine Arts 1-2) in the Department. The courses supporting this program depend on the needs of the individual student 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 the 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 or German.

### COURSES

1. INTRODUCTION TO ART HISTORY. Mr. Walker and Mr. Johnson. *Fall semester.* Consideration is given in the first four weeks to the basic problems of the nature of the work of art, the factors of influence upon its conception, formation and development (geographic, social, economic, etc.) the principles of value and judgments, and methods of analysis. A limited number of representative examples of architecture, sculpture, and painting are studied within the historical context.

of the civilizations and cultural epochs which produced them: Ancient Egypt, Greece and Rome, and Medieval France.

Three hours of lecture a week and one bi-weekly conference hour.

2. INTRODUCTION TO ART HISTORY. Mr. Rhys and Mr. Johnson. *Spring semester*  
European and American architecture, sculpture, and painting from the fifteenth century to the present day are studied from the same points of view and with the same methods as in the first semester.  
Three hours of lecture a week and one bi-weekly conference.
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.
51. ANCIENT ART. Mr. Walker. *Fall semester*  
The development of the forms of architecture, sculpture and painting as expressing various cultural patterns of the ancient civilizations of Greece and Rome.
52. MEDIEVAL ART. Mr. Walker. *Spring semester*  
A study of the relationship between art and society in Europe and the Near East from the fourth through the fourteenth centuries. The ideas and institutions which were instrumental in shaping Christian art during its formative stages of development. Special emphasis is placed on the Romanesque and Gothic periods in France; the abbey and the cathedral.
53. ITALIAN RENAISSANCE ART. Mr. Johnson. *Spring semester*  
A study of certain aspects of the art of the Renaissance in Italy as expressed in architecture, sculpture and painting. Emphasis is placed on such great masters as Donatello, Masaccio, Alberti, Leonardo da Vinci, Raphael, Michelangelo and Titian.
54. NORTHERN RENAISSANCE AND BAROQUE PAINTING. Staff. *Spring semester*  
Developments in painting and drawing during the fifteenth, sixteenth and seventeenth centuries in France, the Netherlands, Germany and Spain through the study of individual artists such as the Van Eycks, Roger van der Weyden, Jean Fouquet, Dürer, Gruenewald, Holbein, El Greco, Rubens, Rembrandt, Vermeer, Poussin and Velasquez.
55. MODERN PAINTING. Mr. Johnson. *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.
56. AMERICAN ART. Mr. Rhys. *Fall 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.
57. MODERN BUILDING. 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.
60. SENIOR CONFERENCE. Mr. Walker. *Spring semester*

## HONORS SEMINARS

100. **MEDIEVAL ART.** Mr. Walker. *Fall semester*  
The development of the forms of Christian art during the Middle Ages, special emphasis on the Romanesque and Gothic periods in France.
101. **ITALIAN RENAISSANCE PAINTING.** Mr. Rhys. *Fall semester*  
A study and analysis of painting in Italy from Giotto to Titian: the contributions of the outstanding masters to its stylistic development and its relationship to the Renaissance movement as a whole.
102. **NORTHERN RENAISSANCE PAINTING.** Mr. Walker. *Spring semester*  
Developments in painting and the graphic arts of drawing and print making during the fifteenth century in England, France, the Netherlands, Germany, Spain through an intensive study of individual masters such as the Van Eyck, Roger van der Weyden, Jerome Bosch, Pieter Brughel, Jean Fouquet, Martin Schongauer, Albrecht Dürer, Hans Holbein, and El Greco.
103. **THE BAROQUE.** Mr. Walker. *Fall semester*  
Developments in painting and the graphic arts of drawing and print making during the seventeenth century in Western Europe. Although the role of the Baroque in the formation of the Baroque as an international style is studied, special orientation is found in the individual work of such great masters as Rembrandt, Vermeer, Velasquez, and Poussin.
104. **MODERN PAINTING.** Mr. Rhys. *Spring 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.
105. **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 expressive forms 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.
107. **ANCIENT ART.** Mr. Walker. *Fall semester*  
Classical Greek art and architecture within the art historical context of the civilizations of the Near East.



## History

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

ASSISTANT PROFESSOR: PETER N. RIESENBERG

INSTRUCTORS: R. ARNOLD RICKS  
HARRISON M. WRIGHT

LECTURER: F. HILARY CONROY

The first course introduces the student to the past, not only of the western tradition but of various parts of the world which have come to share the same heritage since the beginning of the expansion of Europe, and also introduces the student to the methods of the historian and the uses of a knowledge of history. The other courses in the department, particularly at the sophomore level, treat more fully our heritage from England and offer a choice among various aspects of the history of America, and among approaches to an understanding of other parts of the world. The courses open chiefly to juniors and seniors expand certain of the topics introduced in History 1-2. The Honors program is planned for different objectives as well as different methods from the Course program. The seminars rarely parallel courses in subject matter.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS AND MINORS

History 1-2 should be taken in the freshman year, if possible, followed in the sophomore year, if there is room in the individual's program, by a choice of two of the following: (1) one semester of American History, (2) England, and (3) either Russia, the Expansion of Europe, or The Other American Republics. For the major, carefully planned election of related courses in other departments should begin in the sophomore year, particularly with reference to the prerequisite requirements of these departments for Honors seminars. The minimum requirement for acceptance as a major in history at the beginning of the junior year is successful completion of two half courses in history. The student planning to apply for work leading to an Honors degree either as a major or minor should follow in general the same program as the Course major during his first two years.

The work of the major in Course consists of at least eight half courses in the department, including History 1-2, a half course in American history, a half course in English history, and Special Topics. The comprehensive examination is based on the fields covered in these courses and also includes questions on the other courses offered by the department. The department records the field of special competence of its majors so that the information can be given in letters of recommendation, etc., when it is desirable. A major in history may, for example, be described as a major in history with emphasis on the social sciences, on American civilization, on international relations, or on Russian studies.

Students intending to do graduate work in history should bear in mind that the languages usually required by graduate schools are French and German.

## COURSES

No course open to sophomores covers the same ground as an Honors seminar.

- 1-2. INTRODUCTION TO HISTORY. All members of the department. *Full credit*  
One of the basic courses in the curriculum. It is an introduction to the study of history, and use of history for those who do not plan to take any other courses in history as well as for those who do. It is a prerequisite to all other work in history except courses 61 and 64. The course begins with the classical backgrounds of European civilization and ends with the mid-twentieth century. Sections are small enough for discussion.

NOTE: History 1 may be used to meet part of the college requirement of four courses in four different departments whether it is taken alone or in combination with History 2. In certain combinations History 1 may be given credit without History 2 if written permission is obtained from the chairman of the department.

3. ENGLAND. Miss Albertson.  
A survey of the history of the English people.
4. THE UNITED STATES BEFORE 1865. Mr. Field.  
The colonial experience; independence, a new society, and a new government; transcontinental expansion and the struggle between North and South.
5. THE UNITED STATES AFTER 1865. Mr. Field.  
The reconstruction of the Union; industrialism and its consequences; the problems of a shrinking world.
6. AMERICAN INTELLECTUAL HISTORY BEFORE 1865. Mr. Tolles.  
The history of ideas in the United States from the colonial period through the middle of the nineteenth century. A general knowledge of the political and social history of the period is assumed.
7. AMERICAN INTELLECTUAL HISTORY AFTER 1865. Mr. Tolles.  
The history of ideas in the United States from the middle of the nineteenth century to the present time. A general knowledge of the political and social history of the period is assumed.
11. THE OTHER AMERICAN REPUBLICS. Mr. Lafore.  
The development of Latin America with its European and colonial background. The emphasis is on Mexico, Brazil, and Argentina.
14. RUSSIA. Mr. Beik.  
The history of modern Russia. The course begins with the reign of Peter the Great and gives half its time to the period since the Revolution.
15. THE EXPANSION OF EUROPE. Mr. Wright.  
This course treats comparatively the various problems that have arisen in various European areas in which there was contact with Europeans. Case studies will be chosen from among the following areas: Algeria, India, Indonesia, Nigeria, Rhodesias, French West Africa.

The following courses are not open to freshmen and sophomores. Exceptions may be made only on written approval by the chairman of the department.

52. MODERN BRITAIN. Mr. Lafore.  
The development of a modern industrial society and welfare state.
53. THE FRENCH REVOLUTION AND NAPOLEON. Mr. Beik or Mr. Ricks.  
The significance of the period of 1789 to 1815 in the development of modern European social theories and political institutions.

54. **MEDIEVAL EUROPE.** Mr. Riesenbergl.  
The history of western Europe from the decline of the Roman empire through the thirteenth century.
55. **THE RENAISSANCE.** Miss Albertson.  
The history of western Europe from the fourteenth through the sixteenth century. The emphasis is on the influence of the Italian Renaissance.
56. **AMERICAN DIPLOMATIC HISTORY.** Mr. Field.  
Official United States foreign policy considered as a part of the larger problem of American participation in world affairs.
57. **MODERN EUROPE.** Members of the department.  
Recent European problems and institutions examined primarily through the experiences of one nation in the nineteenth and twentieth centuries. In 1959-60 the nation studied will be Germany. Mr. Ricks.
58. **HISTORY OF IDEAS.** Members of the department. In 1959-60 given by Mr. Beik.  
Aspects of the intellectual history of continental Europe and England.
61. **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.
62. **THE NEAR AND MIDDLE EAST.**  
The history of this area in modern times.  
Not offered in 1959-60.
64. **THE FAR EAST.** Mr. Conroy.  
Eastern Asia in the twentieth century. The main themes will be Japanese modernization, imperialism and "democratization", the Chinese revolutionary process, and Far Eastern rivalries.

65, 66. **SPECIAL TOPICS.**

For seniors. Individual programs are planned to prepare majors in history for the comprehensive examination. The discussion of review problems, of papers, and of reading is conducted in group meetings supplemented by individual conferences with members of the department. This may be elected as a single one-semester course or as a double one-semester course. Time is allowed for optional reading and research. The second credit (66) is usually given for a Course thesis.

### HONORS SEMINARS

The following seminars are offered by the department to juniors and seniors to prepare for the examinations for a degree with Honors. The topics of the seminars have been selected in order to illustrate different kinds of historical problems. They may be taken in any combination without regard to chronological order. There are prerequisites in addition to History 1-2 for certain seminars: for seminars 101, 102, and 103 some work in American history beyond the secondary school level is required; for seminars 107 and 109 some work in English history is required. These prerequisites may be fulfilled either by a semester course or by special arrangements made with the instructor of the seminar.

Those who wish to specialize in international relations with a major in history (see p. 113, last paragraph) should include in their programs at least three of the following seminars: numbers 103, 110, 116, 117.

#### *The United States*

101. **EARLY AMERICAN HISTORY.** Mr. Tolles.  
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. Field.  
Selected topics in the history of the United States.
103. PROBLEMS IN AMERICAN HISTORY: FOREIGN. Mr. Field.  
The United States in the world community; a study of the evolution since 1776 of the American policies toward Europe, Latin America, and the Orient, with emphasis on ideological, economic, and strategic developments.
- England and the Commonwealth*
106. MEDIEVAL ENGLAND. Miss Albertson.  
Aspects of English life and institutions from the Norman conquest through the Wars of the Roses.
107. TUDOR AND STUART ENGLAND. Miss Albertson.  
The English Renaissance and Reformation, constitutional theory, the Civil War and the Restoration.
109. ENGLAND 1785 TO 1914. Mr. Lafore.  
The rise of the first modern industrial state. Its social, political, and economic problems.
110. THE BRITISH EMPIRE. Mr. Wright.  
A study of the empire from 1750 to the present. Special attention is paid to the growth of the "second empire" and the internal history of the members of the present commonwealth.

*Europe*

111. MEDIEVAL EUROPE. Mr. Riesenberg.  
The civilization of the twelfth and thirteenth centuries in continental Europe.
112. THE RENAISSANCE AND REFORMATION. Miss Albertson.  
Continental Europe from the fourteenth to the seventeenth centuries.
114. EUROPE 1760 TO 1870. Mr. Beik.  
The disintegration of the old regime and the rise of liberalism.
115. EUROPE 1870 TO 1939. Mr. Lafore.  
Political and social changes which preceded the second world war in western continental Europe.
116. DIPLOMATIC HISTORY OF EUROPE. Mr. Lafore.  
The management of international affairs and problems since 1870.
117. EASTERN EUROPE. Mr. Beik.  
The origins and consequences of the Russian Revolution and the development of the Soviet zone in East Central Europe.

THESIS (120)

A thesis may be substituted for one of the Honors examinations by permission of the department. The topic should be selected and approved by the end of the junior 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 pp. 64-65.

## 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.

### *Group I*

- Political Science 12. INTERNATIONAL POLITICS
- Political Science 13. INTERNATIONAL LAW AND ORGANIZATION
- Political Science 57-58. AMERICAN FOREIGN POLICY
- Economics 60. INTERNATIONAL ECONOMICS

### *Group II*

- History 11. THE OTHER AMERICAN REPUBLICS
- History 14. RUSSIA
- History 15. THE EXPANSION OF EUROPE
- History 62. THE NEAR AND MIDDLE EAST
- History 64. THE FAR EAST

### *Group III*

- Political Science 15. COMPARATIVE GOVERNMENT
- Political Science 19. THE SOVIET SYSTEM
- Political Science 20. ASIAN POLITICAL SYSTEMS
- Political Science 59. 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 chairmen of their prospective major departments.

## Mathematics

PROFESSOR: HEINRICH BRINKMANN, *Chairman*

VISITING PROFESSOR: ORHAN H. ALISBAH

ASSOCIATE PROFESSOR: PHILIP W. CARRUTH

ASSISTANT PROFESSORS: EDGAR R. MULLINS, JR.  
DAVID ROSEN

Pure mathematics is an abstract subject and may be looked upon as the model of deductive science. On the other hand, the subject matter of mathematics has for 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 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 in some of the social sciences.

For students who intend to major in mathematics in college, the normal sequence of courses is the following: Freshman year, courses 3-4; Sophomore year, courses 11, 12; Junior and Senior years, courses 13, 14, 51, 52, 55. The completion of Physics 1, 2 is strongly recommended.

In order to be admitted to honors seminars in mathematics, either as a major or as a minor, a student must have completed courses 11, 12. An honors student who majors in mathematics must also take Physics 1, 2; it is furthermore highly desirable that he have a reading knowledge of French or German. A junior honors student will normally take the seminars in Advanced Calculus and Differential Equations and the seminar in Advanced Analysis; these seminars are offered each year. The remaining seminars are usually taken by senior students and are offered as they are required.

### 1-2. INTRODUCTION TO MATHEMATICS.

*Full course*

The purpose of this course is to acquaint the student with the principles of some of the fundamental concepts of mathematics. While a part of the course will deal with the ideas and applications of elementary calculus, other fundamental concepts of mathematics will also be considered, and in particular appropriate material from algebra and trigonometry will be studied. An introduction to statistics and probability will be given as an application. The course is suitable for a terminal course in mathematics, particularly for students in the social sciences. It may also be used as a prerequisite for further work in mathematics and should be taken by those students intending further study of mathematics who do not have the preparation necessary for courses 3-4.

### 3-4. FIRST YEAR MATHEMATICS.

*Full course*

The subject matter of these courses consists of calculus combined with appropriate material from analytic geometry. It will normally be followed by courses 11, 12 and should be taken by students intending to do their major work in mathematics, the physical sciences, or engineering. Good preparation, including a thorough course in trigonometry, is required as preparation for this course.

11, 12. CALCULUS. *Full course*

In this course the student continues the study of the calculus begun in Mathematics 3-4; certain topics from algebra and analytic geometry are also included. The course forms a necessary basis for any further work in mathematics and is essential for an understanding of the fundamentals of physics and other sciences, as well as engineering.

Prerequisite: Courses 3-4.

13. 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 large part 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.

Prerequisites: Courses 11, 12.

14. HIGHER ALGEBRA. *Spring semester*

The purpose of this course is to introduce the student to some of the abstract ideas that are fundamental in the subject of algebra as well as to extend his knowledge of certain algebraic techniques. Among the subjects studied are: Number systems, fields and their algebraic extensions, matrices and determinants, the solution of algebraic equations, systems of linear equations.

Prerequisites: Courses 11, 12.

51. ADVANCED ANALYSIS I. *Fall semester*

This course deals with the differential calculus of functions of several variables and its geometric applications, multiple integrals, line and surface integrals, improper integrals and infinite series. The treatment is sufficiently rigorous to strengthen the student's understanding of the principles of the calculus. Applications to the physical sciences are given whenever possible.

Prerequisites: Courses 11, 12; these courses must be passed with a grade of C or better.

52. ADVANCED ANALYSIS II. *Spring semester*

This course is a continuation of Mathematics 51. Some of the topics studied are: Ordinary Differential Equations, with applications; Infinite Series; Improper Integrals and the Gamma Function.

Prerequisites: Courses 11, 12, 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.

Prerequisites: Courses 11, 12, 51 (Course 51 may be taken concurrently).

55. SENIOR CONFERENCE. *Spring semester*

A weekly meeting held for the purpose of integrating and supplementing the course program of majors in this department.

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. ADVANCED CALCULUS. *Fall semester*

The subject matter of this seminar includes the differential calculus of functions of several variables, the elements of vector analysis, multiple integrals, line and surface integrals, improper integrals, infinite series, uniform convergence of

infinite processes. The treatment of these various subjects is sufficiently detailed to give the student an introduction to the rigorous processes of analysis.

102. DIFFERENTIAL EQUATIONS.

*Spring semester*

This seminar continues the study of the topics listed under the seminar in Advanced Calculus. It also includes a formal treatment of ordinary differential equations and their applications to various types of problems. This is followed by a study of existence theorems for ordinary differential equations, certain classical linear differential equations, Fourier series and a brief introduction to boundary value problems of certain partial differential equations of the second order.

103. ADVANCED ANALYSIS.

*Fall semester*

This seminar is planned for students who have mathematics as a minor and wish to have just one seminar in analysis. It is part of the Honors Program in Engineering Sciences (see p. 91). Among the subjects studied are functions of several variables, infinite series, uniform convergence of infinite processes, Fourier series, differential equations of the first order, linear differential equations, Bessel functions.

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. Among the specific topics to be studied are the algebra of matrices of classes and of ideals.

105. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE.

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.

Prerequisites: Seminars 101 and 102.

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. DIFFERENTIAL GEOMETRY.

The subject of this seminar is the metric differential geometry of curves and surfaces in three dimensional space.

108. SYMBOLIC LOGIC.

This seminar is given by the Department of Philosophy. A description of it will be found under the offerings of that department. It may be presented as part of the Mathematics program in Honors.

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.



## Modern Languages and Literatures

PROFESSORS: EDITH PHILIPS, *Chairman* (French)

HAROLD MARCH (French)

FRANZ H. MAUTNER (German)†

ASSOCIATE PROFESSORS: HILDE D. COHN (German)

JAMES D. SORBER (Spanish)

ASSISTANT PROFESSORS: ELISA ASENSIO (Spanish)

FREDERIC GROVER (French)‡

JUSTUS ROSENBERG (German and Russian)

JEANNE THEIS WHITAKER (French)

INSTRUCTOR: ROBERT SILHOL (French)

LECTURERS: GEORGE AVERY (German)

JEAN ASHMEAD PERKINS (French)

OLGA LANG (Russian)

ALBERT SCHMITT (German)

The department of modern languages and literatures aims to give its majors a comprehensive view of the literature and culture represented by these languages, in relation to other humanistic studies. Literature courses listed in the separate sections are conducted in the language concerned, and progress in the language is always one of the aims.

The elementary and intermediate courses are designed to prepare the students for advanced work in literature as well as to meet college and departmental requirements. It is possible with some extra reading, to major or to enter honors seminars in a language started in college, but elementary and intermediate courses (numbered 1 to 4) do not count toward the minimum of eight half courses required of a major. Prerequisites and recommended subjects for majors are noted under the listing of each language section.

### MODERN LANGUAGE SEMINARS (conducted in English)

#### 107. MODERN EUROPEAN WRITERS.

Four or five French, German, and Russian novelists.

#### 130. LINGUISTIC SCIENCE.

A study of the nature and development of language. Survey of current practice in linguistic analysis; phonemics, morphophonemics, morphemics, and syntactics. The principles of historical and comparative linguistics and of dialect geography. Meaning and change of meaning. Classification of languages. Linguistics in its relationship to other fields of study. Intended not only for students planning intensive language studies but also for students of anthropology, philosophy, or psychology. While a knowledge of one or more foreign languages is desirable, there are no specific prerequisites.

† Absent on leave, spring semester, 1959-60.

‡ Absent on leave, 1959-60.

## French

All students offering French for entrance are placed at the level where they will presumably profit best by the course, according to their rating in the College Entrance Examination or a test given by the department.

French may be offered as a major in course or as a major or minor in honors work. Prerequisites and recommended supporting subjects are the same for both course and honors students and are as follows:

### Required:

- French 11, 12 Introduction to Literature, or evidence of equivalent work.
- French 5 Advanced Composition and Diction.

### Recommended supporting subjects:

- History of France, History of Modern Philosophy, Psychology, courses in other literatures, Fine Arts.

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

NOTE: All advanced courses are not offered every year. Students wishing a major or minor in French should plan their course carefully in advance with the department in order to get a well rounded program.

## COURSES

### 1-2. ELEMENTARY FRENCH.

For students who begin French in College. Equivalent to two years' 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. INTERMEDIATE FRENCH.

For students who have had French 1-2 or its equivalent (2 years' French in high school). Students who have had three years in high school usually enter French 4. Grammar is reviewed. Reading is from contemporary literature in French editions without notes or vocabulary. Every effort is made to help the student to increase his vocabulary and to discuss what he has read in the French language. Completion of French 4 satisfies the language requirement. The normal course to follow French 4 is French 11. (Both courses are offered each semester.)

### 5. ADVANCED COMPOSITION.

Problems of syntax, stylistics, and translation; vocabulary or literary criticism.

### 6. ADVANCED COMPOSITION AND DICTION.

For those who intend to major in French or 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 LITERATURE.

In Course 11 the transition is made from reading as an aid to language learning to the consideration of literary values. The material is selected from classics of the nineteenth century, but it is not a systematic survey course. Prerequisite: French 4 or equivalent.

In Course 12 the treatment is more historical with selected readings from Rabelais to Rousseau. (Both courses are offered each semester.)

14. PROSE DE LA RENAISSANCE.  
Readings from Rabelais, Calvin, Montaigne.
15. L'AGE DE LOUIS XIV.  
Selected prose and poetry of the seventeenth century exclusive of the theater.
16. LES "PHILOSOPHES."  
Montesquieu, Voltaire, Diderot and Rousseau; their contribution to the development of the ideas on art, literature and society which characterize the French eighteenth century.
17. THÉÂTRE CLASSIQUE.  
The plays of Corneille, Racine and Molière and the growth of the classic ideal in French literature.
21. LITTÉRATURE DU MOYEN AGE.  
Readings from medieval literature in modern French translations.
22. ROMAN MODERNE.  
Important novels from Balzac to the early twentieth century, including such authors as Balzac, Stendhal, Flaubert, Zola, Gide, Proust, Céline.
24. ROMAN CONTEMPORAIN.  
Representative novels from 1920 to the present.
25. LE ROMAN AU 17<sup>e</sup> ET 18<sup>e</sup> SIÈCLES.  
Selected novels before Balzac.
51. SPECIAL TOPICS. (For senior majors.)  
Readings selected to fit the needs of individual 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 with work in other fields.

#### HONORS SEMINARS

100. LITTÉRATURE DU MOYEN AGE.  
Old French readings in lyric poetry, theater and fiction.
101. LA RENAISSANCE EN FRANCE.  
Rabelais, Calvin, Montaigne, Ronsard et la Pléiade.
102. LE THÉÂTRE CLASSIQUE.  
Corneille, Racine, Molière.
103. LE SIÈCLE DES PHILOSOPHES.  
Montesquieu, Voltaire, Diderot, Rousseau.
104. BALZAC, STENDHAL, FLAUBERT, PROUST.
105. PROUST.
106. POÉSIE MODERNE.  
Baudelaire, Rimbaud, Verlaine, Mallarmé, Claudel, Verlaine, Valéry.
108. LE ROMAN DU 20<sup>e</sup> SIÈCLE.

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

## German

All students offering German for entrance are placed at the level where they can presumably profit best by the course, according to their rating in the College Entrance Examination or a test given by the department.

German may be offered as a major in course or as a major or minor in honors work. Prerequisites and recommended supporting subjects are the same for both course and honors students and are as follows:

### Required:

German 11-12. Introduction to German Literature.

### Recommended supporting subjects:

An advanced course in German literature, courses in other literatures, Shakespeare, Modern Philosophy, Psychology, Fine Arts, History of Germany.

As far as possible, German is the language of the classroom. Since not all advanced courses and seminars are offered every year, students wishing a major or minor in German should plan their courses carefully in advance with the department in order to get a well rounded program.

### 1-2. ELEMENTARY GERMAN.

For students who begin German in college. Equivalent of two years' secondary school preparation. Fundamentals of German and easy literary prose such as Schnitzler: *Der blinde Geronimo*.

### 3. INTERMEDIATE GERMAN.

Prerequisite: German 1-2 or two years' secondary school preparation. Narrative and expository prose of moderate difficulty such as Hesse: *Knulp*; Schweitzer: *Leben und Denken*. Review grammar.

### 4. INTERMEDIATE GERMAN.

Fulfills the college requirement for all students who wish to learn reading and speaking. Literary narrative, drama, poetry, expository prose of greater difficulty. Prerequisite: German 3 or equivalent.

### 6. WRITING AND SPEAKING GERMAN.

Composition and conversation. Prerequisite: Course 3-4 or equivalent.

### 7-8. ELEMENTARY GERMAN (SPECIAL READING COURSE.)

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

### 11, 12. INTRODUCTION TO GERMAN LITERATURE.

A study of representative German authors; reading and discussion of dramatic *Novellen*, and lyric poems. Not a survey course. Writing of critical reports. Prerequisite: German 4 or equivalent.

### 13. DIE DEUTSCHE ROMANTIK.

An introductory study of the Romantic movement in Germany, with reading from representative authors such as Novalis, Tieck, Arnim, Brentano, Eichendorff. Lectures, discussion, papers.

Prerequisite: Course 11-12 or equivalent.

14. DIE DEUTSCHE NOVELLE VON GOETHE BIS THOMAS MANN.  
Significant examples of this typically German genre will be read and interpreted as to contents, form, and importance in intellectual history. Authors: Goethe, Eichendorff, Kleist, Stifter, Meyer, Keller, Storm, Thomas Mann.
15. DIE GOETHE-ZEIT.  
Goethe, Schiller, and their contemporaries. The most significant works will be studied.
17. GOETHE'S FAUST, ERSTER UND ZWEITER TEIL.  
An intensive study of *Faust, I and II*. Also for students who only know *Faust, Part One*.
18. MODERNE DEUTSCHE LITERATUR.  
A study of leading German writers of the twentieth century, including Gerhart Hauptmann, Thomas Mann, Rainer Maria Rilke, Hofmansthal, Kafka. Lectures, discussion, papers.  
Prerequisite: Course 11-12 or equivalent.
20. DIE DEUTSCHE LYRIK.  
A critical study of German poetry from the classical age to the present time. The interrelation of form and "contents." Reading will include, among others, Goethe, Schiller, Hölderlin, Eichendorff, Heine, Mörike, Meyer, George, Rilke.
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 WORK

The following seminars prepare for examinations for a degree with Honors. Those actually given in any year vary according to the choices of the students and the convenience of the department.

101. MIDDLE HIGH GERMAN LITERATURE AND PHILOLOGY.  
Introduction into Indo-European and Germanic philology and phonetics. Outline of development of the German language. Middle High German grammar. Brief survey of Old and Middle High German literature. Reading of MHG texts in the original, especially *Nibelungenlied*, Wolfram's *Parzival*, and Walther von der Vogelweide.
103. DEUTSCHES BAROCK UND AUFKLAERUNG.  
A study of German literature in the seventeenth and early eighteenth centuries. The reforms of Opitz, the lyric poetry of the period, the mysticism of Angelus Silesius and Jakob Böhme, the plays of Gryphius, and the prose of Gimmels-hausen; a study of Lessing in his most important dramas and critical writing.
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 and thinking of the first half of the nineteenth century.
106. DIE LITERATUR DES "REALISMUS".  
Studies in the works of Grillparzer, Hebbel, Ludwig, Keller, Meyer, and Storm, and other writers of drama, novel, and *Novelle* in the second half of the nineteenth century.

107. DEUTSCHE LITERATUR SEIT 1900.

The chief writers from naturalism to expressionism: Gerhart Hauptmann's dramas; Thomas Mann's prose; Rainer Maria Rilke's poetry; Hugo von Hofmannsthal's prose and poetry; Kafka; Brecht.

108. DAS DEUTSCHE DRAMA.

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

## Russian

Courses in the Russian language may be used to fulfill the college's foreign language requirement. A major in Russian language and literature may be obtained by taking the courses listed below and additional courses offered at Bryn Mawr College. These courses are part of the Russian Studies program offered at Bryn Mawr, Haverford, and Swarthmore Colleges (see p. 149).

1-2. ELEMENTARY RUSSIAN.

*Full credit*

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

3, 4. INTERMEDIATE RUSSIAN.

Reading of selections from Russian 19th century and contemporary prose and poetry. Short Russian area study: geography, history, constitution. Translation from Russian fiction and periodicals. Review of grammar. Conversation. Reports. Composition.

Prerequisite: Russian 1-2 or its equivalent.

5, 6. ADVANCED RUSSIAN.

Readings in Russian classical literature: Pushkin, Lermontov, Gogol, Tolstoy, Turgenyev, Dostoyevsky, Chekhov. Study of these writers' biographies and political and social backgrounds. Intensive work in translation and composition. Advanced conversation.

Prerequisite: Russian 3, 4 or its equivalent.

## Spanish

All students offering Spanish for entrance are placed at the level where they presumably profit best by the course according to their rating in the College Entrance examination or a test given by the department.

Spanish may be offered as a major in course or as a major or minor in honors work. Prerequisites and recommended supporting subjects are the same for both course and honors students and are as follows:

Required: Spanish 11-12 Introduction to Literature.

Recommended supporting subjects:

Introduction to Philosophy, Psychology, English or other foreign or classic literature, Fine Arts, South American History.

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.

## COURSES

### 1-2. ELEMENTARY SPANISH.

For students who begin Spanish in college. Equivalent to two years' Spanish in high school. The emphasis is both on the spoken language and on reading.

### 3, 4. INTERMEDIATE 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 Marmol in Argentina to Revueltas 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.)

### 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.

### 20. 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.

## 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.

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 PROFESSOR: PETER GRAM SWING, *Chairman*

ASSISTANT PROFESSOR: CLAUDIO SPIES

LECTURER: VINCENT PERSICHETTI

ASSISTANT: ARTHUR PARRIS

The study of music as a liberal art requires an integrated approach to theory, history and performance since experience in all three fields is essential to the understanding of music as an artistic achievement. The Music Department believes that a course of study based on this approach constitutes the best training for a musician whether he aims to be a composer, a musicologist, a performing artist or a teacher.

The academic program consists of a sequence of courses and seminars designed to develop comprehension of music on its own terms. Theory courses and seminars teach skills derived from techniques used in musical composition. Practice in the skills gives the aspiring composer directed training in writing music and helps the musician to develop a sound analytical approach to the study of musical style. History courses and seminars analyze the works of individual composers and representative works of selected eras. They aim to help the student achieve a deeper response to the individual work of art through study of its form and style in the context of cultural history.

The study of theory and history assumes performance, and music students are expected to play or sing in class to the best of their capacities. While the department does not offer credit for instruction in instruments or voice it encourages its students to develop performing skills through private study. The orchestra and chorus, both conducted by members of the Music Department provide valuable ensemble training. Members of the department also coach chamber music groups organized by the students for the weekly Bond concerts and hold informal chamber music readings at their homes.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS AND MINORS

Music 11-12 and 13-14 are required for all majors in music. Students planning to major in music normally take these two courses in their freshman and sophomore years. Music 11-12 is prerequisite for all advanced work in theory and for all seminars in history. A student must receive a grade of B or higher in order to qualify as a candidate for major. He must also pass with a grade of B or higher the final examinations in Music 1, 2, though he will not normally take these two courses for credit. Gifted students with prior training in theory may begin their study of the subject with Music 13-14 by passing a qualifying examination given in the fall. All advanced work in theory and history is taught in seminars conducted on a level necessary to prepare students for honors examinations. Course students taking these seminars will work out with the Department in advance whether they should receive a full or half course credit per seminar and their work for the seminar will be planned accordingly.



*Majors in Course:* The program of a major consists of a minimum of eight half-courses in the Department, including Music 11-12, 13-14 and 171. The normal program will consist of ten half-courses, the choice of additional work in theory, history or composition depending on the student's special interests.

*Majors and Minors in Honors:* Majors in honors take four seminars in the Department including at least one seminar in Advanced Theory. In special cases the seminar in Aesthetics may be substituted for one in Music. 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 Music requires a reading knowledge of French and German.

## THEORY AND COMPOSITION

- 11-12. FIRST YEAR THEORY. Mr. Spies. *Full course*  
A course in elementary music theory offering basic training in Harmony and Counterpoint. Emphasis will be placed on exercises in these musical skills along with ear-training, dictation and keyboard harmony. Frequent reference will be made to a variety of shorter compositions which will be carefully analysed.
- 13-14. SECOND YEAR THEORY. Mr. Spies. *Full course*  
A sequel to Music 11-12, this course will offer training in advanced Harmony and Tonal Counterpoint. In addition to exercises in these skills there will be work in phrase-construction, problems in connection with harmonic rhythm and thorough analysis of a variety of musical compositions for different media. Keyboard harmony and dictation will be continued.
- 61-62. THIRD YEAR THEORY. Mr. Spies. *Full course*  
Advanced work in theory covering those areas in which the student wishes to pursue special study. Students qualified by previous training in theory to work in composition and analysis will be admitted to this course with the consent of the instructor.

## HONORS SEMINARS

161. ADVANCED THEORY. Mr. Spies.
181. COMPOSITION.  
Not offered in 1959-60.

## HISTORY OF MUSIC

- 1, 2. THE HISTORY OF MUSIC IN WESTERN CIVILIZATION. Mr. Swing.  
This course has two main objectives: to teach students how to listen intelligently to music and to acquaint them with representative works from successive periods of music history, thereby furnishing the basis for a growing and life-long interest in music. One lecture and two section meetings per week. Open to all students.  
Music 1 is a prerequisite for Music 2.
21. CONTEMPORARY MUSIC. Mr. Persichetti. *Fall semester*  
A study of harmonic, contrapuntal and formal techniques of Twentieth Century music. The course focuses on the period between the experimental writing of the 1920's and the amalgamation of materials in the 1950's.  
Prerequisite: Music 11-12 or Music 1, 2.
28. W. A. MOZART. Mr. Swing. *Fall semester*  
Prerequisite: Music 11-12.  
Not offered in 1959-60; offered in 1960-61.

30. J. S. BACH. Mr. Swing. *Spring sem*  
An introduction to the study of J. S. Bach, his life and his music, with emphasis on the analysis of representative works in different genres. Particular attention will be given to choral works (including the *Mass in B minor* and the *St. Matthew Passion*).  
Prerequisite: Music 1, 2 or Music 11-12.  
Not offered in 1959-60.

32. HISTORY OF THE STRING QUARTET. Mr. Swing. *Spring sem*  
Prerequisite: Music 11-12.

51. FORM AND STYLE IN MEDIEVAL AND RENAISSANCE MUSIC. Mr. Swing. *Fall sem*  
Prerequisite: Music 11-12.

#### HONORS SEMINARS

128. W. A. MOZART. Mr. Swing. *Fall sem*  
A study of representative works in the light of modern style criticism. A background knowledge of French is desirable.  
Not offered in 1959-60; offered in 1960-61.

132. HISTORY OF THE STRING QUARTET.  
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 and Bartok.

151. FORM AND STYLE IN MEDIEVAL AND RENAISSANCE MUSIC. Mr. Swing. *Fall sem*  
An introduction to the study of polyphonic music from the 9th Century to the middle of the 16th Century.

171. PROBLEMS IN MUSIC HISTORY. Mr. Swing. *Spring sem*  
This seminar will select certain periods in music history for study and comparison. Emphasis will be placed on analysis of style with the study of primary and secondary sources (theoretical works, criticism, letters, etc.) introduced where appropriate.  
Prerequisites: Music 11-12 and 13-14.  
Not offered in 1959-60.

191. TUTORIAL. Staff.

## Philosophy and Religion

PROFESSORS: RICHARD B. BRANDT, *Chairman*  
MONROE C. BEARDSLEY  
JOHN M. MOORE

ASSISTANT PROFESSORS: MICHAEL SCRIVEN  
JEROME A. SHAFFER †  
P. LINWOOD URBAN

LECTURERS: HUGO BEDAU  
GILMORE STOTT

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 experience 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

#### FOB 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.

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.

3-4. PHILOSOPHICAL CLASSICS. *Full course*

The major problems of philosophy are approached through study of some of the great philosophical literature of the West. Plato's *Republic*, Descartes' *Meditations*, and Hume's *Dialogues Concerning Natural Religion* will be read in

† Absent on leave, spring semester, 1959-60.

their entirety; and selections will be read from Aristotle, Lucretius, Aquinas, Hobbes, Berkeley, Locke, J. S. Mill, and others. Students who take Course 3-4 may not elect Course 3-4.

Not offered in 1959-60.

NOTE: Either Course 1 or Course 3-4 is a prerequisite for courses 11 through 18. 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 the methods of justification. The emphasis is systematic, but works of leading ethical philosophers, both classical and contemporary, will be read as illustrations of the theories.
12. LOGIC. Mr. Beardsley. *Fall semester*  
An introduction to applied semantics and applied logic, both formal and informal. The emphasis is on principles and distinctions that are useful in ordinary reading and writing.
13. SELECTED MODERN PHILOSOPHERS. Mr. Shaffer. *Spring semester*  
The history of modern philosophy, with primary attention given to the problems of the foundations, scope and limits of human knowledge, as examined in the works of Descartes, Locke, Berkeley, Hume and Kant.
14. ANCIENT PHILOSOPHY. *Fall semester*  
A study of ancient philosophy in all its aspects: ethics, political theory, metaphysics, and aesthetics. Primary emphasis is placed on the dialogues of Plato; briefer attention is given to the pre-Socratics, Plato's contemporaries, and Aristotle.  
Not offered in 1959-60.
15. PHILOSOPHY OF SCIENCE. Mr. Scriven. *Spring semester*  
A study of the nature, scope, and limitations of scientific method and scientific explanations. This involves, on the one hand, a treatment of a number of particular logical problems such as the nature of laws, explanations, probability, and theories; and, on the other hand, some treatment of a number of particular scientific topics such as the definition of life, action at a distance, cosmology, the uncertainty principle, and evolution.
16. CONTEMPORARY PROBLEMS. Mr. Brandt and Mr. Shaffer. *Fall semester*  
A study of contemporary discussions of fundamental problems, such as the theory of meaning, the foundations of knowledge, the perception of physical objects, the nature of the self. Readings in the articles and books of modern living philosophers, including Russell, Lewis, Ayer, and Ryle.
17. AESTHETICS. Mr. Beardsley. *Fall 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.
18. SOCIAL PHILOSOPHY. Mr. Scriven. *Spring semester*  
A survey of the philosophical problems arising from the study of the history and behavior of human societies. Some examples are: the possible limitations on prediction and explanation, the methodological role of value-judgments, the idea of the society as more than its members, historical relativism, the concept of progress, objectivity, the sociology of knowledge, the justification of democracy.

25. **PHILOSOPHY OF RELIGION.** Mr. Moore.  
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.  
Not offered in 1959-60.
26. **MEDIEVAL PHILOSOPHY.** Mr. Urban. *Spring 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. Urban, Mr. Moore. *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.
31. **PROBLEMS OF CHRISTIANITY TODAY.** Mr. Urban. *Each semester*  
The purpose of this course is to study various answers to the chief religious problems of the twentieth century. Problems include: the nature of the Bible, science and religion, the existence of God, religion and social problems, religion and education, the meaning of history. Answers include: fundamentalism, liberalism, humanism, Christian orthodoxy and neo-orthodoxy. The student will be urged to find his own answers and to work out his own religious beliefs.
- NOTE:** Students planning to take more than one course in Religion should normally commence with Course 31, although this course is not a prerequisite for the others.
32. **BIBLICAL RELIGION AND ETHICS.** Mr. Moore.  
Important parts of the Old and New Testament are examined, in order to trace the growth of Hebrew and Christian religions and the development of the ideas of the Judaeo-Christian tradition, both ethical and theological.
33. **EARLY CHRISTIAN THOUGHT.** Mr. Urban. *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.
34. **MODERN CHRISTIAN THOUGHT.** Mr. Urban. *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.
52. **SENIOR CONFERENCE.** Staff. *Spring semester*  
For senior majors in philosophy. Individual programs are planned to prepare for the comprehensive examination.

**HISTORY 61. QUAKERISM.** Mr. Tolles.

The history of the Society of Friends to the present day. The character, 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 26. For admission to honors in religion, the requirement is normally two semester courses selected from among those numbered 1, and 25 to 45.

**101. MORAL PHILOSOPHY.** Mr. Brandt.

A study of the principal theories about value and obligation, and of their justification, in the light of psychological and anthropological material; of the nature of social justice, criminal justice, and human rights; of the implications for ethics of different theories about the freedom of the will. The emphasis is systematic, but works of representative theorists, both classical and contemporary, will be read.

**102. ANCIENT PHILOSOPHY.** Mr. Shaffer and Mr. Bedau.

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 application of these methods to contemporary techniques.

**103. HISTORY OF MODERN PHILOSOPHY.** Mr. Beardsley and Mr. Shaffer.

The development of modern thought from Descartes to Kant. This series may appropriately be combined with work in any of the three divisions.

**104. CONTEMPORARY PROBLEMS.** Mr. Brandt and Mr. Shaffer.

A study of contemporary theories on some basic problems such as the theory of meaning, universals, the foundations of knowledge, theories of perception, the nature of the self and mental states, and the relation of mind and body. The reading is in the recent work of such philosophers as Broad, Ayer, Russell, Lewis, Ryle, and Wittgenstein.

**105. PHILOSOPHY OF SCIENCE.** Mr. Scriven.

*Spring semester*

An advanced treatment of some fundamental problems in the field. Some of the topics are: the nature of scientific explanations, laws, and theories; the concepts of probability and meaningfulness; the thesis of determinism; definition and inference; the role of mathematics and models in science; simplicity; problems of definition and verification in such fields as cosmology, evolution, and psychoanalysis.

**106. AESTHETICS.** Mr. Beardsley.

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. SOCIAL PHILOSOPHY.** Mr. Scriven.

An advanced treatment of some problems arising from the study of society and individuals. Examples of topics: the nature of scientific method; the possibility and significance of distinctions between these studies and the physical sciences; sophisticated experimental design; analytical philosophy of history; logical character of explanations of behavior; the difference between causal beliefs and reasons for beliefs; the descriptive-evaluative distinction; ideal societies and ideal societies.

108. SYMBOLIC LOGIC. Mr. Scriven. *Spring semester*

The three aims of this seminar are (1) thorough coverage of the techniques of elementary and intermediate symbolic logic, and some attention to advanced topics; (2) development of the various views about the foundations of mathematics in the light of (1); (3) study of the logical implications and difficulties with (1) and (2) with reference to, e.g., the paradoxes, orders of infinity, extensions of the number concept, the Gödel and Skolem theorems.

109. THE THEORY OF VALUES.

An examination of the major problems concerning values, as they arise in the fields of philosophy, psychology, and anthropology. Literature representing the influential positions will be discussed. The emphasis will be on theoretical issues, especially the philosophical ones.

Not offered in 1959-60.

110. MEDIEVAL PHILOSOPHY. Mr. Urban.

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.

111. THE IDEA OF GOD IN WESTERN THOUGHT. Mr. Urban.

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. MODERN RELIGIOUS PHILOSOPHERS. Mr. Urban.

This seminar will concentrate on representative religious thinkers or schools of thought in the present century. These will include Jacques Maritain, Anglo-Catholicism, Brunner, Liberalism, Reinhold Niebuhr, John Bennett, A. J. Muste, Paul Tillich and Will Herberg.

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: ROBERT H. DUNN  
LEWIS H. ELVERSON  
EDWIN J. FAULKNER

ASSISTANTS: AVERY F. BLAKE  
GOMER DAVIES  
JOHN B. H. DONALDSON  
HENRY A. DRUMM  
HENRY C. FORD  
JAMES W. LUKENS, JR.

JAMES C. MAYER  
JAMES J. MCADOO  
JAMES H. MILLER  
HOWARD D. SIPLER  
ARMEN SUNY

COLLEGE PHYSICIAN: DR. MORRIS A. BOWIE

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 with emphasis is also placed on the so-called "carry over" sports which one can engage in after graduation. Each individual, while benefiting from the physical exercise, 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 students 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 the 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 will be permitted to enroll in his Senior year.

#### FALL ACTIVITIES

Badminton  
\*Cross Country  
\*Football

Golf  
\*Soccer  
Swimming

Tennis  
Touch Football

#### WINTER ACTIVITIES

Badminton  
\*Basketball  
Boxing

Lacrosse  
\*Swimming  
Tennis

Track  
Volley Ball  
\*Wrestling

#### SPRING ACTIVITIES

\*Baseball  
\*Golf

\*Lacrosse  
Softball

\*Tennis  
\*Track

\* Indicates intercollegiate competition.



## Physical Education for Women

ASSOCIATE PROFESSORS: VIRGINIA RATH, *Chairman*  
IRENE MOLL

ASSISTANT PROFESSOR: ELEANOR K. HESS

ASSISTANTS: NADIA CHILKOVSKY

PHOEBE LUKENS WELSH

COLLEGE PHYSICIAN: DR. MORRIS A. BOWIE

The aim of this 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 recreational, rhythmic and developmental activities. The program provides: instruction and experience in sports and dancing; swimming ability for all; corrective and developmental exercises. It is our hope that the student will also acquire: appreciation of the dance as a fine art; the meaning of good sportsmanship; added endurance; good posture; leadership training; joy in outdoor exercise; and a program of interests and skills that will carry over for the individual and her community after college.

Classes are kept small to insure individual attention, and students are grouped 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 rhythmic activity; take a team sport; take Body Mechanics if the posture grade indicates a need for it.

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.

### SPORTS

- HOCKEY. Miss Hess. *Fall term*  
Class and Varsity.
- ARCHERY. Miss Rath. *Fall and spring*  
Class and Varsity.
- TENNIS. Miss Hess, Miss Rath, Mr. Faulkner, Miss Moll. *Fall, winter and spring*  
Class and Varsity.
- GOLF. Miss Moll. *Fall and spring*  
Class and Varsity.
- SWIMMING. Miss Rath, Miss Hess. *Fall, winter and spring*  
Beginner, intermediate and advanced classes in strokes and diving.  
Class and Varsity.
- BASKETBALL. Miss Moll, Miss Hess. *Winter*  
Class and Varsity.

BADMINTON. Miss Hess, Miss Rath, Mr. Faulkner, Miss Moll.  
Class and Varsity.

SOFT BALL. Miss Moll.  
Class and Varsity.

LACROSSE. Mrs. Lukens.  
Class and Varsity.

VOLLEY BALL. Miss Moll, Miss Hess.  
Class and Varsity.

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MODERN DANCE. Mrs. Chilkovsky. *Fall, winter and*  
Class and Club.

FOLK AND SQUARE DANCING. Miss Moll. *Fall and*  
Open to men students also.

BODY MECHANICS. Miss Rath.  
Required of all first-year students whose posture indicates a need for it.

FUNDAMENTAL MOVEMENT. Miss Hess.

TUMBLING. Miss Rath.

RED CROSS LIFE SAVING. Miss Rath and members of Instructor Training Board  
*Winter and*  
Senior and Instructors' courses.

## Physics

PROFESSORS: WILLIAM C. ELMORE, *Chairman*

MILAN W. GARRETT

ASSISTANT PROFESSORS: IRVING E. DAYTON

MARK A. HEALD

INSTRUCTOR: ROBERT N. EUWEMA

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, inasmuch as physics is primarily an experimental science.

### 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 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.

Honors students majoring in physics normally take the physics seminars in Optics and Spectra, Electricity and Magnetism, and Modern Physics, and three seminars in mathematics. An honors student who has been unable to schedule Physics 11, 12 should also plan to take the seminar in Classical Mechanics and Heat in his junior year. Other seminars in the program may be chosen from astronomy, biology, chemistry, electrical engineering, engineering sciences, 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; Electrical Engineering 53, 56; Physics 101, 51; and at least one additional half course in astrophysics, physical chemistry, or electrical engineering. 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.

## COURSE STATEMENT

### 1, 2. GENERAL PHYSICS. Staff.

An introductory course in basic physics open to all students. No prerequisite other than those for college entrance are assumed. This course or its equivalent must precede any advanced courses or seminars in physics. It is required of science majors. Three lectures, a conference, and a laboratory period weekly. Separate credit given for each semester's work.

### 11, 12. MECHANICS, HEAT, AND SOUND. Mr. Heald and Mr. Euwema.

The material for this course is drawn from the fields of mechanics, elastic wave motion, kinetic theory, thermodynamics, and statistical mechanics. Considerable emphasis is placed on laboratory work, both to illuminate and extend the subject matter and to foster the student's ability to work independently. This course is required for physics majors and recommended for others desiring a thorough grounding in this area of classical physics. Three lectures and one laboratory period weekly.

Prerequisite: Mathematics 11, 12 taken concurrently.

### 51. ATOMIC AND NUCLEAR PHYSICS.

*Fall semester*

An introduction to modern physics with emphasis on the basic concepts of quantum mechanics, atomic and nuclear structure, and solid state physics. Laboratory work is directed toward a study of basic principles rather than applications.

Prerequisites: EE 53 or equivalent, and Mathematics 12. It is planned to offer this course for the first time during the 1960-61 academic year.

## HONORS SEMINARS

### 101. OPTICS AND SPECTRA. Mr. Dayton.

*Spring semester*

This seminar covers those aspects of physics directly connected with light, radiation, and atomic structure. Topics include geometrical optics, physical optics, spectroscopy, spectral series, X-rays, and elementary quantum theory. Insofar as practicable, all theoretical conclusions are directly supported by laboratory work.

Prerequisite: Mathematics 11, 12.

### 102. ELECTRICITY AND MAGNETISM. Mr. Garrett.

*Fall semester*

This seminar treats classical electrodynamics at an advanced undergraduate level. It covers static and dynamic electricity, magnetism and electromagnetism, and some electronics. The emphasis throughout is on fundamental analysis rather than application. The laboratory includes measurements in direct and alternating currents and in magnetism, together with some fundamental experiments in electronics.

Prerequisite: Mathematics 101, 102.

### 103. MODERN PHYSICS. Mr. Elmore.

*Spring semester*

The topics covered in this seminar include electromagnetic theory of radiation, special relativity, quantum mechanics, atomic and nuclear structure and high energy particle physics. The seminar discussions are accompanied by a full laboratory period each week.

Prerequisite: Physics 11 or equivalent, and Physics 102.

104. THEORETICAL PHYSICS. Mr. Euwema.

*Spring semester*

A study of topics selected from advanced dynamics, hydrodynamics, kinetic theory, and statistical mechanics. Little duplication occurs of theoretical material covered in the other seminars offered by the department. Not accompanied by laboratory.

Prerequisites: Physics 11, 12 or Physics 111, and Mathematics 101, 102.

111. CLASSICAL MECHANICS AND HEAT. Mr. Elmore.

*Fall semester*

This seminar covers material drawn from the fields of classical mechanics, including Lagrange's equations, wave motion and sound, kinetic theory, thermodynamics, and statistical mechanics. The laboratory experiments cover the same general topics but are also designed to introduce the student to a variety of important experimental techniques. A student may not receive credit for both Physics 11, 12 and Physics 111, inasmuch as there is considerable overlap in subject matter.

Prerequisite: Mathematics 11, 12.

## Political Science

PROFESSOR: J. ROLAND PENNOCK, *Chairman*

ASSOCIATE PROFESSOR: KENNETH N. WALTZ ‡

ASSISTANT PROFESSORS: CHARLES E. GILBERT ‡

GENE D. OVERSTREET

DAVID G. SMITH

INSTRUCTORS: JAMES F. GUYOT

GEORGE A. MALLEY

LECTURER: ZARA SHAKOW STEINER

The aim of the Department of Political Science is to study, both in ideal and in reality, the place of the state in society and to contribute to an understanding of the purposes, organization, and operation of political institutions, domestic and international. For the beginning student, the Department offers an introduction to the nature of politics and to the problems of various political systems. For those who become majors or for others who take additional work in political science, courses are provided which will permit giving special attention to the areas of political theory, comparative government, government in the United States, and international political institutions.

### REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS

Course 1-2 is prerequisite to all other work in the department. Students who intend to major in political science should, preferably, take Course 1-2 in the freshman year and Course 11 in the sophomore year; however, Course 11 may be taken by sophomores concurrently with Course 2. Students who desire to concentrate on international affairs without taking the full International Relations Program referred to below may substitute Comparative Government (Political Science 15) or The Soviet System (Political Science 19) or Asian Political Systems (Political Science 20) for Course 11. Majors are also advised to take Economics 1-2. Courses in Statistics (Economics 4) and in American history are recommended. Political Theory, either in seminar or in course, is required of all majors; course majors should take Course

### 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 courses in one or more modern languages.

Advanced courses selected from the groups listed below may be incorporated into 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 the Senior Comprehensive Examination in this field. Students preparing for this exam

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‡ Absent on leave, 1959-60.

ination 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 12—International Politics
- Political Science 13—International Law and Organization
- Political Science 57-58—American Foreign Policy
- Economics 60—International Economics

#### GROUP II

- History 11—The Other American Republics
- History 14—Russia
- History 15—The Expansion of Europe
- History 62—The Near and Middle East
- History 64—The Far East

#### GROUP III

- Political Science 15—Comparative Government
- Political Science 19—The Soviet System
- Political Science 20—Asian Political Systems
- Political Science 59—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 chairmen of their prospective major departments.

### COURSES

1-2. INTRODUCTION TO POLITICAL SCIENCE. All members of the department.

*Full course*

The foundations of politics—historical, economic, psychological, sociological, and ideological; nature and development of political institutions. Application of the foundations as instanced by major types of government, including a more detailed study of selected aspects of American national government. Political Science 1-2 is open to all students and is prerequisite to all other courses offered by the department. Credit is not given for a single semester of this course.

11. PROBLEMS IN COMMUNITY GOVERNMENT. Mr. Guyot.

*Spring semester*

Study of selected problems in community life and government, at both local and state levels. Includes topics such as centralization and home rule; governmental reorganization; corruption, bossism and reform; urban and rural planning and development. Emphasis is placed on field work and original research, using one of the nearby communities as a laboratory.

12. INTERNATIONAL POLITICS. Mr. Waltz.

*Alternate years, fall semester*

Approaches to the theory and practice of international politics such as those developed by liberals, pacifists, behavioralists, and socialists will be examined in some detail before considering the abiding and changing patterns of relations among states and the various factors that affect them.

Not offered in 1959-60.

13. INTERNATIONAL LAW AND ORGANIZATION. Mr. Waltz.

*Alternate years, spring semester*

The development of international law and organization, including a study of the major problems of international law and world government and of the structure, accomplishments and limitations of general and regional organizations.

Not offered in 1959-60.

15. **COMPARATIVE GOVERNMENT.** Mr. Smith. *Alternate years, fall semester*  
 A critical study of selected political systems of Western and Eastern Europe. The major countries studied include France, Germany, Italy, and the states of Central and Eastern Europe. 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.
19. **THE SOVIET SYSTEM.** Mr. Overstreet. *Spring semester*  
 An analysis of the Soviet political system in relation to its theoretical and historical bases and its socio-economic setting. Topics included are the role of the Party, the nature of governmental institutions and mass organizations, economic structure and policy, selected problems of domestic and foreign policy, and a comparative examination of other Communist political systems, notably that of China.
20. **ASIAN POLITICAL SYSTEMS.** Mr. Overstreet. *Fall semester*  
 A comparative study of the contemporary political systems of China, Japan, and India. Introductory consideration is given to nationalism in Asia, with particular reference to traditionalist, Marxist, and liberal democratic elements, while, in the concluding section, attention is given to special features of political development in the more advanced areas.
51. **PUBLIC ADMINISTRATION.** Mr. Guyot. *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 public administration.  
 Open to juniors and seniors only, except by special arrangement.
52. **AMERICAN CONSTITUTIONAL LAW.** Mr. Pennock. *Fall semester*  
 The role of the Supreme Court in the American political system, viewed 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 may 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 includes interest groups, public opinion and voting behavior, electoral systems and party representation, the legislative process.  
 Not offered in 1959-60.
54. **HISTORY OF POLITICAL THEORY.** 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 juniors and seniors only, except by special arrangement, and to sophomores planning to take the "Modern and Analytical" version of Political Theory honors seminar.
55. **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 developments of Marxism other than Communism. Selected examples of contemporary Marxist theory are also considered.



56. JURISPRUDENCE. Mr. Pennock. *Alternate years, spring semester*  
 A study of the sources and nature of law; historical, sociological and philosophic approaches to legal theory; the nature of the judicial process; key problems of jurisprudence illustrated by case study in selected areas of American constitutional law.
- 57-58. AMERICAN FOREIGN POLICY. Mr. Malley. *Alternate years, full course*  
 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 our policies in crucial parts of the world.
59. MODERN POLITICAL THEORY. Mr. Smith. *Spring semester*  
 Political theory from the Enlightenment to the present. Idealism and romantic and conservative nationalism; anarchism, Marxism, and later socialist doctrines; Utilitarianism and "revisionist" Liberalism; pragmatic and sociological theories of politics; conservative critics of democracy and the political theories of authoritarianism and of fascism. Considerable time will be devoted to the analysis of liberal, democratic, and totalitarian theories and to influential theories of an ideological quality such as nationalism, Marxism, and fascism.
60. 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.

### 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 for students planning to take 101b to take Political Science 54 during their sophomore year.
102. POLITICS AND LEGISLATION. Mr. Guyot. *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. Guyot. *Fall semester*  
 A detailed study of the forms and functions of modern government, particularly on the administrative side. Problems of administrative organization, policy-making and responsibility in the light of democratic political purposes and processes and the legal, sociological and economic setting. Emphasis is on United States experience, although relevant experience abroad is examined.
104. INTERNATIONAL POLITICS, LAW, AND ORGANIZATION. Mr. Malley. *Fall semester*  
 A comprehensive inquiry into the principles and problems of international politics, international law, and international organization.

105. **AMERICAN FOREIGN POLICY.** Mr. Malley and Mrs. Steiner. *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 implementation of American foreign policy. The changing assumptions of our policy and 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 "realist" approaches to law; key problems of jurisprudence illustrated by study of selected fields of federalism and civil liberties in American constitutional law.
107. **THE SOVIET SYSTEM.** Mr. Overstreet.  
 A study of political, social, and economic institutions in the Soviet Union in relation to their theoretical and historical background; selected problems of domestic and foreign policy; a comparative examination of other Communist political systems, notably that of China.
108. **COMPARATIVE GOVERNMENT.** Mr. Smith.  
 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, decentralization, and trans-national political movements.
120. **THESIS.** All members of the department.  
 Approval must be secured early in the student's junior year.

## Psychology and Education

PROFESSORS: HANS WALLACH, *Chairman*

SOLOMON E. ASCH ‡

WILLIAM C. H. PRENTICE

JOSEPH B. SHANE

ASSOCIATE PROFESSOR: HENRY GLEITMAN †

ASSISTANT PROFESSORS: GLORIA CAREY EVANS

PETER MADISON

JACOB NACHMIAS

LECTURER: 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

Introductory Psychology is required of all students who wish to take other courses in the department. Students who wish to take Honors seminars may offer Psychology 1 and one of the following courses: 11. Experimental Psychology, 12. Motivation, or 14. Learning and Thinking. Honors majors will be required to offer Psychology 11. When a student has taken Psychology 12 he cannot take Seminar 103 and the same applies to Psychology 14 and Seminar 102. Students who wish to major in course should take Psychology 1 and, in the sophomore year, another half course to be chosen from Psychology 12, 14, 57 and 60. Psychology 11 is required of all courses majors and should preferably be taken in the junior or senior year.

Courses in education—11, 12, 14, 15 and 16 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 for the certification of secondary school teachers by taking:

1. Psychology 1—Introductory Psychology.
2. Education 11—Educational Psychology.
3. Education 14—Introduction to Teaching.
4. Education 12—Principles and Methods of Secondary Education.

‡ Absent on leave, 1959-60.

† Absent on leave, spring semester, 1959-60.

5. Education 15—History of Education.
6. History 4, 5, 6 or 7—The United States (arrangements must be made for special work in the History of Pennsylvania). Only one term is required.
7. A minimum of three full courses (or six half-courses) in the subject or subjects in which the student expects to teach.
8. Education 16—Practice Teaching.

Swarthmore students may receive credit toward a Pennsylvania elementary school certificate by taking:

1. Psychology 1—Introductory Psychology.
3. Psychology 16—Child Psychology.
4. Education 11—Educational Psychology.
5. Education 14—Introduction to Teaching.
6. History 4, 5, 6 or 7—The United States (with special work in Pennsylvania history). Only one term is required.

## Psychology

1. INTRODUCTORY PSYCHOLOGY. Mr. Gleitman. *Each semester*  
Three lectures plus weekly conference hour to be arranged. A survey of the problems studied by psychologists and of the facts and theories of modern behavior study. Chief emphasis is given to basic contributions in perception, learning, thinking, and motivation.
11. EXPERIMENTAL PSYCHOLOGY. Mr. Wallach and Staff. *Each semester*  
Laboratory section one afternoon per week to be arranged. An introduction to experimental thinking and laboratory techniques in psychology.
12. MOTIVATION. Mr. Nachmias. *Spring semester*  
Emphasis is upon the role of dynamic factors (drives, needs, values) in the termination of behavior. Consideration is given to the measurement of motivation, the relationship between biological and psychological tension-systems, conflict, frustration, success and failure, reward and punishment. Evaluation of the theories of motivation of McDougall, Tolman, Lewin, Allport, Murray and Freud. Term paper or design of an original experiment is required.
14. LEARNING AND THINKING. Mr. Gleitman, Mr. Nachmias. *Spring semester*  
An advanced course in problems, facts, and theories about man's creative thought, problem-solving, and memory. Some use will also be made of animal evidence and of current systematic approaches.
15. ANIMAL EXPERIMENTATION. Mr. Gleitman. *Offered irregularly on request*  
Students desiring to exercise this option should consult with the Staff at least one semester in advance.
55. CHILD PSYCHOLOGY. Mr. Madison. *Fall semester*  
The development of the child from birth through puberty, studied in terms of basic psychological principles. Important theories and practices of child-rearing are evaluated in the light of experimental and cross-cultural data. To include the significance of infantile and childhood experience on subsequent personality development, parent-child relationships, sibling rivalry, and the "behavior problems" which typically occur during the socialization process. One of the following is required: (1) acting as an assistant in a child-care center for approximately 20 hours, (2) an intensive study of a single child.
56. SOCIAL PSYCHOLOGY. Mr. Asch, Mrs. Evans. *Fall semester*  
A study of some basic processes and products of interaction between persons and groups and between groups. The following topics are covered: the formation of the social field of the individual. Perception of persons as psychological

entities. Perception of groups. Formation of the self; social relations of the self. Psychological forces supporting group-belonging. Functional consequences of group membership. The psychological investigation of group processes. Group requirements and group standards. Formation and change of attitudes.

57. **PSYCHOLOGICAL TESTS AND MEASUREMENTS.** Mrs. Evans. *Alternate years*  
The concept of psychological measurements as applied to tests of intelligence, personality, interests, and abilities. The course surveys a wide variety of contemporary tests and studies intensively the characteristics and underlying assumptions of one representative test of each major type. (Open to sophomores.)

58. **PERSONALITY.** Mr. Madison. *Fall semester*  
Intensive study of some of the main theories of personality examined in the light of recent research. Extensive use of case material will be made.

59. **ADVANCED PERSONALITY.** Mr. Madison. *Spring semester*  
A consideration of further theories of personality and of research in the field is combined with an intensive study of student personality as seen in the college setting.  
Prerequisite: Psychology 58.

60. **PHYSIOLOGICAL PSYCHOLOGY.** Mr. Nachmias. *Fall semester*  
The physiological foundations of human and animal behavior, including sensory function, metabolic and endocrine functions, the nervous systems, and response mechanisms; the application of such facts to motives and appetites, to emotion, to perceiving and to learning and thinking. (Open to sophomores.)

63-64. **SYSTEMATIC SEMINAR.** The Staff. *Full course, spring semester*  
A double credit course requiring half the student's time for a semester. This seminar covers the major integrative theories or approaches to psychology, including structuralism, functionalism, behaviorism, Gestalttheorie, and psychoanalysis. Majors students who so elect will take Course 63-64 in their senior year. The course is open only to senior psychology majors except by special arrangement.

65. **HISTORY OF PSYCHOLOGY.** Mr. Gleitman. *Fall semester*  
This course is given as an alternative to 63-64. It is a lecture course open to juniors and seniors. It covers the major integrative theories or approaches to psychology, including structuralism, functionalism, behaviorism, Gestalttheorie, and psychoanalysis.

The following courses are not to be counted toward a major in psychology and are not included in the comprehensive examination; they are designed primarily for students whose major work is in other departments.

41. **THE PSYCHOLOGY OF DRAMATIC EXPERIENCE AND PRESENTATION.** Mr. Gleitman.  
The object of this course is to explore some possible contributions of scientific psychology—in particular, the psychology of emotional expression—to an area hitherto the domain only of intuitive artists. Topics of discussion will include structural aspects of dramatic forms, the experience of the comic and the tragic, psychological problems of timing and rhythm, theories of acting and direction, and the like. The course will involve some laboratory work, testing relevant hypotheses with standard experimental techniques. Permission of instructor is necessary.

Prerequisite, Psychology 1. Some contact with drama either through the literature or in practice is desirable.

Three hours lecture per week and 2 hours laboratory.

Not offered in 1959-60.

42. APPLIED SOCIAL PSYCHOLOGY.

This course deals with communications within groups, leadership, attitudes, propaganda, wage payment plans, consumer motivation and behavior, and 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.

Not offered 1959-60.

43. EMOTIONAL AND MOTIVATIONAL PROCESSES. Mr. Hunt, Dr. Saul, Mr. Wallach. *Spring semester*

The role of emotions and motives in the process of reaching maturity. In addition to readings in the general literature, a number of case histories will be studied. To increase the student's insight into the difficulties and possibilities of emotional growth.

## Education

11. EDUCATIONAL PSYCHOLOGY. Mr. Shane. *Fall semester, alternate years*

The application of psychological principles concerned with the processes of thinking, learning and motivation to the problems of education.  
Prerequisite: Course 1.

12. PRINCIPLES AND METHODS OF SECONDARY EDUCATION. Mr. Shane. *Fall semester, alternate years*

A study of the principles of secondary education, with emphasis upon content 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 per week assisting in a classroom in the local schools.

15. HISTORY OF EDUCATION. Mrs. Brodhead. *Each semester*

Educational thought in our western culture from the Greeks to the present day. Weekly seminar.

16. PRACTICE TEACHING. Mrs. Brodhead.

A limited number of students may complete the Pennsylvania requirement of 180 hours in the Swarthmore High School summer session under the direction of their teaching staff. Students should enroll for this course at the January registration. They must be recommended by the college department whose subject they plan to teach.

## HONORS SEMINARS

101. PERCEPTION. Mr. Wallach, Mr. Prentice.

Reading and discussion combined with independent experimental projects. The student is expected to know the basic facts about human perceptual mechanisms, 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 of needs and attitudes, general theory of perception. When time permits, some attention is given to parallel problems in other senses.

102. LEARNING AND THINKING. Mr. Gleitman, Mr. Nachmias.

Deals with principles of adaptive behavior, the functions of memory and thinking; the nature of understanding and problem-solving; the nature of intelligence.

103. MOTIVATION. Mr. Prentice, Mr. Nachmias.

A systematic and experimental approach to the dynamics of behavior, based on material drawn from the laboratory and the clinic, and covering the following topics: instinctive behavior and biological drives; the relation of motivation and learning; derived motivation; the relation of perception and motivation; frustration and its relation to aggression, regression; level of aspiration; success and failure; substitution and sublimation; ego needs and the nature of the ego; emotion and feeling; contemporary theories of motivation.

104. INDIVIDUAL IN SOCIETY. Mr. Asch, Mrs. Evans.

The relationship between man and his society, approached from the points of view of social psychology, sociology, and cultural anthropology; the study of group-structures and the psychological consequences of group-membership; the critique of available procedures for scientific treatment of group-behavior and group-influences.

105. PERSONALITY. Mr. Madison, Mrs. Evans.

The personality concept, considered broadly as the individual's characteristic representation of and reaction to events of emotional significance in living. Principal attention to the origin of contemporary thought on personality in Freud's writings and the relation of his concepts to general theory in psychology. Topics such as the adjustive, motivational and cognitive aspects of personality, the nature of our phenomenal experience of self and of personality, the concepts of unrecognized and unconscious processes, personality types, the characteristics of good and poor adjustment, and methods of personality study. Problems of the origin, persistence and change of personality habits as these are understood in personality theory on the one hand and in the psychology of learning and perception on the other. Laboratory work in the study of problems in personality when conditions permit.

106. DEVELOPMENT. Mr. Prentice, Mr. Gleitman.

An investigation of the concepts of psychological growth, including sensori-motor skill, intellectual and emotional functions, and personality. Readings in experimental and clinical literature; some direct observation and experimentation with children.

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.

## Russian Studies

A grant from the Carnegie Corporation made possible the inauguration of a Russian Studies program, in the fall of 1949, at Bryn Mawr, Haverford, and Swarthmore Colleges. While that grant has now expired, Swarthmore College continues to offer courses in Russian language, history, and political and social institutions.

Courses in this group cannot themselves comprise a major subject. Courses in Russian language may be used to fulfill the college foreign language requirements. Courses and seminars in Russian history and in Russian political and economic institutions may be counted toward a major or minor in the departments offering them. (These courses are listed under their appropriate departments.)

### RUSSIAN LANGUAGE

- 1-2. ELEMENTARY RUSSIAN. *Fall*  
Designed to familiarize the beginner with the essentials of the spoken and written language. Fundamentals of grammar and reading of easy literary prose.
- 3, 4. INTERMEDIATE RUSSIAN.  
Reading of selections from Russian 19th century and contemporary prose and poetry. Short Russian area study: geography, history, constitution. Translations from Russian fiction and periodicals. Review of grammar. Conversation. Reports. Composition.  
Prerequisite: Russian 1-2 or its equivalent.
- 5, 6. ADVANCED RUSSIAN.  
Readings in Russian classical literature: Pushkin, Lermontov, Gogol, Turgenyev, Dostoyevsky, Chekhov. Study of these writers' biographies and political and social backgrounds. Intensive work in translation and composition. Advanced conversation.  
Prerequisite: Russian 3, 4 or its equivalent.

### HISTORY

14. RUSSIA. Mr. Beik. *Fall*  
The history of modern Russia. The course begins with the reign of Peter the Great and gives half its time to the period since the Revolution.
117. EASTERN EUROPE. Mr. Beik. *Honors*  
The origins and consequences of the Russian Revolution and the development of the Soviet zone in East Central Europe.

### POLITICAL AND ECONOMIC INSTITUTIONS

19. THE SOVIET SYSTEM. Mr. Overstreet. *Spring*  
An analysis of the Soviet political system in relation to its theoretical and historical bases and its socio-economic setting. Topics included are the structure of the Party, the nature of governmental institutions and mass organization, economic structure and policy, selected problems of domestic and foreign relations, and a comparative examination of other Communist political systems, notably that of China.
107. THE SOVIET SYSTEM. Mr. Overstreet. *Honors*  
A study of political, social, and economic institutions in the Soviet Union in relation to their theoretical and historical background; Soviet foreign relations and the international Communist movement.



## REFERENCE SECTION

## Visiting Examiners—May 1959

- BIOLOGY:** PROFESSOR JOHN M. ANDERSON, *Cornell University*; DR. BENT BOVIN, *Carnegie Institution of Washington*; DR. JOHN CAIRNS, JR., *Academy of Natural Sciences, Philadelphia*; PROFESSOR ARIEL G. LOEWY, *Haverford College*; PROFESSOR DANIEL J. O'KANE, *University of Pennsylvania*; PROFESSOR CARL I. SWANSON, *Johns Hopkins University*.
- CHEMISTRY:** PROFESSOR HAROLD C. BEACHELL, *University of Delaware*; PROFESSOR PHILIP S. SKELL, *Pennsylvania State University*; PROFESSOR RUSSELL R. WILLIAMS, *Haverford College*.
- CLASSICS:** PROFESSOR CHARLES L. BABCOCK, *University of Pennsylvania*; PROFESSOR DONALD W. PRAKKEN, *Franklin and Marshall College*.
- ECONOMICS:** PROFESSOR ARTHUR R. BURNS, *Columbia University*; PROFESSOR PAUL F. GEMMILL, *University of Pennsylvania*; PROFESSOR CHARLES P. KINDLER, *Berkeley, Massachusetts Institute of Technology*; PROFESSOR FRANCO MODIGLIANI, *Carnegie Institute of Technology*.
- ELECTRICAL ENGINEERING:** PROFESSOR HOWARD E. TOMPKINS, *University of Pennsylvania*.
- ENGLISH LITERATURE:** PROFESSOR MARVIN FELHEIM, *University of Michigan*; PROFESSOR VICTOR LANGE, *Princeton University*; PROFESSOR MONROE K. SPEAR, *University of the South*; PROFESSOR DENHAM SUTCLIFFE, *Kenyon College*; PROFESSOR DOROTHY VAN GHENT, *Brandeis University*.
- FINE ARTS:** PROFESSOR EVELYN B. HARRISON, *Columbia University*; PROFESSOR LINCOLN F. JOHNSON, JR., *Goucher College*; PROFESSOR ELEANOR P. SPENCER, *Goucher College*.
- HISTORY:** PROFESSOR ROBERT F. BYRNES, *Indiana University*; PROFESSOR GEORGE B. COOPER, *Trinity College*; PROFESSOR ARTHUR P. DUDDEN, *Bryn Mawr College*; PROFESSOR HAROLD T. PARKER, *Duke University*.
- MATHEMATICS:** PROFESSOR BERNARD EPSTEIN, *University of Pennsylvania*; PROFESSOR OYSTEIN ORE, *Yale University*.
- MODERN LANGUAGES—FRENCH:** PROFESSOR DONALD FRAME, *Columbia University*; PROFESSOR EDWARD D. SULLIVAN, *Princeton University*.  
**GERMAN:** PROFESSOR ADOLF D. KLARMANN, *University of Pennsylvania*.
- PHILOSOPHY AND RELIGION:** PROFESSOR STEPHEN F. BARKER, *Harvard University*; PROFESSOR WILLIAM A. CHRISTIAN, *Yale University*; PROFESSOR PAUL DESJARDINS, *Haverford College*; PROFESSOR NICHOLAS RESCHER, *Lehigh University*; PROFESSOR C. L. STEVENSON, *University of Michigan*.
- PHYSICS:** PROFESSOR FRANK C. SHOEMAKER, *Princeton University*.
- POLITICAL SCIENCE:** DR. FREDERIC S. BURIN, *Department of State, Washington, D. C.*; PROFESSOR WILLIAM T. R. FOX, *Institute of War and Peace Studies, Columbia University*; PROFESSOR SAMUEL HENDEL, *The City College of New York*; DR. FRITZ MORSTEIN MARX, *Bureau of the Budget, Washington, D. C.*
- PSYCHOLOGY:** PROFESSOR DONALD R. BROWN, *Bryn Mawr College*; PROFESSOR RICHARD S. CRUTCHFIELD, *Institute for Advanced Study*; DR. ELEANOR J. GIBSON, *Institute for Advanced Study*; DR. JAMES J. GIBSON, *Institute for Advanced Study*; PROFESSOR RICHARD L. SOLOMON, *Harvard University*.

## Degrees Conferred

June 8, 1959

### BACHELOR OF ARTS

#### *In the Division of the Humanities*

- ANN CAROL ABRAMSON (History)  
SUSAN BARKER (History)  
MOFFETT ARMSTRONG BEALL (English Literature)  
EUGENIA ELIZABETH BEAM (Philosophy)  
LEANNE BEUKELMAN (Religion)  
ALLAN B. BROWN (History)  
RUTH ANNE CAHN (French)  
SARAH JANE CAMPBELL (History)  
CAROLINE CARLSON (Fine Arts)  
CATHERINE CONDOSTANOS (English Literature)  
GRANDIN R. CONOVER (English Literature)  
JEFFREY RICHARD DAVIDSON (French)  
CHARLES GATES DEMPSEY (Fine Arts)  
SYLVIA BUNCE DUVAL (History)  
MARGARET HELEN EMIGH (Psychology)  
ANN FERGUSON (Philosophy)  
JAMES STUART FORRESTER, 3RD (English Literature)  
ANDREW LEWIS FREY (History)  
ALISON BARTLETT GIFFORD (French)  
STEVEN NEIL GILBORN (English Literature)  
BARBARA ELAINE GILLIES (English Literature)  
RUTH GILMAN (English Literature)  
MURRAY BART CRANE GOLDMAN (Philosophy)  
ANN COMPTER GOSLIN (History)  
JUDITH GRACE (History)  
NICOLE MARIANNE HACKEL (Psychology)  
BARBARA ANNE HADDAD (English Literature)  
ROBERTA EILEEN HALDEN (Psychology)  
JUDITH HENDERSON (History)  
BARBARA JOY HILL (Philosophy)  
LOIS JEAN HOOD (English Literature)  
LIBBY S. HUMMER (English Literature)  
RICHARD A. JOHNSON (English Literature)
- ELINOR LEE KAAS (Fine Arts)  
EDWARD LOUIS KEENAN, 3RD (Religion)  
STARR KOESTER (English Literature)  
ELLEN KRUG (History)  
ANNA DOROTHEA LAVERMAN (Psychology)  
TRUDY RUTH LOWENHEIM (History)  
LENORE MACGAFFEY (English Literature)  
JEAN WEIR MANNINEN (History)  
MARILYN JANET MATHEWS (Fine Arts)  
GEORGIA ANN MATHIESON (English Literature)  
MARJORIE ANN MCCUTCHAN (English Literature)  
MARNIE SABINA MILLER (English Literature)  
JEAN MCDOUGALL MOORE (Psychology)  
MARY LOUISE MORSE (Greek)  
THEODOR HOLM NELSON (Philosophy)  
\*GUILLERMO ANTONIO NIGAGLIONI (Spanish)  
ANNE WATTS PARKER (English Literature)  
FRANKLIN JOHN PHILIP (Psychology)  
MICHAEL PENNOCK PREDMORE (Spanish)  
\*STEPHEN ELMORE PRICE (English Literature)  
VIRGINIA KNIGHT REEVES (English Literature)  
MIRIAM JULIA REPP (English Literature)  
MARY ANN RITZ (History)  
MAURIANNE SCHIFREEN (History)  
ELENA SCOTT (English Literature)  
TIMOTHY AMES SHOPEN (Greek)  
PENELOPE PAYSON SIMKIN (English Literature)  
FRANK REA SLOAN, 3RD (Fine Arts)  
GEORGIA RUTH SOMMERS (English Literature)

\* As of the Class of 1958.

LAURENCE HULL STOOKEY (English Literature)  
JANET CATHERINE TAYLOR (Philosophy)  
SHAWNA VELYA TROPP (English Literature)  
MARGERY KAY WAGENER (English Literature)

CANDACE QUINBY WATT (English Literature)  
ELINOR EASTMAN WEEKS (History)  
CAROL HAMBLETON WILLS (English Literature)  
SUSAN ABIGAIL YODER (Fine Arts)  
EVE ZARIN (English Literature)

*In the Division of the Social Sciences*

JOHN EVI ADAMS (Psychology)  
STEPHEN BROWNING AGARD (Economics)  
RUDOLF STEFAN AMANN (Economics)  
CAROL JOYCE ANDERSON (Psychology)  
JUDITH ANDREWS (Economics)  
JOSEPH PEDRICK BAKER (Political Science)  
WINFRED PARKER BUCKWALTER, 3RD (Psychology)  
L. DAVID COLE (History)  
JOHN BOVILLE COLLINS (Political Science)  
PETER COLLINS (Political Science)  
PORTIA CORNELL (Political Science)  
CAROL LYNN CRANDELL (Political Science)  
RICHARD BENJAMIN DARLINGTON (Economics)  
CONSTANCE HOLDEN DAVIS (Political Science)  
JOHN WHYLEN DEPAUW (Political Science)  
SARA FRANCES DUSTIN (Political Science)  
ELIZABETH ANN EAMES (History)  
MARIANNE EDEL (Political Science)  
SARAH PATRICIA FREEDMAN (Economics)  
LEWIS RUMSEY GATY, 2ND (Economics)  
JOHN EDWARD GILLMOR (History)  
ANNE SEGUENOT GRIMES (Psychology)  
PAUL NEWMAN GUTHRIE, JR. (History)  
PAUL JULIAN HARE (Political Science)  
MICHAEL CRAIG HUDSON (Political Science)  
LENNOE WILLIAMS HUFFMAN (History)  
ELIZABETH KÁRPÁTI (Political Science)

MITCHELL PALMER LICHTENBERG (History)  
HILLEL SAMUEL LIEBERT (Economics)  
ELLEN CAMPBELL LOGAN (History)  
MARCIA LOU MCCOY (Political Science)  
MARTHA MCKEAN (Psychology)  
CHARLES ALLEN MILLER (Political Science)  
MARY MONTGOMERY (Psychology)  
CAROLINE PIPPIN (Political Science)  
WILLIAM POOLE, JR. (Economics)  
SERGEI RETIVOV (Political Science)  
MARY STEPHANIE REYNOLDS (Psychology)  
MARK EDWIN ROBART (Economics)  
WILLIAM TALMADGE SALISBURY (Political Science)  
CORINNE ANN SEITHER (History)  
EDWARD CORNELL STANTON (History)  
WILLIAM H. STAUFFER (Economics)  
BETH ERHART STEVENS (Political Science)  
THOMAS H. STEVENSON (Political Science)  
FRED STOLLNITZ (Psychology)  
PETER TEMIN (Economics)  
SAMUEL LOTHROP THORNDIKE, (Economics)  
LINDA GRAY WALTON (Political Science)  
JEAN LAWRENCE WELLMAN (Economics)  
MONIQUE F. WESTON (Political Science)  
CONSTANCE MARALYN WILSON (History)  
BARBARA LAMAR ZIMMERMAN (Psychology)

*In the Division of Mathematics and the Natural Sciences*

- PETER THOMAS ATKINSON (Biology)  
ROBERT LEWIS BAKER (Botany)  
PAUL DAVID BERK (Chemistry)  
JOHN STRICKLAND BOYER (Biology)  
STEPHAN ROBERT CAVIOR (Mathematics)  
JAMES PEARSON CLARKE (Zoology)  
DENNIS GENE COLE (Zoology)  
DOROTHY COOK (Mathematics)  
ROBERT M. COTTON (Physics)  
STEPHANIE MOSS DAY (Biology)  
ELIZABETH JOAN DEUTSCH (Zoology)  
ELIZABETH JANNEY ELLIOTT (Chemistry)  
RICHARD LANE EMERSON, JR. (Psychology)  
RICHARD INGRAM FEINBERG (Zoology)  
ABIGAIL FIRST (Psychology)  
DEBORAH GOODYEAR (Mathematics)  
WILLIAM HOWARD HAGUE (Psychology)  
MARION CATHERINE HALE (Chemistry)  
CHARLES SAMUEL HARRIS (Psychology)  
J. SCOTT HILDUM (Physics)  
JEAN ELIZABETH INGLIS (Zoology)  
DAVID MYRON KANEF (Psychology)  
DAVID JOHN KLINGENER (Zoology)  
HARRIET LATHAM (Biology)  
MARGARET PENNINGTON LEE (Psychology)  
VICTOR WERNER LUDEWIG (Chemistry)  
MICHAEL REEVES LUSIGNAN (Chemistry)  
MARGOT SINGLETON MEARS (Biology)  
MARIE LUQUEER MILLER (Chemistry)  
RALPH STANLEY NASH (Physics)  
ANDREW WILKINSON NICHOLS (Psychology)  
LUCY WOODWORTH PEIRCE (Biology)  
NATHAN J. PRICE (Zoology)  
JOHN ALAN ROBBINS (Physics)  
JEFFREY SCHLANGER (Zoology)  
SARAH VIRGINIA SHAW (Mathematics)  
DAVID BEN SHEAR (Biology)  
ROBERT TODD SIMPSON (Chemistry)  
ANDREW K. SNYDER (Mathematics)  
MICHAEL IVOR SOBEL (Mathematics)  
ADRIENNE STEINACKER (Chemistry)  
LLOYD DUDLEY TARLIN, JR. (Zoology)  
\*FRANK B. THIESS (Mathematics)  
JANET TOLLMAN (Biology)  
PAUL KONRAD TRACHTMAN (Zoology)  
GEORGE ROAN WARD, JR. (Zoology)  
JUDITH WEGMAN (Chemistry)  
JOSEPHINE LEA WEISSMAN (Psychology)  
KARL LEWIS ZINN (Psychology)

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\* As of the Class of 1956.

## BACHELOR OF SCIENCE

### *In the Division of Engineering*

THOMAS R. CORWIN  
(Electrical Engineering)

ERIC PAUL ERLANSON  
(Mechanical Engineering)

\*\*SUSAN CREASEY GERTLER  
(Mechanical Engineering)

SETH GIBSON  
(Mechanical Engineering)

JOHN WILLIAM HOFFMAN  
(Electrical Engineering)

THOMAS COBB LOWE  
(Electrical Engineering)

ALFRED STEPHEN PEIKER  
(Electrical Engineering)

SAMUEL DAVID PRESTON  
(Mechanical Engineering)

OFEI SAAKWA-MANTE  
(Civil Engineering)

WILLIAM WALTON WALLS, JR.  
(Mechanical Engineering)

## MASTER OF ARTS

JAMES STANDISH CARTER (Philosophy)    VIRGIL VINCENT MCKENNA (Psychology)

## DOCTOR OF LAWS

GAYLORD P. HARNWELL

DEVEREUX C. JOSEPHS

HENRY ALLEN MOE

## DOCTOR OF LETTERS

ROBERT PENN WARREN

## DOCTOR OF SCIENCE

WOLFGANG KÖHLER

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\*\* As of the Class of 1958.

## Awards and Distinctions

June 8, 1959

### HONORS AWARDED BY THE VISITING EXAMINERS

#### HONORS:

Ann Carol Abramson, John Evi Adams, Stephen Browning Agard, Judith Andrews, Moffett Armstrong Beall, Peter Collins, Charles Gates Dempsey, Ann Ferguson, Sarah Patricia Freedman, Barbara Elaine Gillies, Nicole Marianne Hackel, Barbara Anne Haddad, Charles Samuel Harris, J. Scott Hildum, Michael Craig Hudson, Jean Elizabeth Inglis, Hillel Samuel Liebert, Marjorie Ann McCutchan, Andrew Wilkinson Nichols, Franklin John Philip, John Alan Robbins, Elena Scott, Georgia Ruth Sommers, Margery Kay Wagener, Carol Hambleton Wills.

#### HIGH HONORS:

Susan Barker, Paul David Berk, L. David Cole, Richard Benjamin Darlington, Jeffrey Richard Davidson, Elizabeth Joan Deutsch, Andrew Lewis Frey, Steven Neil Gilborn, Ruth Gilman, Judith Grace, Paul Julian Hare, Richard A. Johnson, David Myron Kanef, Elizabeth Kárpáti, Starr Koester, Lenore MacGaffey, Georgia Ann Mathieson, Jean McDougall Moore, Mary Louise Morse, William Poole, Jr., Maurianne Schifreen, Robert Todd Simpson, Michael Ivor Sobel, Fred Stollnitz, Janet Catherine Taylor, Janet Tollman, Monique F. Weston.

#### HIGHEST HONORS:

Charles Allen Miller, Peter Temin, Shawna Velya Tropp.

### DISTINCTION IN COURSE AWARDED BY THE FACULTY

Sarah Jane Campbell, Libby S. Hummer, Trudy Ruth Lowenheim, Jean Weir Manninen, Michael Pennock Predmore.

### ELECTIONS TO HONORARY SOCIETIES

#### PHI BETA KAPPA:

Paul David Berk, Richard B. Darlington, Elizabeth Joan Deutsch, Andrew Lewis Frey, Steven Neil Gilborn, Ruth Gilman, Charles Samuel Harris, Libby S. Hummer, Richard A. Johnson, David Myron Kanef, Elizabeth Kárpáti, Trudy Ruth Lowenheim, Jean Weir Manninen, Charles Allen Miller, Jean McDougall Moore, William Poole, Jr., Michael Pennock Predmore, John Alan Robbins, Robert Todd Simpson, Michael Ivor Sobel, Fred Stollnitz, Peter Temin, Janet Tollman, Shawna Velya Tropp, Monique F. Weston.

#### SIGMA XI:

Paul David Berk, David Myron Kanef, Michael Ivor Sobel, Elizabeth Joan Deutsch, Charles Samuel Harris, John Alan Robbins, Robert Todd Simpson, Janet Tollman.

#### SIGMA TAU:

Seth Gibson, John William Hoffman, Thomas Cobb Lowe.

## SWARTHMORE COLLEGE FELLOWSHIP AWARDS

- The Hannah A. Leedom Fellowship* to EVE ZARIN.  
*The Joshua Lippincott Fellowship* to CONSTANCE MARALYN WILSON.  
*The John Lockwood Memorial Fellowship* to ANNA DOROTHEA LAVERMAN.  
*The Lucretia Mott Fellowship* to STARR KOESTER.  
*The Phi Beta Kappa Fellowship* to ELIZABETH KÁRPÁTI.

### SPECIAL AWARDS \*

- The Ivy Medal* to PAUL DAVID BERK AND CHARLES SAMUEL HARRIS.  
*The Oak Leaf Medal* to JANET TOLLMAN.  
*The McCabe Engineering Award* to JOHN WILLIAM HOFFMAN.  
*The John W. Nason Award* to LUCIUS SHERO, CAROLINE SHERO, AND FRANCES SHERO.  
*The Crane Prize* to OLIVIA CONNERY AND GILBERT HARMAN.  
*The Katherine B. Sicard Prize* to HELEN R. FIFIELD.  
*The William Plummer Potter Public Speaking Fund Awards:*  
The Potter Poetry Reading Contest: first prize, SHELDON FRANK AND STEVEN GILBORN; second prize, REBECCA ADAMS AND THEODOR H. NELSON.  
The Potter Public Speaking Prize: DAVID V. EDWARDS.  
The Potter One-Act Play Contest: first prize, PAUL TRACHTMAN; second prize, JOAN MOFFITT; third prize, ROBERT KRAMER.  
*The Ella Frances Bunting Extemporary Speaking Award* to RONALD KATZ.  
*The Owen Moon Award* to THEODOR H. NELSON.  
*The John Russell Hayes Poetry Prizes:* first prize, SARAH DUSTIN; second prize, ESTHER GLASER AND PAUL TRACHTMAN.  
*The Lois Morrell Poetry Award* to GRANDIN CONOVER.  
*The A. Edward Newton Library Prize* to DAVID J. KLINGENER.  
*The Phi Beta Kappa Prize* to ROBERT T. MOORE.  
*The Scott Award* to WALTER M. DICKEY.  
*The Sarah Kaighn Cooper Scholarship* to ROBERT W. MAYBERRY.  
*The Radio Corporation of America Scholarship* to ROBERT T. MOORE.  
*The Westinghouse Achievement Award* to CHARLES C. TAPPERT.

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\* A description of each of these awards can be found in another section of the catalogue.



## Enrollment of Students by Classes, 1958-59

	<i>Men</i>	<i>Women</i>	<i>Total</i>
Seniors .....	85	96	181
Juniors .....	107	99	206
Sophomores .....	126	119	245
Freshmen .....	157	118	275
	<hr/>	<hr/>	<hr/>
	475	432	907
Special Students .....	3	8	11
Graduate Students .....	2	0	2
	<hr/>	<hr/>	<hr/>
Totals .....	480	440	920

## Geographical Distribution, 1958-59

New York .....	196	Montana .....	2
Pennsylvania .....	194	Oregon .....	2
New Jersey .....	86	Arizona .....	1
Massachusetts .....	47	New Mexico .....	1
Illinois .....	43	North Dakota .....	1
Maryland .....	43	Oklahoma .....	1
Connecticut .....	34	South Carolina .....	1
California .....	24	South Dakota .....	1
Delaware .....	24	Utah .....	1
Ohio .....	23	Washington .....	1
District of Columbia .....	19	Wyoming .....	1
Virginia .....	18		
Florida .....	14	Total U. S. ....	892
Michigan .....	14	Canada .....	3
North Carolina .....	10	Japan .....	3
Missouri .....	9	Austria .....	2
Indiana .....	8	France .....	2
Iowa .....	6	Germany .....	2
Maine .....	6	Ghana .....	2
Minnesota .....	6	Great Britain .....	2
Wisconsin .....	6	Hong Kong, B.C.C. ....	2
Colorado .....	5	Cuba .....	1
Kentucky .....	5	Egypt .....	1
Nebraska .....	5	Ethiopia .....	1
New Hampshire .....	5	Greece .....	1
Rhode Island .....	5	Jordan .....	1
Louisiana .....	4	Korea .....	1
Texas .....	4	Netherlands .....	1
Alabama .....	3	Nigeria .....	1
Tennessee .....	3	Peru .....	1
Vermont .....	3	Philippines .....	1
West Virginia .....	3		
Georgia .....	2	Total from abroad .....	28
Hawaii .....	2	Grand Total .....	920

## Selected Publications About Swarthmore College

- AYDELOTTE, FRANK, Breaking the Academic Lockstep; the Development of Honors Work in American Colleges and Universities, N. Y., Harper, 1944. 183 p.
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## Index

- Absence from classes and Collection, 62  
Absence from Examinations, 63  
Academic Requirements, Committee on, 21, 63  
Addams, Jane, Peace Collection (See Swarthmore College Peace Collection)  
Administrative Officers, 22-24  
ADMISSIONS PROCEDURE, 30-32  
    Application Dates, 31  
    Scholastic Aptitude and Achievement Tests, 31-32  
    School Subjects Recommended, 31  
Advanced Degrees, 64-65  
Advanced Standing, 32  
Advisers, 49, 55-57  
Alumnae Scholarship, 37  
Alumni Association, Officers of, 11  
Alumni Council, 11  
Alumni Office, 24, 49  
Arthur Hoyt Scott Horticultural Foundation, 45  
Astronomical Observatories, 43, 70  
Astronomy, Courses in, 70-71  
Athletic Fields, see Map, 164  
Atkinson (Barclay G.) Scholarship, 41  
Atkinson (Rebecca M.) Scholarship, 41  
Attendance at Classes and Collection, 62  
Automobiles, Regulations concerning, 50  
Awards and Prizes, 66-67, 155-156
- Bachelor of Arts Degree, 64  
Bachelor of Science Degree, 64  
Baker, (George F.) Scholarships, 35  
Benjamin West House, 46, 164  
Benjamin West Lecture, 46  
Bibliography of Swarthmore, 158  
Biddle Memorial Library, 43  
Biology, Courses in, 72-77  
Board of Managers, Committees of, 9, 10  
Board of Managers, Members of, 8, 9  
Botany, Courses in, 72-74  
Bower (Edward S.) Memorial Scholarship, 39  
BUILDINGS, see Map, 164-165  
    Activities and Class Lodges  
    Astronomical Observatories  
    Bartol Research Foundation  
    Bassett House  
    Beardsley Hall  
    Benjamin West House  
    Biddle Memorial Library  
    Bond Memorial  
    Chemistry, Hall of  
    Faculty Residences  
    Field House  
    Hall Gymnasium  
    Hicks Hall  
    Isaac H. Clothier Memorial  
    Library Building  
    Martin (Edward) Biological Laboratory  
    Meeting House  
    Palmer Hall  
    Pierre S. duPont Science Building  
    Pittenger Hall  
    Parrish Hall  
    Roberts Hall  
    Scott (Arthur Hoyt) Outdoor Auditorium  
    Somerville Hall  
    Sproul Observatory  
    Students' Observatory  
    Swimming Pool  
    Thomas House  
    Trotter Hall  
    Wharton Hall  
    Willets Hall  
    Worth Hall  
Bunting (Ella Frances) Extemporaneous Speaking Contest, 67  
Calendar, College, 5-6  
Chemistry, Courses in, 78-81  
Chi Omega Scholarship, 40  
Churches, 47  
Class of 1913 Loan Fund, 41  
Class of 1915 Scholarship Fund, 39  
Class of 1916 Loan Fund, 41  
Class of 1930 Scholarship, 39  
Class of 1931 Scholarship Fund, 39  
Classics, Courses in, 82-85  
Cole (Sarah Antrim) Scholarship, 40  
Collection Attendance, Regulation concerning, 48, 62  
College Community, 27, 50  
College Entrance Examinations, 30-32  
College Jobs, 34  
Committees of the Board of Managers, 9, 10  
Committees of the Faculty, 21  
Comprehensive Examinations, 55, 57  
Cooper (Sarah Kaighn) Scholarship, 36  
Cooper (William J.) Foundation, 44-45

## Index

- Cooperation with Neighboring Institutions, 26, 148  
Corporation, Officers of, 8  
Course Advisers, 49, 55-57  
COURSES OF INSTRUCTION, 69-148  
    Astronomy, 70-71  
    Biology, 72-77  
    Chemistry, 78-81  
    Classics, 82-85  
    Economics, 86-88  
    Engineering, 89-101  
        Civil, 93-95  
        Electrical, 96-99  
        Mechanical, 100-101  
    English Literature, 102-105  
    Fine Arts, 106-108  
    History, 109-112  
    International Relations, 113, 138  
    Mathematics, 114-116  
    Modern Languages, 117-123  
    Music, 124-126  
    Philosophy and Religion, 127-131  
    Physical Education for Men, 132  
    Physical Education for Women, 133-134  
    Physics, 135-137  
    Political Science, 138-142  
    Psychology and Education, 143-147  
    Russian Studies, 148  
Crane Prize, 66  
Cutting (Bronson M.) Collection, 46  
Decker (Kathleen H. and Martin M.)  
    Foundation Scholarship, 38  
DEGREES, 64-65  
    Advanced Engineering  
    Bachelor of Arts  
    Bachelor of Science  
    Master of Arts  
    Master of Science  
Degrees Conferred, 151-154  
Delta Gamma Scholarship, 40  
Dining Rooms, 47  
Directions for Correspondence, 2  
Directions for Reaching the College, 26  
Distinction in course, 58  
Divisions and Departments, 20  
Dormitories, 47  
Dorsey (William) Scholarship, 41  
Economics, Courses in, 86-88  
Education, Courses in, 143, 146  
Education, Physical, 132-134  
Educational Program, 27, 54-61  
Ellsler (George) Scholarship, 41  
Emeritus Professors, 13  
Engineering, Courses in, 89-101  
Engineering, Degrees in, 54, 64-65, 8  
English Literature, Courses in, 102-105  
Entrance Requirements, 30-32  
Examination Regulations, 63  
Examinations, College Board, 31-32  
Exclusion from College, 64  
Expenses, 33  
Extra or Fewer Courses, 63  
Extra-Curricular Activities, 51  
Faculty Members of, 13-19  
Faculty Regulations, 50, 62-64  
Fees (Tuition, Residence, etc.), 33, 34  
Fellowships, 67-68  
Ferguson (Donald Renwick), Scholarship, 37  
Fine Arts, Courses in, 106-108  
Foreign Language Requirements, 56, 57  
Foreign Students, 157  
Foreign Study, 61  
Fraternities, 52  
French, Courses in, 118-119  
Friends Historical Library, 23, 43  
Friends Meeting, 47  
Geographical Distribution of Students, 157  
German Language and Literature, Courses in, 120-122  
Gillingham (Joseph E.) Fund, 41  
Grades, 62  
Graduation, Requirements for, 64  
Grants-in-aid, 34  
Greek Language and Literature, Courses in, 82-85  
Hayes (John Russell), Poetry Prize  
Health, Care of Student, 47-48  
Hillborn (Rachel W.) Scholarship, 41  
History, Courses in, 109-112  
Honors, Reading for, 58-60  
    Examiners, 60, 150  
Housing, 27, 47  
Infirmaries, 48  
Insurance, Accident and Sickness, 34  
International Relations, Courses in, 138

## Index

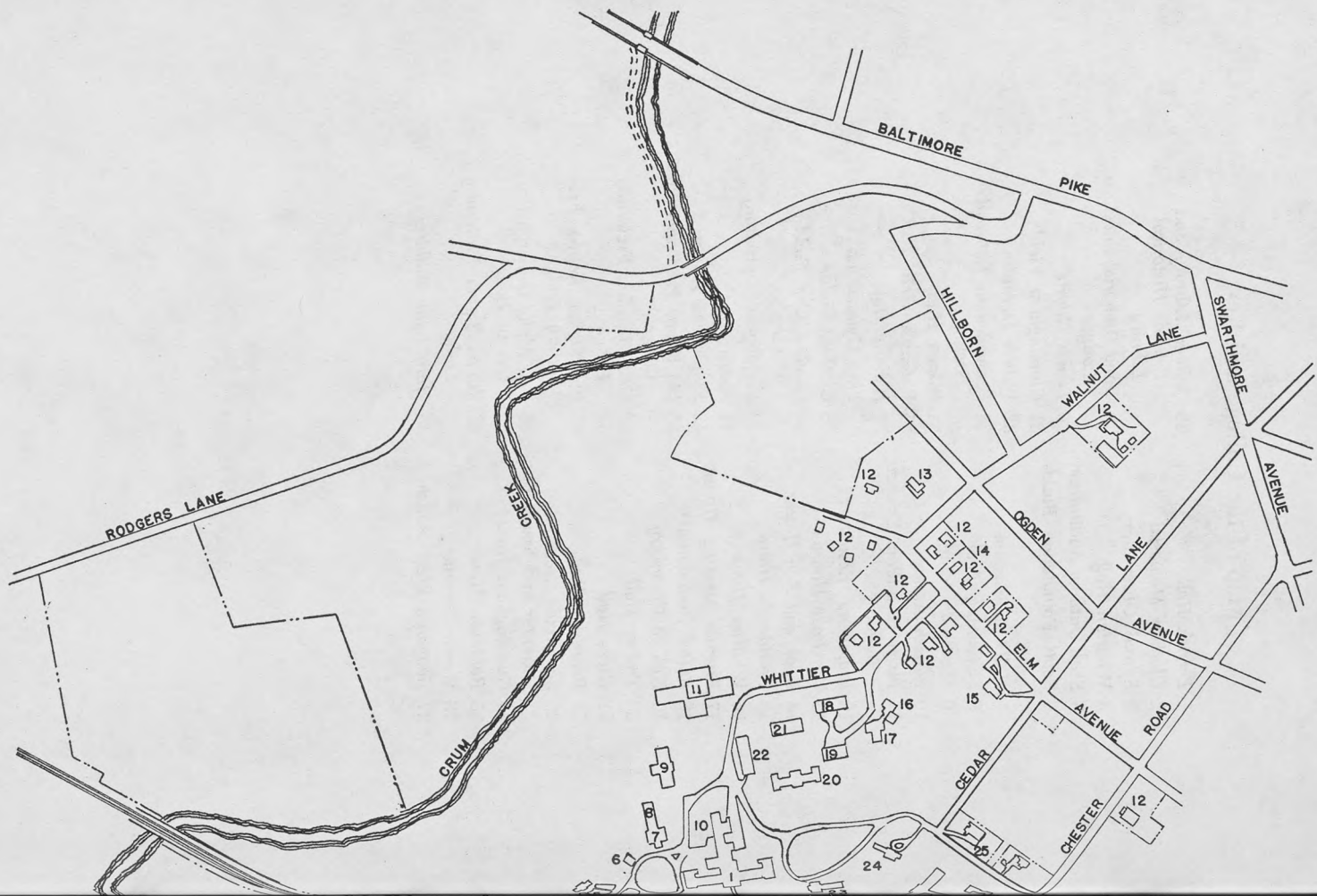
- ins (Aaron B.) Scholarship, 36  
 y Award, 66, 156
- hnson (George K. and Sallie K.) Fund,  
 37  
 hnson (Howard Cooper) Scholarship,  
 36
- appa Alpha Theta Scholarship Fund, 38  
 appa Kappa Gamma Scholarship, 41  
 ovalenko (Jessie Stevenson) Scholarship,  
 38
- afore Scholarship, 40  
 atin Language and Literature, Courses  
 in, 82-85  
 awrence (E. Hibberd) Scholarship, 39  
 eedom (Hannah A.) Fellowship, 67  
 eedom (Thomas L.) Scholarship, 41  
 BRARIES, 23, 43-44  
   Biddle Memorial, 43  
   College, 43  
   Friends Historical, 43-44  
 lly (Scott B.) Scholarship, 35  
 ppincott (Joshua) Fellowship, 68  
 ppincott (Sarah E.) Scholarship, 41  
 ans to Students, 41  
 ocation of the College, 26  
 ockwood (John) Memorial Fellowship,  
 68  
 ongstreth (Mary T.) Scholarship, 38  
 ucretia Mott Fellowship, 68
- anagers, Board of, 8, 9  
 ap of College Grounds, 164-165  
 arshall (Clara B.) Scholarship, 37  
 artin Biological Laboratory, 43  
 athematics, Courses in, 114-116  
 McCabe Engineering Award, 66, 156  
 McCabe (Thomas B.) Scholarship, 35  
 eeting House, 47, 164  
 en's Student Government, 51  
 ertz (Peter) Scholarship, 37  
 idwest Scholarships, 38  
 iller, Flounders Scholarship, 36  
 iller (James E.) Scholarship, 40  
 iller (John A.) Loan Fund, 42  
 oon (Owen) Fund for Public Speaking,  
 67  
 orrell (Lois) Poetry Award, 67  
 ott (Lucretia) Fellowship, 68  
 usic, Courses in, 124-126
- Nason (John W.) Award, 66  
 Newton (A. Edward) Library Prize, 66
- Oak Leaf Award, 66, 156  
 Observatories, Astronomical, 43, 70  
 Open Scholarships for Men, 35  
 Open Scholarships for Women, 37
- Paiste (Harriet) Fund, 38  
 Pearson (Paul M.) Loan Fund, 42  
 Perkins (T. H. Dudley) Memorial  
 Scholarship, 36  
 Phi Beta Kappa Fellowship, 68  
 Phi Beta Kappa Prize, 66  
 Philosophy, Courses in, 127-131  
 Physical Education for Men, 132  
 Physical Education for Women, 133-134  
 Physical Education Requirements, 63, 132-  
 134  
 Physics, Courses in, 135-137  
 Plan of College Grounds, 164-165  
 Political Science, Courses in, 138-142  
 Pool (Anthony Beekman) Scholarship, 37  
 Potter Collection of Recorded Literature,  
 46  
 Potter (Wm. Plummer) Public Speaking  
 Fund, 67, 156  
 Pre-Medical Program, 60-61  
 Preston (Mary Coates) Scholarship, 38  
 Prizes, 66-67, 156  
 PROGRAM OF STUDY, 54-61  
   For Freshmen and Sophomores, 55-57  
   For Juniors and Seniors, 57-60  
   Honors Work, 58-60  
   Pre-Medical Program, 60-61  
 Psychology, Courses in, 143-147  
 Public Speaking Prizes, 66-67, 156
- RCA Scholarship, 39  
 Reeves (Mark E.) Scholarship, 41  
 Religion, Courses in, 127-131  
 Religious Life, 47-48  
 Requirements for Admission, 30-32  
 Requirements for Graduation, 64  
 Residence, Regulations concerning, 47, 64  
 Russian Studies, Courses in, 148
- Scholarships, List of, 34-41  
 Scholastic Aptitude Test, 31-32  
 Scott (Arthur Hoyt) Horticulture Foun-  
 dation, 45-46  
 Scott Award, 35, 156

## Index

- Serrill (William G. and Mary N.) Scholarship, 36  
Sharples (Philip T.) Scholarship, 36  
Shoemaker (Annie) Scholarship, 37  
Sicard (Katherine B.) Prize, 67, 156  
Sigma Xi Fellowship, 68  
Social Committee, 51  
Solomon (Frank) Scholarship, 41  
Somerville Committee, 51  
Spanish, Courses in, 122-123  
Spock (Betty Dougherty) Memorial Fund, 46  
Sproul (Mary) Scholarship, 41  
Sproul Observatory, 43, 70  
Squier (Helen) Scholarship, 41  
States, Summary of Students by, 157  
Student Aid, 34-42  
Student Activities Bulletin, 52  
Student Council, 50  
Study Abroad, 61  
Sullivan (Joseph T.) Scholarship, 41  
Sullivan (Marshall P.) Scholarship, 38  
Summer School Work, 63  
Swarthmore College Peace Collection, 23, 44  
Swarthmore College Student Loan Fund, 42  
Taylor (Jonathan K.) Scholarship, 4  
Thorne (Phebe Anna) Fund, 40  
Tuition and Other Fees, 33  
Tyson (Martha E.) Fellowship, 68  
Underhill (Daniel) Scholarship, 39  
Vocational Advising, 49  
West, Benjamin, Lecture, 46  
Westbury Quarterly Meeting Scholarship, 40  
Westinghouse Achievement Scholarship, 39  
Wharton (Deborah F.) Scholarship  
White Open Scholarships for Women  
Willets (Samuel) Fund, 41  
William J. Cooper Foundation, 43-44  
Williams (Ellis D.) Fund, 41  
Williamson (I. V.) Scholarships, 41  
Wilson (Edward Clarkson) Scholarship, 39  
Women's Student Government Association, 51  
Wood (Mary) Fund, 38  
Woodnutt (Thomas) Scholarship, 41  
Zoology, Courses in, 75-78

## Map of the College and Key

- 1 Parrish Hall
- 2 Clothier Memorial
- 3 Sproul Observatory
- 4 Wharton Hall
- 5 Scott Outdoor Auditorium
- 6 Scott Foundation Building
- 7 Hall Gymnasium
- 8 Swimming Pool
- 9 Martin Building
- 10 Parrish Annex
- 11 Pierre S. duPont Science Building
- 12 Professors' Residences
- 13 Woolman House
- 14 Book and Key House
- 15 President's House
- 16 Whittier House
- 17 Friends Meeting House
- 18 Bartol Foundation
- 19 Hall of Chemistry
- 20 Trotter Hall
- 21 Hicks Hall
- 22 Beardsley Hall
- 23 Somerville Recreation Center and Snack Bar
- 24 Cunningham House
- 25 Robinson House
- 26 Worth Dormitory
- 27 Benjamin West House
- 28 College Library and Friends Historical Library
- 29 Bond Memorial and Class Lodges
- 30 Tennis Courts
- 31 Cunningham Field
- 32 Willets Dormitory
- 33 Pennsylvania Railroad Station
- 34 Palmer Hall
- 35 Pittenger Hall
- 36 Roberts Hall
- 37 Prep Gymnasium
- 38 Clothier Fields
- 39 Lamb-Miller Field House
- 40 Employees' Dormitory
- 41 Power Plant
- 42 Employees' Houses
- 43 Phi Kappa Psi Fraternity Lodge
- 44 Delta Upsilon Fraternity Lodge
- 45 Phi Sigma Kappa Fraternity Lodge
- 46 Tau Alpha Omicron Fraternity Lodge
- 47 Kappa Sigma Fraternity Lodge
- 48 Mary Lyon Buildings







*Plan of the Grounds  
of  
Swarthmore College*

Geographical Chart

Map of the Province



