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SWARTHMORE COLLEGE BULLETIN

CATALOGUE ISSUE
FOR 1944-1945 SESSIONS



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CATALOGUE ISSUE
FOR 1944-1945 SESSIONS

SWARTHMORE, PENNSYLVANIA

Volume XLII

Number 2

Eleventh Month, 1944

*Entered at the Post-Office at Swarthmore, Pa., as second-class matter, in
accordance with provision of the Act of Congress of July 16, 1894.*



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LUNAR CALENDAR

1944

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

1945

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

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

COLLEGE CALENDAR

1944-45

Winter Term

- Eleventh Month 1.....Classes and seminars begin
Twelfth Month 21.....Christmas Vacation begins at 6.00 p.m.
Twelfth Month 29.....Christmas Vacation ends at 8.00 a.m.

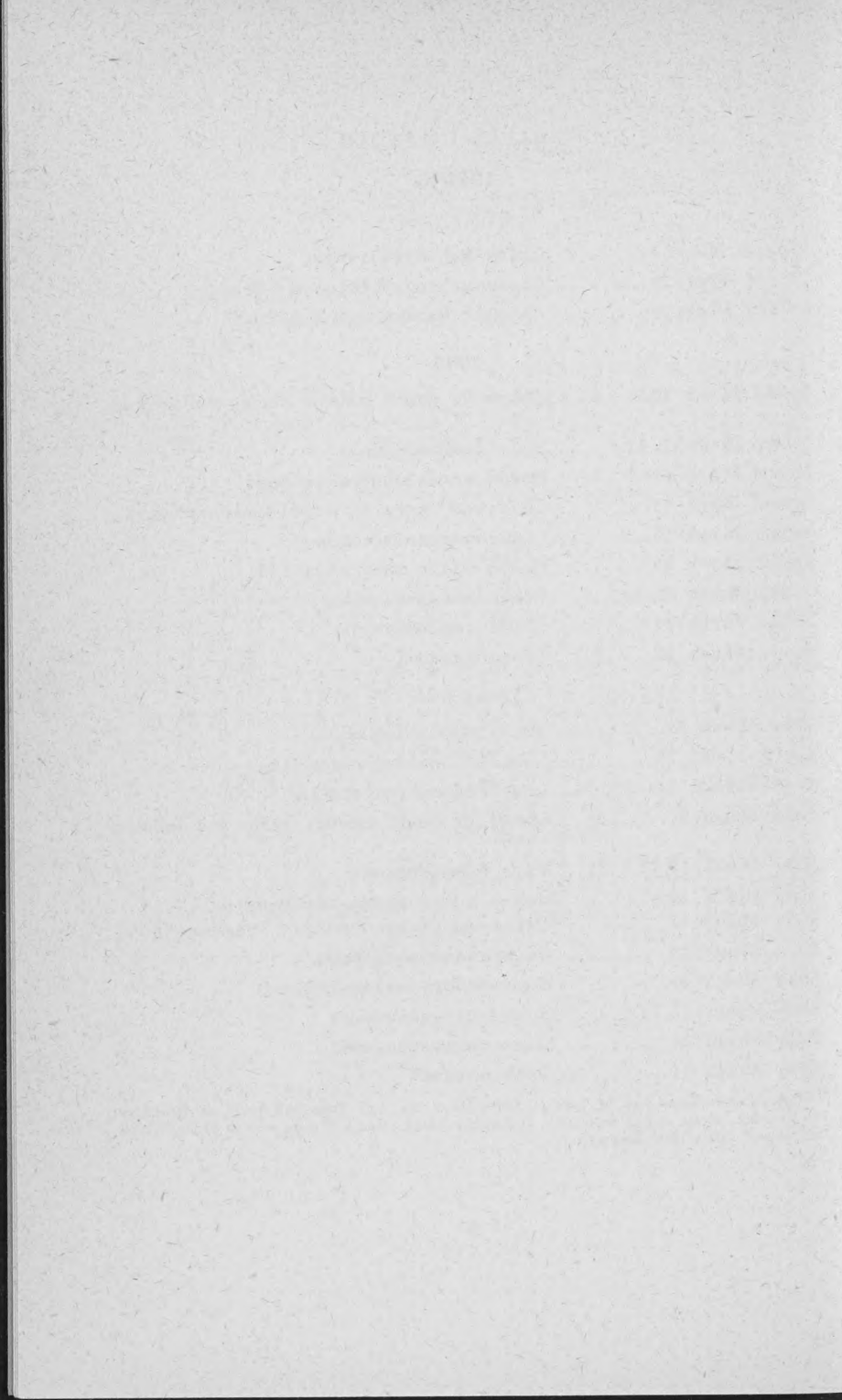
1945

- Second Month 10.....Classes for second semester seniors and seminars
end
Second Month 12, 13.....Senior Comprehensives
Second Month 13.....Honors written examinations begin
Second Month 15.....Classes end (except for second semester seniors)
Second Month 16.....Course examinations begin
Second Month 21.....Honors written examinations end
Second Month 23, 24.....Honors oral examinations
Second Month 24.....Course examinations end
Second Month 25.....Commencement

Spring Term

- Third Month 5.....Classes and seminars begin
Fourth Month 20.....Long Week-end begins at 6 p.m.
Fourth Month 24.....Long Week-end ends at 8 a.m.
Sixth Month 9.....Classes for second semester seniors and seminars
end
Sixth Month 11, 12.....Senior Comprehensives
Sixth Month 12.....Honors written examinations begin
Sixth Month 14.....Classes end (except for second semester seniors)
Sixth Month 15.....Course examinations begin.
Sixth Month 20.....Honors written examinations end
Sixth Month 22, 23.....Honors oral examinations
Sixth Month 23.....Course examinations end
Sixth Month 24.....Commencement*

* A Summer Term may be held in 1945. If so, the Fall Term will begin on November 1; otherwise, at the end of September. Information about plans and dates may be obtained from the Deans' Office after February 1.



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232 South Seventh Street, Philadelphia 6, Pa.
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* Nominated by the Alumni Association.

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Executive*

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ISAAC H. CLOTHIER, JR.
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MARY LIPPINCOTT GRISCOM
ADA GRAHAM CLEMENT
ELEANOR STABLER CLARKE

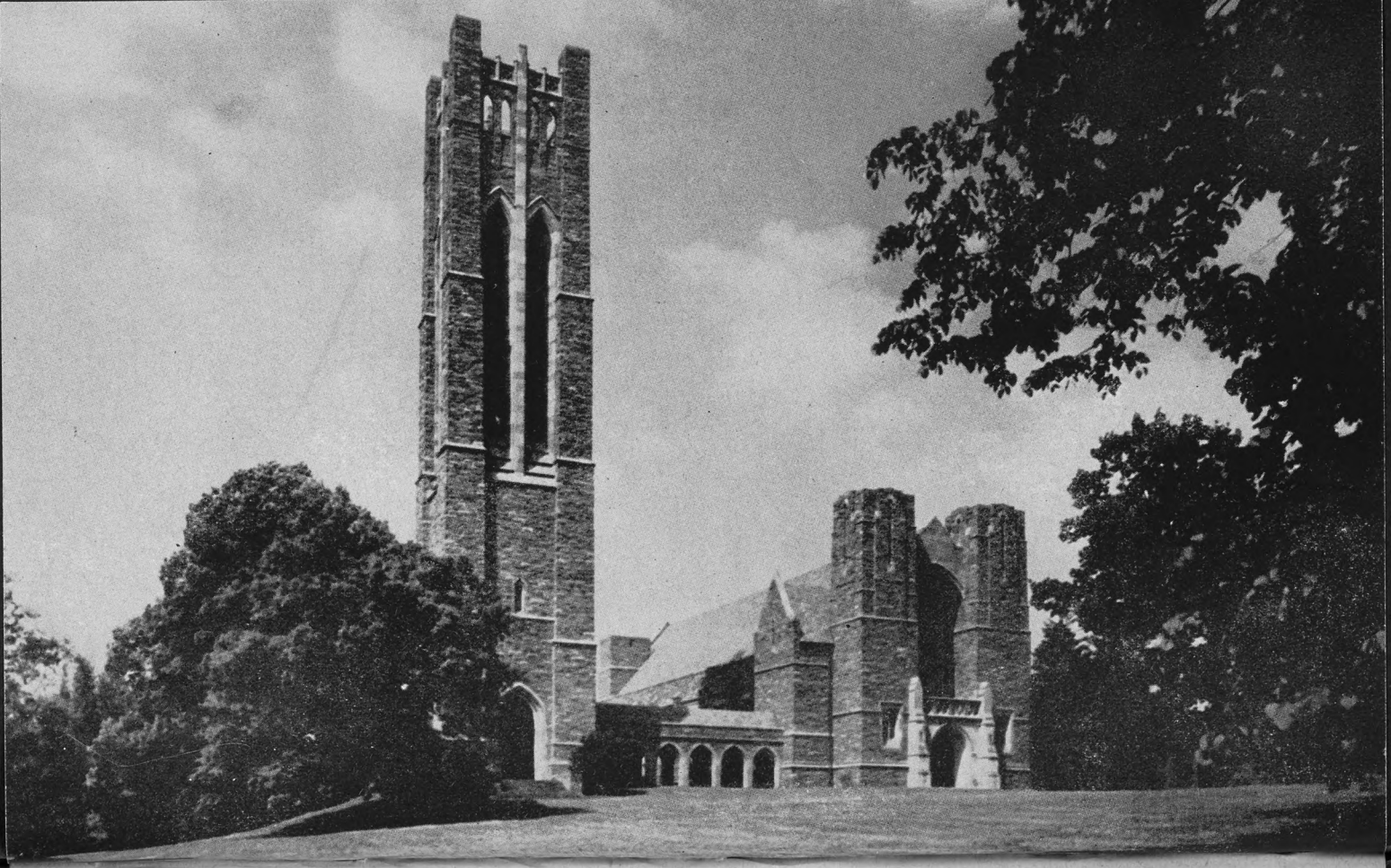
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ANNA ENGLE TAYLOR
ANNA OPPENLANDER EBERLE

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HADASSAH MOORE LEEDS
RUTH POTTER ASHTON

ROBERT E. LAMB
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 ** Absent on leave, part-time.
 *** Absent on leave, Winter Term.

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* Absent on leave.

** Absent on leave, part-time.

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- *CHARLES HEIMSCH, *Instructor in Botany*.....
B.A., Miami University; M.A. and Ph.D., Harvard University.
- FREDRIC S. KLEES, *Instructor in English*.....Cunningham House
B.A., Bowdoin College.
- *BEATRICE BEACH MACLEOD, *Instructor in English*.....
B.A., Swarthmore College; M.F.A., Yale University.
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- MAY E. PARRY, *Instructor in Physical Education for Women*.....
Swarthmore Apartments
B.A., Swarthmore College; B.S., Temple University.
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B.S. and C.E., Princeton University.
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B.A., M.A. and Ph.D., Radcliffe College.
- HERBERT G. SINTHOFF, *Instructor in Political Science*.....409 Elm Avenue
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B.A., Swarthmore College; M.A., University of Pennsylvania.
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Ph.B., University of Chicago; M.A., Columbia University.
- *FREDERICK B. TOLLES, *Librarian of the Friends Historical Library and Instructor (part-time) in History*.....302 North Chester Road
B.A. and M.A., Harvard University.
- HANS WALLACH, *Instructor in Psychology*.....23 Princeton Avenue
Dr. phil., University of Berlin.
- **JEAN WALTON, *Instructor in Mathematics*.....401 Walnut Lane
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- *C. BROOKE WORTH, *Instructor in Zoölogy*.....602 Elm Avenue
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* Absent on leave.

** Absent on leave, Spring Term.

*** Teaching in Winter Term.

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- W. H. AUDEN, *Lecturer in English*.....16 Oberlin Avenue
B.A., Oxford University.
- HANS FRIED, *Lecturer in Mathematics*.....361 Lancaster Avenue, Haverford
Dr. phil., University of Vienna.
- FRANKLIN G. WILLIAMS, *Lecturer in Mathematics*.....608 University Avenue
B.A., Middlebury College; M.A., Pennsylvania State College; Ph.D.,
Cornell University.
- SEYRIL SCHOCHEN RUBIN, *Director of Dramatics*.....302 North Chester Road
B.A., Ohio State University; Diploma, Dramatic Workshop of New
School of Research.
- FLORENCE C. WILCOX, *Director of Arts and Crafts*.....510 Ogden Avenue
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- JEAN FRANCKSEN, *Assistant in Fine Arts*.....
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B.F.A. in Education, University of Pennsylvania.
- VIRGINIA BELL KLOPFER, *Assistant in Psychology*.....
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B.A., Bryn Mawr College.
- SARAH LEE LIPPINCOTT, *Assistant in Astronomy*.....
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B.A., University of Pennsylvania.
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513 East Brighthurst Street, Germantown
- F. M. McLARTY, *Assistant in Drawing*.....23 Oberlin Avenue
- GEORGE E. REIMER, *Assistant in Physical Education for Men*.....
B.A., Franklin and Marshall College. 613 Yale Avenue, Morton
- Naval Personnel*
- GLENN G. BARTLE, *Lieutenant, D-V(S), USNR*.....302 Ogden Avenue
B.A., M.A., and Ph.D., Indiana University.
- DAVID R. REVELEY, *Lieutenant, D-V(S), USNR*.....16 Oberlin Avenue
B.A., Hampden Sydney College; M.A., University of Virginia.
- JAMES M. PETERS, *Lieutenant Commander, MC-V(S), USNR*.....
Walnut Park Plaza, 63rd and Walnut Streets, Philadelphia
Ph.B., Boston College; M.D., Tufts College.
- THOMAS J. LOUGHRAN, *Chief Specialist (A), USNR*.....
259 W. Baltimore Avenue, Clifton Heights, Pa.
B.S., Stroudsburg State Teachers College; M.A., Columbia University.
- ROBERT J. NEUMAN, *Chief Specialist (A), USNR*.....1 South Chester Road
B.S., Illinois Wesleyan; M.A., University of Illinois.
- WILLIAM G. LOVE, *Chief Yeoman, USNR*.....
2230 South Shields Street, Philadelphia
- HOWARD W. ROTH, *Storekeeper 1st Class, USNR*.....
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- MILDRED RUBIN, *Yeoman 2nd Class, USNR*...U.S. Naval Convalescent Annex
- WILBUR V. MOLLOY, *Pharmacist's Mate 1st Class, USN*..410 Harvard Avenue
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VISITING EXAMINERS OF CANDIDATES FOR
DEGREES WITH HONORS

OCTOBER, 1943

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English: PROFESSOR RALPH M. SARGENT, Haverford College; PROFESSOR WILLARD THORP, Princeton University.

Fine Arts: PROFESSOR DAVID M. ROBB, University of Pennsylvania.

History: PROFESSOR JOHN POWELL, University of Delaware; PROFESSOR CARLETON C. QUALEY, Bard College; PROFESSOR CAROLINE ROBBINS, Bryn Mawr College; MISS LAURENCE STAPLETON, Bryn Mawr College.

Philosophy: PROFESSOR GRACE A. DELAGUNA, Bryn Mawr College.

Psychology: PROFESSOR DONALD W. MACKINNON, Bryn Mawr College.

Division of the Social Sciences

Economics: DR. KARL R. BOPP, Philadelphia, Pa.; DR. LLOYD A. METZLER, Washington, D. C.

History: PROFESSOR JOHN POWELL, University of Delaware; PROFESSOR CARLETON C. QUALEY, Bard College; PROFESSOR CAROLINE ROBBINS, Bryn Mawr College; MISS LAURENCE STAPLETON, Bryn Mawr College.

Philosophy: PROFESSOR GRACE A. DELAGUNA, Bryn Mawr College.

Political Science: DR. DOUGLAS W. CAMPBELL, Washington, D. C.; PROFESSOR GRAYSON L. KIRK, Columbia University.

Psychology: PROFESSOR DONALD W. MACKINNON, Bryn Mawr College.

Division of Mathematics and the Natural Sciences

Chemistry: PROFESSOR A. HAROLD BLATT, Queen's College; PROFESSOR JAMES L. CRENSHAW, Bryn Mawr College; PROFESSOR N. H. FURMAN, Princeton University.

Mathematics: PROFESSOR H. A. RADEMACHER, University of Pennsylvania.

Physics: DR. WILLIAM C. ELMORE, Bartol Research Foundation.

FEBRUARY, 1944

Division of the Humanities

English: PROFESSOR RALPH M. SARGENT, Haverford College.

History: PROFESSOR ELMER A. BELLER, Princeton University; PROFESSOR JOHN POWELL, University of Delaware.

Philosophy: PROFESSOR MAYLON H. HEPP, Haverford College.

Division of the Social Sciences

Economics: DR. JOSEPH D. COPPOCK, Washington, D. C.

History: PROFESSOR ELMER A. BELLER, Princeton University; PROFESSOR JOHN POWELL, University of Delaware.

Political Science: DR. E. P. CHASE, Washington, D. C.

Division of Mathematics and the Natural Sciences

Botany: PROFESSOR RAY F. DAWSON, Princeton University; PROFESSOR PHINEAS W. WHITING, University of Pennsylvania.

Chemistry: PROFESSOR JAMES L. CRENSHAW, Bryn Mawr College; DR. DAVID TODD, Oceanographic Institute.

Psychology: DR. WILLIAM C. PRENTICE, The Johns Hopkins University.

Zoology: DR. WILLIAM AMBERSON, University of Maryland Medical School; PROFESSOR MARY GARDINER, Bryn Mawr College.

JUNE, 1944

Division of the Humanities

English: PROFESSOR HOWARD F. LOWRY, Princeton University.

History: PROFESSOR MARGARET JUDSON, New Jersey College for Women; PROFESSOR JOHN POWELL, University of Delaware; PROFESSOR ROGER H. WELLS, Bryn Mawr College.

Philosophy: PROFESSOR GRACE A. DELAGUNA, Bryn Mawr College; PROFESSOR MILTON C. NAHM, Bryn Mawr College.

Psychology: PROFESSOR S. E. ASCH, Brooklyn College.

Division of the Social Sciences

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History: PROFESSOR MARGARET JUDSON, New Jersey College for Women; PROFESSOR JOHN POWELL, University of Delaware; PROFESSOR ROGER H. WELLS, Bryn Mawr College.

Philosophy: PROFESSOR GRACE A. DELAGUNA, Bryn Mawr College; PROFESSOR MILTON C. NAHM, Bryn Mawr College.

Political Science: DR. DOUGLAS W. CAMPBELL, Washington, D. C.; DR. DOROTHY FOSDICK, Washington, D. C.

OCTOBER, 1944

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History: DR. CARLETON MABEE, Skillman State Village, N. J.; PROFESSOR ROGER H. SOLTAU, Swarthmore, Pa.; PROFESSOR ROGER H. WELLS, Bryn Mawr College.

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Economics: DR. LLOYD A. METZLER, Washington, D. C.

History: DR. CARLETON MABEE, Skillman State Village, N. J.; PROFESSOR CAROLINE ROBBINS, Bryn Mawr College; PROFESSOR ROGER H. SOLTAU, Swarthmore, Pa.

Political Science: DR. CARLETON MABEE, Skillman State Village, N. J.; PROFESSOR ROGER H. SOLTAU, Swarthmore, Pa.; PROFESSOR ROGER H. WELLS, Bryn Mawr College.

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SECRETARY TO THE FACULTY: Silz.

INTRODUCTION TO SWARTHMORE COLLEGE

EDUCATIONAL AIMS

Swarthmore College was founded in 1864 by members of the religious Society of Friends. In accordance with Friendly traditions, Swarthmore students undertake a program of self-discovery and self-development intended to prepare them for well-rounded lives as individual human beings, and as responsible members of their communities. Their success in this program depends upon hard intellectual work supplemented by participation in sports, in arts and crafts, and in other enterprises which make group life stimulating and rewarding.

College requirements point to the value of a variety of courses during the first two years, followed by some degree of specialization during the junior and senior years. Freshmen and sophomores are helped to plan their work so that they will explore new fields and also test their ability to do well on the college level in subjects which interested them in high school. By the end of the sophomore year, they should know their own bent well enough to choose the field of their concentration. They should know also whether they wish to continue to enroll in courses or whether they prefer to undertake "Honors Work" (p. 29), a kind of study which has had special attention at Swarthmore during the past twenty years. Through a method of instruction in small seminars, honors work enables independent students to progress at their own rate and to develop initiative and a sense of responsibility, while profiting at the same time from close association with their instructors.

THE COLLEGE COMMUNITY

Swarthmore is a residential college with a normal enrolment of seven hundred and fifty students, divided equally between men and women. The students represent a variety of localities in the United States and in foreign countries (p. 103). The campus, which is a tract of two hundred and fifty acres, gives space for dormitories and for houses for members of the faculty. Living near each other, faculty and students meet outside as well as inside the classroom. As the village of Swarthmore is a commuting suburb of Philadelphia, the college enjoys the out-of-door life of the country, and the opportunities offered by a city. The college is also sufficiently near three other institutions, Bryn Mawr and Haverford Colleges, and the University of Pennsylvania, to make possible some sharing of instructors and libraries.

WAR-TIME ADJUSTMENTS

Swarthmore College is attempting to meet its obligations in war time by training men and women to fulfill the demands of national service, and, at the same time, by continuing to emphasize the permanent values of a liberal education. With the latter aim in view, students are urged to carry on, so far as they can, the kind of program in which they find their fullest personal development, in the confidence that they will thereby become capable of making their richest contribution to their communities. This aim is within the present range of possibility for all women students and for men under draft age who may make a start in the work to which they will return after the war. The immediate need of preparing men and women for national service is met by a variety of courses in the humanities and the social sciences as well as in the natural sciences and engineering, and by a Navy V-12 program in which instruction is in the hands of the Swarthmore College Faculty.

As an interesting addition to the Navy program, a unit of 49 Chinese officer candidates came to the college in November, 1943, for two terms of instruction in English, and in the natural sciences.

The undergraduate body now includes a unit of 250 apprentice seamen who will be candidates for commissions as deck, engineering, and medical officers, in addition to 100 civilian men and 350 women. All students continue to be housed in college dormitories and to have their meals in the college dining room. Civilian and Navy students attend the same classes, and cooperate fully in athletics, student activities, and college social life.

To meet war-created demands, the college has adopted an accelerated program which includes three terms of sixteen weeks each. Eight such terms constitute the normal requirements for the B.A. or B.S. degree, but a student who enrolls for three terms a year will complete his work in 32 months. If he is called into service after his seventh term, he may be granted a special war degree. Freshmen have been accepted at the beginning of each term, in November, March and July. The accelerated program has not been compulsory but has been strongly recommended for all men and for women in science. Whether or not it will be carried through the summer of 1945 will depend upon national needs. The college stands ready to provide a summer term so long as it may be required for a Navy V-12 Program or may prove practicable for returning veterans.

POLICY TOWARD VETERANS

1. Swarthmore welcomes veterans of the Armed Forces, both men and women, who are qualified to do the work and who are interested in the type of program and community life for which the college stands.

2. The college offers courses leading toward the B.A. degree in arts and sciences and the B.S. degree in civil, mechanical, and electrical engineering. We do not contemplate setting up courses outside these fields, but within the established program every effort will be made to adjust courses to individual or group needs.

3. Provision will be made for an accelerated program for veterans. The college will offer its own summer term if the number wishing such a program is sufficient. Otherwise, arrangements will be made for summer work at other institutions and full credit will be given by the college for satisfactory performance.

4. Questions of admission and academic status will be determined on the merits of each individual case. Careful consideration will be given to the previous academic record of the applicant and to experience contributing to the intellectual development of the applicant gained in the training programs of the various Services and under the direction of the Armed Forces Institute. As a general principle, applicants will be accepted at that academic level which will enable them by the time they qualify for degrees to compete on equal terms with those who have proceeded through the normal eight semesters.

5. Various tests will be used to help determine the academic status and best programs for the applicant. All candidates are urged to take the four tests of general educational development administered by the Armed Forces Institute. These are available at most demobilization centers. They may also be taken at the college. In addition aptitude and subject matter tests may be given by the college as an aid both to the veteran and to the college.

6. The college will accept as students married veterans. Both husband and wife, if qualified, will be eligible to take courses for credit.

7. The Servicemen's Readjustment Act of 1944 provides for government aid to the veteran in completing his education. Applications for this aid are available at the various branch offices of the Veterans Administration and at the college. Veterans are eligible for college scholarship and grants-in-aid when government help is not available.

8. Application for admission should be made to the Deans, Swarthmore College, Swarthmore, Pa. A catalogue, application card, and Veterans Administration Rehabilitation Form (for government aid) will be sent upon request. An applicant is urged wherever possible to visit the college and discuss his problems and proposed program with the Deans, members of the Admissions and scholarship committees, and representatives of the departments in which he expects to do his work.

THE STUDENT'S PROGRAM

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 Mathematics and the Natural Sciences.* Eight terms of resident study which are normally completed in four years lead to a Bachelor's degree. During the war, an accelerated program of three terms a year is optional.

During the first half of their college program, all students are expected to complete general college requirements, to choose their major and minor subjects, and to prepare for advanced work in these subjects by taking certain prerequisites. Their schedule is made up of *full* or *half* courses. Four full courses or their equivalent in half courses constitute the normal program for two terms.** A full course represents from ten to twelve hours of work a week, including class meetings and laboratory periods. The program for upper class students affords a choice between two methods of study: Honors Work, which may lead to a degree *with Honors*, and General Courses. An honors student concentrates upon three related subjects which he studies by the seminar method; the system will be explained more fully below. A student in general courses may concentrate somewhat less, and continues to have a schedule of four full courses for two terms.

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 that department (see pp. 87-89) and must attend the Collection exercises of the college (see p. 40).

Course Advisers

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.

* For groupings of departments, see page 18.

** For permission to carry extra work, see page 44.

PROGRAM FOR FRESHMEN AND SOPHOMORES

A revised program for the first four terms will be put into effect in the fall of 1945. Although the details of the new plan must still be worked out, its general purpose can be stated now.

The proposed program will be 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:

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 the relationship of himself to it.

3. The natural sciences—those studies through which man learns to understand the world, both organic and inorganic, outside of his own individual and social being.

Accordingly, every student will include in the work of his first two years one course or half course in each of the following subjects:

History

Literature

Foreign Language

Social Science

Philosophy

Natural Science

Psychology

Mathematics

(for scientists)

He should then have a broad and sound background for the more specialized work of his last two years.

REQUIREMENTS IN FORCE FOR 1944-45

The general requirements for the first four terms include:

(a) Two full courses selected from two of the three Divisions: Humanities, Social Sciences, Mathematics and the Natural Sciences.

(b) Prerequisites for the work of the last four terms in major and minor subjects.

(c) Completion of the minimum foreign language requirement. An exceptionally well prepared freshman may demonstrate that he has completed this requirement before entering college by his rating in an Achievement Test given by the College Entrance Examination Board. The results of the test indicate, however, that most students need to devote from one to four terms to further study of language.

The language requirement is explained as follows:

Each student will pursue one foreign language to a point equivalent to the completion of Course 2. The desired standard is normally met

on the basis of four years' 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.

PROGRAM FOR JUNIORS AND SENIORS

WORK IN COURSES

The work of juniors and seniors in courses includes some intensive, specialized study in two related subjects, designated as a "major" and a "minor." A student's major is the subject in which he offers at least four courses for graduation and in which he must pass a comprehensive examination at the end of his senior year. His "minor" is a subject in the division of his major, in which he must complete three courses or their equivalent. A major in English is often combined with a minor in History, Philosophy, Fine Arts, or a foreign literature; a major in Economics, with a minor in Political Science, History, Philosophy, or Psychology; a major in Chemistry, with a minor in Physics or Mathematics, etc.

A student must choose his major and minor at the end of the sophomore year, and apply formally to be accepted by the two departments. The members of the major department consider him not only on the basis of his grades, but also on their estimate of his ability to pass a comprehensive examination. If a student is not acceptable as a major to any department, he cannot be allowed to enter the junior class. His minor also must be approved.

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

The completion of sixteen full courses, with a minimum average of C, normally constitutes the course requirement for a degree. A student may carry extra work after the freshman year with the approval of his course adviser and of the Committee on Prescribed and Extra Work, provided that his record in the previous year has been satisfactory.

HONORS WORK

DESCRIPTION OF THE SYSTEM

Honors work is a system of instruction designed to free from the limitations of class-room routine those students whose maturity and capacity enable them to do independent work. Students who are chosen toward the end of their sophomore year to read for honors are exempt from further course requirements. Instead, during their junior and senior years they study a few subjects intensively and independently. They meet their instructors weekly in small seminars lasting about three hours. In these meetings it is customary for students to present frequent papers, although the methods of stimulating discussion vary greatly. In scientific subjects additional time is spent in the laboratory. The work is so planned that a student takes two seminars each semester, making a total of eight seminars during his last two years. Departments sometimes permit their major students to prepare a thesis instead of one seminar.

Honors work involves a concentration of the student's efforts upon a limited and integrated field of studies. He chooses seminars in three (or sometimes four) allied subjects, and customarily devotes at least one-half of his time to a single department in the line of his major interest, in which he is expected to demonstrate real achievement. Combinations of seminars are not governed by rigid rules but must be approved by the departments and divisions in which work is taken. Combinations involving seminars from two divisions must be approved by the Committee on Extra and Prescribed Work. No examinations or grades are given from semester to semester.* At the end of the senior year honors students take written and oral examinations given by examiners from other institutions.**

The student should attain a degree of proficiency which will enable him to meet a rigorous and searching examination. This examination is designed to test his competence in a field of knowledge rather than his mastery of those facts which an instructor has seen fit to present in seminar. This is one of the chief ends for which the system of visiting examiners has been instituted. The examiners first set a three-hour written examination on the subject of each seminar, and after reading the written examination have an opportunity to question each student orally, in order to clarify and enlarge the basis of their judgment of the student's command of his material.

* It is customary for honors students to take practice examinations at the end of the junior year over the work covered thus far. These papers are read by the instructor concerned and are used as a basis for advice and guidance for the work of the senior year.

** For list of examiners in October, 1943; February, June, October, 1944, see pages 16, 17.

Upon recommendation of the examiners, successful candidates are awarded the bachelor's degree with honors, with high honors, or with highest honors. Highest honors are awarded only to those who show unusual distinction. When the work of a candidate does not, in the opinion of the examiners, merit honors of any grade, his papers are returned to his instructors, who decide, under rules of the faculty, whether he shall be given a degree in course.

Students admitted to honors work who prove unable to meet the requirements or who for other reasons return to regular classes may receive proportional course credit for the work they have done while reading for honors.

Regulations governing possible combinations of major and minor subjects in the four divisions appear below. Lists of seminars offered in preparation for examinations follow departmental statements.

REGULATIONS

Combinations of Majors and Minors

DIVISION OF THE HUMANITIES

Major subjects include English, French, German, Greek, History, Latin, Philosophy and Psychology; related minor subjects include those already listed, Music and Fine Arts. At least half of the student's time will probably be devoted to his major subject, the remainder being divided between two related subjects within the division.

DIVISION OF THE SOCIAL SCIENCES

Major and minor subjects include Economics, History, Philosophy, Psychology, and Political Science. Students in this division normally devote half their time to their major subject, dividing the remainder among related minor subjects according to plans approved by the division.

DIVISION OF MATHEMATICS AND THE NATURAL SCIENCES

Major subjects include Botany, Chemistry, Mathematics, Physics, Psychology, Zoölogy; related minor subjects include the subjects listed, and Astronomy and Philosophy. At least half of the student's time will probably be devoted to his major subject, with the remainder divided between two other related subjects within the division.

Major subjects for honors work in this division include Civil Engineering, Electrical Engineering and Mechanical Engineering; a minor may be taken in either or both of the engineering departments in which the student does not have his major, or in Chemistry, Mathematics, Physics or Economics. At least one-half of the student's time will be devoted to his major in engineering. The degree granted is the B.S. in Engineering.

The final examination will include papers on the fundamentals of the three professional departments of engineering, four papers on the seminars of the senior year, and one or two additional papers based upon the course which the student has taken, the number of the papers and their subjects to be determined by the faculty of the division.

Procedure for Admission

A candidate for admission to an honors division must file his application near the end of his sophomore year with the chairman of his division, and must indicate the particular combination of related subjects on which he wishes to be examined for his degree. His acceptance by the division depends in part upon the quality of his previous work as indicated by the grades he has received but mainly upon his apparent capacity for assuming the responsibility of honors work. The names of successful candidates are announced later in the spring. The major department will then arrange, in consultation with the student, a definite program of subjects to constitute the field of knowledge on which he will be examined at the end of his senior year. That department is responsible for drawing up the original plan of his work, for supervising his choice of seminars in all departments and for keeping in touch with his progress from semester to semester. The division is responsible for approval of the student's original program and for any subsequent changes in that program. Proposals for combinations of subjects or departments not provided for in the divisional arrangements must be submitted by the division to the Committee on Extra and Prescribed Work for final approval.

DEGREES

BACHELOR OF ARTS AND BACHELOR OF SCIENCE

The degrees of Bachelor of Arts and Bachelor of Science are conferred upon students who have met the requirements for graduation as stated on pages 27, 28 and following. Students who are drafted after the completion of the seventh semester and who are in good standing when drafted shall be awarded the Bachelor's degree *honoris causa*.

MASTER OF ARTS AND MASTER OF SCIENCE

The degrees of Master of Arts and Master of Science may be conferred upon graduates of Swartmore College or of other institutions of satisfactory standing who spend at least a year in residence at this college, pursuing a course of study approved by the faculty. Each candidate for the Master's degree must prepare a satisfactory thesis on a subject assigned by the professor in charge of the major subject, and must pass a final oral examination before a committee of the faculty. In recent years the policy of the faculty has been opposed to accepting candidates for the Master's degree.

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 the fulfilling of the requirements given below:

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





ADMISSIONS PROCEDURE

Applications for admission should be addressed to the deans of the college; from men applicants, to Dean Everett L. Hunt; from women, to Dean Frances Blanshard.

GENERAL STATEMENT

An applicant for admission will be judged on the basis of the following evidence:

1. Record in secondary school.
2. Recommendation of the school principal or headmaster.
3. Rating in the Scholastic Aptitude Test, and in his choice of three of the Scholastic Achievement Tests given by the College Entrance Examination Board.
4. Personal interview with one of the deans or an appointed representative (interviews are normally arranged only for applicants of promise).

As the number of qualified applicants greatly exceeds the limits of the freshman class, admission is on a competitive basis. In the selection of students, strong intellectual interests and excellence in some particular direction will receive more consideration than a record which shows a higher average without promise of unusual ability in any one field. Children of Friends and Alumni of the college who rank high in their graduating class will be assured of admission; those who do not rank high will be considered under the terms of the selective process described above.

In general candidates are admitted on the basis of (1) high rank in school and in the Scholastic Aptitude and Achievement Tests; (2) evidence of sturdiness of character.

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 and a letter of honorable dismissal. They must also take the Scholastic Aptitude and Achievement Tests required of a freshman entrant, unless they have already taken these tests for admission to another college.

As a general rule, students are not admitted to advanced standing later than the beginning of the sophomore year. The minimum requirement of residence for a degree is four terms, two of which must be those that constitute the senior year.

SUBJECTS OF PREPARATORY STUDY

In preparation for college an applicant is expected to complete a four-year secondary school course which includes work in English, foreign language, mathematics, history, and usually a laboratory science. The table below shows the possible distribution of work among these subjects. A "unit" represents a course involving four or five periods a week throughout one school year except in the case of English where three units are assigned for four such courses.*

Required Subjects, Ten and One-Half Units

	<i>Units</i>
Elementary and Intermediate Algebra	1½
Plane Geometry	1
English (4 years)	3
**Foreign Language	4
History	1

Elective Subjects, Four and One-Half Units

	<i>Units</i>		<i>Units</i>
Advanced Algebra	½	American History	1
***Solid Geometry	½	Civics	½
***Plane Trigonometry	½	Problems of Democracy	1
Latin	2, 3 or 4	Physics	1
Greek	2, 3 or 4	Chemistry	1
French	2, 3 or 4	Botany	½ or 1
German	2, 3 or 4	Biology	½ or 1
Spanish	2, 3 or 4	Physical Geography	½ or 1
Ancient History	1	Freehand Drawing	½ or 1
Medieval and Modern History..	1	Mechanical Drawing	½ or 1
Modern History	1	Music	1
English History	1	(with History and Theory)	
		Art History and Appreciation..	1

* These entrance requirements may be modified in individual cases to meet the conditions of the present national emergency.

** Five units, three of one language and two of another, are recommended whenever possible. Engineering students need offer only two units. Applicants who expect to concentrate in science are strongly advised to include German, and if possible also French, in their school program. This will permit a more flexible program in college.

*** Required of engineering students.

EXAMINATIONS FOR ADMISSION AND FOR SCHOLARSHIPS

All applicants for admission are required to take certain examinations given by the College Entrance Examination Board: the Scholastic Aptitude Test and three Achievement Tests, one of which must be in English Composition, the other two to be chosen by the candidate. No additional tests are required of candidates for scholarships. For information please write to the College Entrance Examination Board, Box 592, Princeton, N. J.

A NEW TIME TABLE

Applicants for admission in October 1945 must file their applications by February 15, 1945, and must take the required tests given by the College Entrance Examination Board on April 7, 1945. Applicants who wish to enter in March 1945 should take their tests on December 2, 1944.

Candidates for the White Open Scholarships must write for a special application blank by February 1, 1945, and must return it to the Deans' Office by February 15. The date on which they are to take their tests is April 7, 1945.

Notices of the action of the Admissions Committee will be mailed early in May.

JUNIOR EXAMINATIONS

Students who wish to take tests *for practice* at the end of the junior year are encouraged to do so. Unless their ratings are phenomenally high, however, they should repeat all tests in April of their senior year, in order to give themselves the advantage of their maximum preparation in the very keen competition for admission.

EXPENSES

The charge for tuition is to be increased, beginning in the fall of 1945, from \$200 to \$225 a term. This change has become necessary because of higher costs and lower returns from the endowment. Students who find the extra charge difficult to meet will be given special consideration by the Committee on Scholarships.

The charge for residence is \$250 a term. There is a uniform laboratory and activities fee of \$25 per term, which covers both academic and extra-curricular college activities and supersedes all separate fees formerly charged. A deposit of \$25 is required of each student, payable in advance, to cover incidental bills. Any unused balance is returned.

Charges per term:

Tuition	\$225
Residence	250
Fees	25
	<hr/>
Total charges	\$500

The payment of each term's charges is due not later than Registration Day at the beginning of the term. Bills are mailed before the opening of the current term. Payments should be made by check or draft to the order of SWARTHMORE COLLEGE. In case a student's bill is not paid by the end of the first month, he may be excluded from all college exercises. Correspondence about financial matters should be addressed to the Comptroller, Mr. Nicholas O. Pittenger.

No reduction or refunding of the tuition charge can be made on account of absence, illness or dismissal during the year. If a student shall withdraw or be absent from college for any reason, there will be no reduction or refund because of failure to occupy the room assigned for that term. In case of illness or absence for other reasons from the college for six weeks or more, there will be a proportionate reduction for board, provided that notice be given to the Comptroller at the time of withdrawal. Fees cannot be refunded for any reason whatever.

Students may charge incidental bills, including purchases at the college bookstore, laundry, telephone and room breakage, against the \$25 deposit. When this deposit has been exhausted a new deposit will be required immediately.

EDUCATIONAL RESOURCES

The SWARTHMORE COLLEGE LIBRARY, in part the gift of Andrew Carnegie, contains reading rooms, offices, and a collection of 135,000 volumes. Some 5,000 volumes are added annually. About 600 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 store-room for 150,000 volumes was erected in 1935. Important special units of the main library are the Appleton collection of classics and English literature and the Potter collection of legal material. 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.

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 of Friends. The library is the central depository for the records of Friends' meetings belonging to Philadelphia Yearly Meeting (Hicksite), and contains approximately 900 record books, many of which have been reproduced on microfilm. A microfilm reading machine is available. Among the other manuscript holdings are the Charles F. Jenkins Autograph Collection, including signatures of authors, reformers, and members of the Continental Congress; the Charles F. Jenkins Whittier Collection, consisting of first editions and manuscripts of John Greenleaf Whittier; and journals, letters, and miscellaneous papers of many Friends. The library's collection of printed materials by and about Friends includes a large number of seventeenth-century imprints as well as many books, pamphlets, and periodicals of later date. There is also an extensive collection of photographs of meeting houses and pictures of representative Friends including the original of Sir Peter Lely's portrait of George Fox. Also housed in the Friends Historical Library is the Jane Addams Peace Collection built around a nucleus of books and personal papers given in 1930 by Jane Addams; it contains a large amount of material dealing with international peace and has become a repository for the files of many peace organizations. All the collections are housed in the Biddle Memorial Library, a fire-

proof structure of stone and steel, given by Clement M. Biddle in memory of his father. It is hoped that Friends and others will consider the advantages of depositing in this library for preservation and for the use of scholars, books and family papers which may throw light on the history of the Society of Friends.

The WILLIAM J. COOPER FOUNDATION provides a varied program of lectures and concerts which enriches the academic work of the college. The Foundation was established by William J. Cooper, a devoted friend of the college, whose wife, Emma McIlvain Cooper, served as a member of the Board of Managers from 1882 to 1923. Mr. Cooper bequeathed to the college the sum of \$100,000 and provided that the income should be used "in bringing to the college from time to time eminent citizens of this and other countries who are leaders in statesmanship, education, the arts, sciences, learned professions and business, in order that the faculty, students and the college community may be broadened by a 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 7 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. *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*. University of Pennsylvania Press, 1941.

The BENJAMIN WEST SOCIETY, an organization of alumni, members of the faculty, and friends of the college, has built up a collection of 286 paintings, drawings, and etchings, which are exhibited as space permits in various college buildings. The Society owes its name to the American artist of the eighteenth century who was born in a house which still stands on the Swarthmore Campus, and who became President of the Royal Academy.

The GEORGE GREY BARNARD COLLECTION, the gift of the artist, contains 200 casts of his works, many of great size. It is not open to visitors, since the building in which it is temporarily stored for safe keeping is not suitable for exhibitions.

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

The ARTHUR HOYT SCOTT HORTICULTURAL FOUNDATION. Two hundred and thirty-seven 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 Arboretum 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 Arboretum is designed both to beautify the campus and 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. There are exceptionally fine displays of Japanese cherries and tree peonies, and a great variety of lilacs and chrysanthemums. Many donors have contributed generously to the collections. (For full information see *Bulletin of Swarthmore College*, Vol. xxxvii, No. 5.)

COLLEGE LIFE

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. It is committed to the belief that religion is best expressed in the quality of everyday living. There are accordingly no compulsory religious services. Students are encouraged to attend the churches of their choice: Episcopal, Presbyterian, Methodist, and Christian Science, in the borough of Swarthmore; Catholic, in the nearby towns of Morton, Media, and Chester. The Swarthmore Meeting House is located on the campus. Students are cordially invited to attend its active religious service on Sunday. Extra-curricular groups under faculty direction exist for the study of the Bible and the exploration of common concerns in religion.

There is an assembly of the college, called Collection, from 11.00 until 11.30 a.m. every Thursday in Clothier Memorial; attendance of students is required. The program is opened by a period of silence according to the Friendly tradition, followed by an address or music.

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 in houses on the campus.

Dormitories

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. Wharton Hall is now occupied by the Naval Unit.

The women's dormitories include the upper floors in the wings of Parrish Hall; Worth Hall, the gift of William P. Worth, 1876, and J. Sharpless Worth, ex-1873, as memorial to their parents; Woolman House and Bassett Dormitory on Walnut Lane.

Dining Rooms

All students, both men and women, have their meals in two adjoining College Dining Rooms in Parrish Hall.

STUDENT WELFARE

Health

There are two part-time college physicians, one for civilian men and one for women, each of whom holds daily office hours at the college. Students may consult them during office hours without charge. A student must report any illness to the college physicians, but is free to go for treatment to another doctor if he prefers to do so.

The college physicians give physical examinations to all students at the beginning of their freshman year, and arrange to see every student at least once in each subsequent year.

The college health program includes tuberculin tests, which are compulsory for all students.

There are three infirmaries, one for the Naval Unit, one for civilian men and one for women. The "sick bay" for the Naval Unit is in Section F of Wharton Hall; the infirmary for civilian men, in Roberts 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 physicians.

The infirmaries are open to resident students without charge unless the services of a special nurse are required. Students suffering from a communicable disease or from illness which makes it necessary for them to remain in bed must stay in the infirmaries for the period of their illness.

The psychiatrists of the Institute of the Pennsylvania Hospital are consulted when need arises.

Student Advisers

The deans and their assistants and members of the faculty serve as student advisers. They rely also on the help of upper class men and women in work with freshmen. Members of the Senior Honorary Societies of Book and Key and of Mortar Board carry special responsibility for the Freshman Placement Program.

Vocational Advice

The Alumni Secretary and the Women's Vocational Director provide information on vocations and arrange conferences to assist students in their choice of a career; they also attempt to help undergraduates and graduates find employment.

THE STUDENT COMMUNITY *

Student Council

The whole undergraduate community of men and women is represented by the *Student Council* which attempts to coordinate all student activities, and confers with the *Administrative Council* of the faculty on college problems.

Men's Executive Committee

The men students of the college are represented by the *Men's Executive Committee*, a group elected to take responsibility for specified problems which have to do primarily with dormitory life.

Women's Student Government Association

All women students are members of the *Women's Student Government Association*, headed by an Executive Committee elected to promote a great variety of women's interests. This committee includes the chairmen of certain important committees: *Conduct*, which maintains social regulations; *Personnel*, which has a special concern for helping freshmen; *Social* (see below); *Vocational*, which assists the women's Vocational Director; *Student-Alumnae Relationships*, which arranges the program for Somerville Day, on which alumnae are invited to return to the College; *Somerville Lectures*, which brings to the college popular speakers on subjects related to the arts.

Social Committee

An extensive program of social activities is managed by the *Social Committee*, under the direction of two elected co-chairmen, a man and a woman. The program is designed to appeal to a wide variety of interests, and is open to all students.

Somerville Forum

All women undergraduates and graduates are members of the *Somerville Forum*, an outgrowth of the Somerville Literary Society, which was established in 1871. The undergraduates hold open meetings devoted to music, art and literature; the alumnae maintain two fellowships for women for graduate work, the Lucretia Mott Fellowship and the Martha E. Tyson Fellowship. The final meeting in April, known as Somerville Day, is a gathering of alumnae and undergraduates.

* A HANDBOOK, written by students, describing their activities, may be obtained by writing to the Deans' Office.

FACULTY REGULATIONS

Attendance at Classes and Collection

Members of the faculty will hold students responsible for regular attendance at classes.

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

The last meeting before vacation and the first meeting after vacation in each course must be attended. The minimum penalty for violation of this rule is probation. The exact definition of probation in individual cases is left to the deans with the understanding that it shall include attendance at all classes without cuts.

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

Grades

Instructors report to the deans' office at intervals during the year upon the work of students in courses. Informal reports during the semester take the form of comments on unsatisfactory work. At the end of each semester formal grades are given in each course under the letter system, by which *A* means excellent work; *B* means good work; *C* means fair work; *D* means poor work, and *E* shows failure. *W* signifies withdrawn and *Cond.* signifies conditioned in the course.

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. (See pp. 16, 29.)

The mark "conditioned" indicates either (1) that a student has done unsatisfactory work in the first half of a course, but by creditable work during the second half may earn a passing grade for the full course, and thereby remove his condition; (2) that a student's work is incomplete in respect to specific assignments or examinations; when he completes it, he will remove his condition.

Conditions of both types must normally be made up in the term immediately following that in which they were incurred; for the removal of conditions of type (2), a date is set at the end of the first six weeks of each term when makeup examinations must be scheduled

and late papers submitted. Under special circumstances involving a use of laboratories or attendance at courses not immediately available, a student may secure permission to extend the time for making up a condition until the second term following. Any condition not made up within a year from the time it is imposed shall thereafter be recorded as *E*, i.e., *complete failure*, which cannot be made up.

Extra or Fewer Courses

A student may carry more or less than the normal number of courses only if he has the formal approval of his course adviser and of the Committee on Prescribed and Extra Work. He should submit his petition to the Committee on Registration Day.

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.

Residence

All men students except freshmen choose their rooms in order determined by lot. All freshmen, both men and women, are assigned to rooms by the deans. Upper class women have a preferential system carried out by a committee of students and members of the administrative staff.

Since vacations under the accelerated program are too short to permit extensive travel, students may occupy their rooms between terms by special arrangement with the deans. The college dining room is closed during all vacations.

Freshmen are asked to leave the college immediately after their last

examination at the end of any term when they are going home so that their rooms may be used by Commencement visitors.

Prohibition of Automobiles at Swarthmore

By action of the faculty, approved by the Board of Managers, undergraduates are forbidden to maintain automobiles at the college or in the borough of Swarthmore. The regulation is as follows:

Resident students are not allowed to keep automobiles on the campus or in the borough of Swarthmore. The rule prohibits equally the keeping of automobiles owned by students and those owned by other persons but placed in the custody or control of students. Day students may use cars in commuting to college.

Under exceptional circumstances, a student may obtain permission from one of the deans to keep an automobile in the borough for a limited time.

Parents and students must realize that this regulation will be strictly enforced; students who do not observe it will be asked to withdraw from college.

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.

COURSES OF INSTRUCTION

Departmental statements include courses which are required by the Navy V-12 program. These courses are designated by the numbers used in the Curricula Schedules issued by the Navy. Such numbers (B1, C2, etc.) appear in parentheses, and follow the usual Swarthmore Catalogue numbers in the case of courses open to both civilian and naval students.

*BOTANY

ASSISTANT PROFESSORS: LUZERN G. LIVINGSTON, *Chairman*.
RUTH McCLUNG JONES.

INSTRUCTOR: **CHARLES HEIMSCH.

1. Biology. Staffs of Botany and Zoölogy Departments. *Full course.*

This introductory course is designed to present the fundamental aspects of biology. Wherever possible, principles will be illustrated by both plants and animals with particular reference to their interdependence and interrelationship. The topics for consideration during the first semester (Biology 1a) include: protoplasm, the cell, structure and function in the higher plants, genetics, and a brief survey of the plant kingdom. The topics in the second semester (Biology 1b) include: principles of vertebrate structure and physiology, embryology, a comparative study of a few invertebrate phyla, ecology, and evolution. The course is a prerequisite for advanced courses in botany and zoölogy.

Three lectures or conferences and one laboratory period per week.

B1 and B2. Staffs of Botany and Zoölogy Departments.

Similar to Biology 1 in scope, but schedules two lecture-recitation periods and two three-hour laboratory periods per week. Open only to students who are in V-12 or who have the permission of the departments.

2. Genetics. Mr. Livingston. *Half course.*

A study of the fundamental principles of genetics, including Mendelian inheritance, the chromosome mechanism and the gene theory, and the application of the principles of genetics to plant and animal breeding.

Two lectures, one conference and one laboratory period per week.

3. Taxonomy. Mr. Heimsch. (Omitted in 1944-45) *Half course.*

A course including (1) the methods involved in identification of native and horticultural species of the campus and woods, and (2) considerations of evidence from various fields of study, i.e., anatomy, morphology, cytology, etc., which bear directly on the problems of interrelationships of angiosperms.

Two lectures and two laboratory periods per week.

4. Plant Anatomy. Mr. Heimsch. (Omitted in 1944-45) *Half course.*

A course designed to introduce the technique of plant tissue preparation and the fundamentals of plant anatomy, including cellular organization of vegetative and reproductive parts as well as critical consideration of meristematic activity and differentiation.

Two lectures and two laboratory periods per week.

5. Survey of the Plant Kingdom. Mr. Heimsch. (Omitted in 1944-45) *Half course.*

A comparative study of the structure and life habits of the thallophytes, bryophytes, and tracheophytes (exclusive of the angiosperms). Particular attention will be given to current concepts of evolutionary relationships from the standpoints of both comparative morphology and paleobotanical evidence.

6. Plant Physiology. Mr. Livingston. *Half course.*

An integrated study of the physiological processes of the higher plant, including general cellular physiology, water relations, mineral nutrition, photosynthesis, enzyme action and organic synthesis, cellular respiration, translocation, the physiology of growth and development, and related topics.

Two lectures, one conference, and one laboratory period per week.

7. Economic Botany. Mr. Heimsch. (Omitted in 1944-45) *Half course.*

A study of the principles and factors which condition the utilization of plant materials such as wood and wood products, fibers, food products (fruits, cereals, leaf and root crops), drugs, etc.

Three lectures per week, plus reports and/or laboratory.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

8. The Biology of Bacteria. Mr. Livingston. *Half course.*
 An approach to the study of bacteriology with principal emphasis on the consideration of bacteria as organisms rather than causative agents for disease, etc.
 Two lectures and two laboratory periods per week.
9. Cytology. Mrs. Jones. *Half course.*
 An advanced course including a study of both cytoplasmic and nuclear structures. Prerequisite either Botany 4 or Zoölogy 6a (Microscopic Anatomy).
10. Special Topics. Mr. Heimsch, Mrs. Jones, and Mr. Livingston. *Half course.*

REQUIREMENTS FOR MAJOR AND MINOR IN COURSE

Students intending to major in botany are advised to consult a departmental representative early in their college course for the purpose of planning a well integrated program. *Biology 1* and *Chemistry 1* are required as prerequisites for advanced work. Courses in physics, mathematics, and further courses in chemistry are highly desirable, particularly for students anticipating graduate study.

For students planning to minor in botany, *Biology 1* constitutes the sole prerequisite.

Numerous libraries, museums and parks in and around Philadelphia offer unusual opportunities for students to carry on investigations in the botanical sciences.

HONORS WORK

Prerequisites. The following courses, or their equivalents, are required for admission to honors work in botany: biology (see Course 1 above) and general inorganic chemistry. Students are also urged to present additional preparation in physics, mathematics, and chemistry whenever this is possible. Candidates for honors should arrange a discussion of their course program in relation to future honors work as early as possible in their freshman year.

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

1. Plant Physiology.
 An integrated study of the physical, chemical and biological aspects underlying plant function.
2. Plant Taxonomy and Distribution.
 A close study of the classification and distribution of our most important plant families. Laboratory and field work in plant identification, and a consideration of the effects of environment factors on the distribution of plants.
3. Genetics.
 A study of the structure and development of the cell-theories of inheritance, Mendelism, plant and animal breeding methods and problems, etc.
4. Cytology.
 A detailed study of plant and animal cells from the point of view of morphology and function. Especial attention is given to cytogenetics.
5. Problems of Growth and Development.
 A morphological and physiological study of growth phenomena in plants.
6. Bacteriology.
 A study of the biology and biochemistry of bacteria.

*CHEMISTRY

PROFESSORS: **H. JERMAIN CREIGHTON, *Chairman*.

EDWARD H. COX, *Acting Chairman*.

ASSOCIATE PROFESSORS: DUNCAN G. FOSTER.

WALTER B. KEIGHTON, JR.

INSTRUCTOR: HOWARD POTTER.

1a (C1). Inorganic Chemistry. Mr. Keighton. *Half course.*

Three lecture and recitation periods and one four-hour laboratory period weekly. Some of the central concepts and fundamental principles of chemistry are studied thoroughly. The application of these principles is emphasized rather than the mere accumulation of chemical facts in order that the student may learn the methods of chemical inquiry through their use. The course is designed to meet the needs of those students who wish to study chemistry as a part of their general education as well as those professionally interested in chemistry. Textbooks: Hildebrand and Latimer, *Principles of Chemistry and Reference Book of Inorganic Chemistry*; Bray and Latimer, *A Course in General Chemistry*.

This course and Chemistry 1b together are prerequisites for later work in chemistry.

1b (C2). Inorganic Chemistry and Qualitative Analysis. Mr. Keighton. *Half course.*

Two lectures and two laboratory periods weekly. This course is a continuation of Chemistry 1a and is also concerned with the fundamental principles of chemistry. The procedures of qualitative analysis and the facts of descriptive chemistry are used as a framework for the study of these principles. Textbooks: Those listed under Chemistry 1a and Fales and Kenny, *Inorganic Qualitative Analysis*.

This course and Chemistry 1a together are prerequisites for later work in chemistry.

11 (C1a-2a, C6). Chemistry and Engineering Materials. Mr. Potter and the Engineering Division. *Full course.*

This course, designed to meet the Navy C1a and C2a requirements, is identical with Chemistry 1a for the first term. During the second term there are three lecture-recitation periods and one three-hour laboratory period weekly. The work of the second term is in chemistry for eight weeks and in engineering materials for another eight weeks. The lectures and laboratory work in engineering materials are given by the Engineering Division.

2. Qualitative Analysis. Mr. Foster. *Half course.*

The theory and practice of the detection of the commoner chemical elements. Two lecture-recitation periods and two four-hour laboratory periods weekly. Textbook: Hammett, *Solutions of Electrolytes*.

Prerequisite: Chemistry 1, with a minimum grade of C.

3 (C3). Quantitative Analysis. Mr. Foster. *Half course.*

A review of analytical procedures studied in Chemistry 1 and an introduction to the theory and practice of gravimetric and volumetric analysis. Two lecture-recitation periods and two four-hour laboratory periods weekly. Textbook: Talbot, *Quantitative Chemical Analysis*.

Prerequisite: Chemistry 1, with a minimum grade of C.

4. Quantitative Analysis. Mr. Foster. *Full course.*

A laboratory course in the principles of gravimetric analysis, organic and gas analysis. Textbook: Kolthoff and Sandell, *Quantitative Inorganic Analysis*. Nine hours' laboratory work weekly with conferences, when necessary, to be arranged at the beginning of the course.

Prerequisite: Chemistry 3.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave, Winter Term.

5 (C7). Physical Chemistry. Mr. Keighton. *Full course.*

Three hours of conference and lectures and one four-hour laboratory period weekly. The fundamental principles of theoretical chemistry are studied and a number of numerical exercises are worked. In the laboratory the student uses a wide variety of physical-chemical apparatus. Books recommended: Millard, *Physical Chemistry for Colleges*; Daniels, Matthews, and Williams, *Experimental Physical Chemistry*.

Prerequisites, Chemistry 1 with a minimum grade of C, and a course in General Physics. This course is offered to juniors and seniors.

The Navy C7 requirement is met by the lectures in this course without the laboratory work. Credit toward graduation is given only on completion of the entire course, including the laboratory work.

6a. Organic Chemistry. Mr. Cox. *Half course.*

Lectures, written exercises, and laboratory work. Three lecture-recitation periods and one four-hour laboratory period a week. In the laboratory students carry out reactions and syntheses of various organic compounds, as given in Adams and Johnson, *Laboratory Experiments in Organic Chemistry*. The lectures follow Conant, *Chemistry of Organic Compounds*, and cover the principles and theories of organic chemistry, nomenclature and classification of aliphatic compounds.

Prerequisite: Chemistry 1, with a minimum grade of C.

6b. Organic Chemistry. Mr. Cox. *Half course.*

Three lecture-recitation periods and one four-hour laboratory period a week.

This course is a continuation of course 6a. In the laboratory, the students carry out some of the more difficult preparations as given in Adams and Johnson, *Organic Syntheses*, and other laboratory manuals. In the lectures the aliphatic and aromatic series are studied from an advanced point of view, and follow such texts as Conant, *Chemistry of Organic Compounds*, Fuson and Snyder, *Organic Chemistry*, and current review articles.

Prerequisite: Chemistry 6a, with a minimum grade of C.

16a (C4). Organic Chemistry. Mr. Cox and Mr. Potter. *Half course.*

The ground covered is similar to that outlined under Chemistry 6a, but the class meets for two lecture-recitation periods and two three-hour laboratory periods a week.

16b (C5). Organic Chemistry. Mr. Cox and Mr. Potter. *Half course.*

The ground covered is similar to that outlined under Chemistry 6b, but the class meets for two lecture-recitation periods and two three-hour laboratory periods a week.

HONORS WORK

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

1. Analytical Chemistry. Mr. Foster.

A laboratory seminar designed to give the student as thorough a groundwork in the principles and practice of quantitative analytical chemistry as the time will allow. Approximately twenty-four hours a week are spent in the laboratory under the guidance, but not the supervision of the instructor, carrying out examples of gravimetric, advanced volumetric and gas analytical methods. Conferences are held when necessary.

2. Physical Chemistry. Mr. Keighton.

Weekly seminar and laboratory. The work of the seminar includes the study of the states of aggregation of matter, elementary principles of thermodynamics, equilibrium, the theory of solutions, electro-chemistry and colloid chemistry. One day per week is spent in the laboratory.

3. Advanced Physical Chemistry. Mr. Keighton.

Weekly seminar and laboratory. The work of the seminar includes the study of thermodynamics, the activity concept and activity coefficients, the Debye-Hückel theory of strong electrolytes, and chemical kinetics including photochemistry and acid-base catalysis. One day per week is spent in the laboratory.

4. Organic Chemistry. Mr. Cox and Mr. Potter.

For students majoring in Chemistry and others wishing to take Honors 6, Advanced Organic Chemistry. A four-hour conference and eight-hour laboratory period once a week. Conant's *The Chemistry of Organic Compounds* is preferred in covering the groundwork, although any good standard text may be substituted. The groundwork is covered in three months. The remaining part of the semester is given over to reviews of the text material and discussion on reaction mechanisms and advanced topics. Adams and Johnson's *Laboratory Experiments in Organic Chemistry* is used as the basis of laboratory work.

5. Organic Chemistry. Mr. Cox and Mr. Potter.

For students taking Chemistry as their minor subject. A three-hour conference and six-hour laboratory period once a week. The groundwork for the conferences is taken from any one of the elementary organic texts (preferably Conant's *The Chemistry of Organic Compounds*). In the laboratory students prepare various organic compounds as given in Adams and Johnson's *Laboratory Experiments in Organic Chemistry*.

6. Advanced Organic Chemistry. Mr. Cox and Mr. Potter.

A continuation of Honors 4. Students write thirteen weekly comprehensive papers on advanced subjects. These papers are gathered from Reviews, Monographs, and original journal articles. A four-hour conference and eight-hour laboratory period once a week. In the laboratory the students prepare more difficult compounds and pursue approximately five weeks of qualitative organic analysis. Prerequisite—Honors 4.

REQUIREMENTS FOR MAJOR AND MINOR

Students with a major in chemistry follow a course of study leading to the degree of A.B. This degree may be taken either in course or with Honors. In either case there must be completed, during the first two years, the following: Two courses in chemistry, two courses in mathematics, one course in physics, and two courses in German (or their equivalent).

In the junior and senior years, students in course are required to complete courses 4, 5, 6a and 6b in the department of chemistry and to complete the requirements in their minor subject. For students who have been accepted for honors work there are offered the seminars listed above. At the end of their senior year, Honors students majoring in chemistry take (1) not less than four nor more than five examination papers in chemistry; (2) one paper in physics; (3) and the remaining papers in topics selected from the following: mathematics, physics, philosophy, physiology.

For admission to minor honors work in chemistry, *Chemistry 1a* and *1b* is a prerequisite.

Students intending to prepare for the medical profession will find it to their advantage to take as many as possible of the following courses in chemistry: Nos. *1a* and *1b*, 2, 3, 5, 6a and 6b.

*CLASSICS

PROFESSORS: E. H. BREWSTER, *Chairman.*
L. R. SHERO.

GREEK

1. Elementary Greek. Mr. Shero. *Full course.*
Study of the essentials of Greek grammar and reading of easy selections from Greek literature, with collateral study of various aspects of Greek civilization.
2. Intermediate Greek. Mr. Shero. *Full course.*
Selections from Homer and from Herodotus, Plato's *Apology*, and a tragedy are read. Students planning to read for Honors will be permitted to do some of the reading for this course in Latin, if it is impossible for them to take Latin 4.
3. Greek Survey. Mr. Shero. *Full course.*
A survey of Greek literature with reading of some of the masterpieces of prose and of poetry of the classical period.
4. Advanced Greek Reading. Mr. Shero. *Full course. (Offered as required.)*
The reading done in this course is determined by the interests and needs of the members of the class.
9. Greek Literature in English. Mr. Shero. *Half course.*
Study in English translation of some of the masterpieces of Greek literature, including the *Iliad*, several of the dramas, Thucydides, and Plato's *Republic*.
16. Greek and Roman Drama in English. Mr. Shero, Miss Brewster. *Half course.*
Study in English translation of a considerable number of Greek and Latin tragedies and comedies.

LATIN

1. Sub-Freshman Latin. *Full course. (Offered as required.)*
For students who begin Latin in college or for those who are not prepared to enter Latin 2. (Equivalent normally to two years' preparation in secondary school.)
2. Intermediate Latin. Miss Brewster, Mr. Shero. *Full course or two half courses.*
Prose and verse (including Phaedrus Gellius, Roman Law; Virgil) selected according to the interests and needs of the members of the class. For students who have had two or more years of preparatory Latin and are not prepared to enter Latin 3.
3. Latin Survey. Miss Brewster. *Full course or two half courses.*
A survey of Latin literature with emphasis upon Comedy, Livy; Horace, Elegy. The course aims to give students some conception of the Roman spirit as manifested in Latin literature and in the personality of Latin writers. Open to those whose Achievement Tests indicate adequate preparation.
4. Advanced Latin Reading. Miss Brewster, Mr. Shero. *Full course or two half courses.*
Selected Letters of Cicero and Pliny, selections from Tacitus; Catullus, Virgil's *Eclogues* and *Georgics*.

* Under the accelerated program not all courses will be offered every term.

5. Roman Satire and Epigram. Miss Brewster. *Half course.*
6. Latin Philosophical Writings. Miss Brewster. *Half course.*
7. Latin Language. Miss Brewster. *Half course.*

A study of the development of the Latin language. Practice in reading Latin, in writing Latin prose, and in translating Latin (including medieval Latin) at sight.

8. Comprehensive Survey. *Half course.*

Review readings and supplementary reading in Latin authors and in modern authorities on Roman history, public and private, art, literature, and religion. Designed to enable students, through independent study and occasional conferences, to prepare themselves for final comprehensive examinations. Open to seniors with a major in Latin.

9. Latin Literature in English. Miss Brewster. *Half course.*

A study in English translation of some of the masterpieces of Latin literature, with emphasis upon the drama, satire, and philosophic writings and their influence upon western thought and literature.

16. Greek and Roman Drama in English. Mr. Shero, Miss Brewster. *Half course.*

Study in English translation of a considerable number of Greek and Latin tragedies and comedies.

ANCIENT HISTORY AND CIVILIZATION

10. The Mediterranean World: Greece and the East (History 5). Mr. Shero. *Half course.*

A study of Greek civilization in its most significant aspects to the time of the Hellenistic Kingdoms, 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.

11. The Mediterranean World: Rome (History 6). Miss Brewster. *Half course.*

A survey of the history of Rome to the accession of Marcus Aurelius, with emphasis upon republican institutions and the Augustan principate. The course stresses the Roman genius for organization and administration.

12. Mediterranean Backgrounds. Mr. Shero, Miss Brewster. *Half course.*

A study of the provinces of the Roman Empire as a background for modern Europe and the Mediterranean countries.

13. Greek Life and Thought. Mr. Shero. *Half course.*

A general survey of those aspects of Greek civilization which have had special significance for the modern world, with detailed study of some of the masterpieces of Greek art and of Greek literature (in translation).

14. Pagan-Christian Centuries. Miss Brewster. *Half course.*

A study of the development of Christian forms and ideas in the Roman Empire before the Edict of Constantine. Lectures and reports supplemented by readings in translation from pagan and Christian sources.

15. Classical Art and Archaeology. Mr. Shero, Miss Brewster. *Half course.*

A study of the methods of archaeological investigation, with a survey of the development of Greek and Roman architecture, sculpture, painting, ceramics, numismatics, and town-planning. Special attention is given to the early Greek period.

HONORS WORK

I. *General prerequisites:* For a major in Greek or Latin: *Elementary Greek* (1), *Intermediate Greek* (2), *Latin Survey* (3).

For a minor in Greek: *Elementary Greek* (1), *Intermediate Greek* (2).

For a minor in Latin: *Latin Survey* (3).

II. *Supplementary preparation advised:* *History of Europe* (1), *Introduction to Philosophy* (2), French or German literature.

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

1. History of Ancient Greek and Roman Civilization, a survey concentrating upon political institutions, art, and religion. Mr. Shero.
2. Intensive Study of a Special Period of Greek or Roman History: Solon to the End of the Peloponnesian War. Mr. Shero.
The Gracchi to Nero. Miss Brewster.
3. Plato. (See page 85 under Department of Philosophy.)
4. Greek or Latin Language: an introduction to classical philology, epigraphy, palæography; practice in reading and writing in Greek or in Latin. Mr. Shero, Miss Brewster.
5. Prose Authors: Greek, Thucydides, Plato, the Attic Orators. Mr. Shero. Latin, with emphasis upon Cicero and the Historians. Miss Brewster.
6. Poets: Greek, with emphasis upon Epic and Tragedy. Mr. Shero. Latin, with emphasis upon Epic (including Lucretius) and Satire. Miss Brewster.
7. Greek and Roman Archaeology: intensive study of the results of excavations in a few important cities and sanctuaries (e. g., Corinth, Olympia; Pompeii, Ostia).
8. Greek and Roman Political Thought: the principles presented in the writings of Plato, Aristotle, Polybius, and Cicero, and in the careers of representative Roman statesmen.

Required for a major in Greek or Latin: Nos. 5, 6, either 3 or 4, and one elective from the group above.

Required for a minor in Greek or Latin: Nos. 5 and 6 above and an additional paper testing translation at sight.

Required for a major in Ancient History: Two seminars in the ancient field (Nos. 1, 2, 7, or 8 above) and two seminars in medieval or modern history. See the statement under History.

IV. A thesis may be substituted for No. 1 or No. 2 above if students have adequate preparation in history, ancient art, and modern languages.

ECONOMICS

PROFESSORS: CLAIR WILCOX, *Chairman*.

HERBERT F. FRASER.

ASSOCIATE PROFESSOR: *PATRICK MURPHY MALIN.

ASSISTANT PROFESSORS: **FRANK C. PIERSON.

WOLFGANG F. STOLPER.

Prerequisites and Requirements: Economics 1 is prerequisite to all advanced courses and seminars in the department. Economics 2 and 3 are strongly recommended to all students who plan to major in the department. Advanced courses and seminars are open only to juniors and seniors. Money and Banking is required of all majors and should be taken, in course or in seminar, during the junior year. Economic Theory is required of all students taking four seminars in the department and should be taken during the junior year.

Course Offerings: Courses 1, 2, 3 and 4 and all seminars are offered annually. All other advanced courses are normally offered in alternate years. A single semester of Courses 8, 9 and 11 may be taken for half-course credit.

INTRODUCTORY COURSES

- 1 (BA 1-2). Introduction to Economics. Messrs. Fraser, Stolper and Wilcox. *Full course.*

A description of the structure of the economy. A study of economic processes. An elementary analysis of the determination of prices and the distribution of income. A discussion of contemporary economic problems.

- 2 (BA 5). Accounting. *Half course.*

Theory of corporate accountancy; the functions and the interpretation of financial statements, including credit analysis and financial and operating ratios.

- 3 (BA 7). Statistics. Mr. Stolper. *Half course.*

Study and application of statistical methods used in analyses of economic data.

ADVANCED COURSES

- 4 (BA 3). Money and Banking. Mr. Stolper. *Half course.*

Development and significance of the institutions of money, credit, and banking. Theory and practice of commercial banking. Central banking, liquidity, prices and monetary standards. Credit control. Objectives in monetary policy.

5. Business Cycles. Mr. Stolper. *Half course.*

A discussion of the time series used to measure the business cycle; a brief survey of the statistical methods used; a discussion of business cycle theories with particular emphasis on the determinants of the level of income and employment; an analysis of the 1930's.

6. International Economics. Mr. Fraser. *Half course.*

International monetary problems: the balance of payments, the gold standard, free exchanges, exchange equalization accounts, exchange control. The theory of international trade. Commercial policy: tariffs, quotas, clearing agreements, reciprocal trade agreements.

7. Public Finance. Mr. Fraser. *Half course.*

A study of government expenditures, indebtedness, and revenues, with particular emphasis upon the problem of deficit financing and the economics of taxation.

* Absent on leave.

** Absent on leave, part-time.

8. Economics of Business. Mr. Fraser.

Full course

The economic problems which confront the business executive. First semester: corporate organization and finance; investment banking and the securities exchanges. Second semester: marketing problems and price policies; risk, speculation, and insurance.

9. Public Control of Business. Mr. Wilcox.

Full course.

First semester: competition and monopoly in construction, manufacturing, agriculture, marketing and the service trades; public enforcement and regulation of competition. Second semester: public control of production and prices in municipal utilities, transportation, communications and the extractive industries; public control of prices in war-time. (Includes the material covered in Navy V.12 Course BA-4.)

10. Labor Problems. Mr. Pierson.

Half course.

The position of the industrial worker; the American labor movement; the structure and functions of unions. Employer approaches to labor relations; personnel programs. The economics of wage policies. Governmental control of labor relations.

11. Social Economics. Mr. Wilcox.

Full course.

An examination of the extent, consequences, and causes of economic inequality. An appraisal of economic reforms with particular reference to social security, medical care, housing, minimum wage laws, the social use of the taxing power, consumers' cooperation, socialism, and economic planning.

SEMINARS

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

1. Money and Banking. Mr. Pierson.

The subject matter includes the material covered in Courses 4 and 5 above. The method consists of systematic seminar discussions on the basis of assigned readings, oral reports, and written papers.

2. Economic Theory. Mr. Stolper.

An advanced analysis of the processes by which the prices of goods and services and the incomes of the factors of production are determined under various market conditions. A study of theories of the business cycle. Directed reading and discussion, supplemented by reports on the theoretical problems raised by factual studies.

3. International Economics. Mr. Fraser.

A more detailed examination of the topics listed under Course 6 is followed by a study of the economics of war and post-war readjustment. Directed reading and written reports.

4. Public and Private Finance. Mr. Fraser.

The subject matter parallels that of Courses 7 and 8. Directed reading and written reports.

5. Public Control of Business. Mr. Wilcox.

The subject matter parallels that of Course 9. Independent reading under guidance in an extensive bibliography. Weekly outline reports but no semester reports.

6. Social Economics. Mr. Wilcox.

The subject matter parallels that of Courses 10 and 11. Independent reading under guidance in an extensive bibliography. Weekly outline reports but no semester reports.

THESIS

A thesis may be substituted for a course or for the examination on the subject matter covered in a seminar, under exceptional circumstances, by special arrangement.

*ENGINEERING

PROFESSORS: SCOTT B. LILLY, *Chairman*.

**HOWARD M. JENKINS.

ASSOCIATE PROFESSORS: SAMUEL T. CARPENTER.

ANDREW SIMPSON (part-time).

**CHARLES G. THATCHER.

***GEORGE B. THOM.

ACTING ASSOCIATE PROFESSOR: A. E. VIVELL.

VISITING ASSOCIATE PROFESSORS: SAMUEL J. LEONARD (part-time).

ALBERT H. REPSCHA (part-time).

WILLIAM J. STEVENS (part-time).

ASSISTANT PROFESSORS: JOHN B. CLOTHIER.

C. JUSTUS GARRAHAN.

**JOHN D. MCCRUMM.

MARK B. MOORE.

†PAUL S. SHOOK.

†FRED J. SPRY.

INSTRUCTOR: †ROBERT W. RICHARDS.

ASSISTANT: F. M. McLARTY (part-time).

There are three departments of Engineering: Civil, Electrical and Mechanical. These departments cooperate in a program of (1) introductory courses, taken normally by freshman and sophomore engineers; (2) general courses, open to all students in the college. Each department offers also its own separate program of advanced work.

An engineering student devotes about half his time to engineering courses; the other half he divides between basic sciences, such as physics and mathematics, and the non-technical fields useful for a liberal education.

* Since July 1, 1943, the College has had a Navy V-12 Unit on the campus and the civilian program outlined above has been followed for students with advanced standing only. In these trying times, the program of the civilian student must conform to the necessities of the training for the Navy. The curricula in Engineering follow the specifications set forth in the current Navy V-12 Bulletin. Civilian students are permitted to make certain substitutions for non-technical courses, with the permission of their course adviser.

There can be little difference in the fundamentals taught under the Navy program and that taught in the civilian program, although the arrangement of the material is slightly different.

The Navy curricula in Engineering now being offered at Swarthmore are: 101, 201, 311, 411, 351, 451, 353, 453, 354, 454, 355, 455, 356, 456, 553, 653, 554, 654, 551, 651, 556, 656, 751, 851, 753, 853, 756, 856, 754, 854.

Persons interested in the study of engineering at Swarthmore should apply to Dean Hunt for a copy of the current Navy V-12 Bulletin which describes above curricula in detail.

** Absent on leave.

*** Absent on part-time leave.

† Teaching in the Winter Term.

During their first three years, all engineering students follow the schedule of courses outlined below. During the sophomore year students may elect Course 8, Principles of Electrical Engineering. Those who propose to major in electrical engineering should take this course. Those students whose ability in the field of mathematics and the natural sciences is marked, and those who intend to go on into graduate work, should take an additional course in mathematics in the junior year; those students whose greatest interest lies in administration, operation, or management of engineering enterprises should choose their fourth course in the field of economics or industrial management.

All students devote their last two years: (1) to developing their special interests; (2) to fulfilling the major requirements of one of the departments of Engineering; (3) to certain basic courses required of all engineers. (For details see below.)

Engineering students qualify for the degree of Bachelor of Science in Engineering.

OUTLINE OF THE CURRICULUM IN ENGINEERING

Freshman Year—Four Courses

Humanities or Social Science elective

Mathematics 1, 2

Chemistry 1

Engineering 1, 2, 3

Summer Session Engineering 4, 5 (not offered under accelerated program)

Sophomore Year—Four Courses

Humanities or Social Science elective

English for Engineers

Mathematics 11, 12

Physics 1

Engineering 6, 7

In addition students who plan to major in electrical engineering should take

Principles of Electrical Engineering 8 (Second semester only)

Junior Year—Four Courses

Humanities, Social Science or Natural Science elective

Mechanics of Fluids, consisting of
22—Elementary Fluid Mechanics
40—Thermodynamics

Mechanics of Solids, consisting of
20—Analytic Mechanics
21—Strength of Materials

Electrical Engineering 10 and 11

Electrical Engineering 4

The courses taken in the senior year are described under the headings Civil, Electrical and Mechanical Engineering.

COURSES OF INSTRUCTION

Introductory Courses

1. Surveying. Mr. Carpenter. *One-quarter course.*

Surveying instruments and their adjustment; practice in taping, leveling, running traverses, taking topography, stadia work, preparation of profiles and maps from field notes.

Required course for freshman engineers. Open to all students who have had trigonometry in high school or college.

2. Freshman Drawing and Shop Practice. *Half course.*

Woodworking, pattern making, principles of foundry practice, forging and welding and machine shop. Industrial trips. Orthographic projection and modern drafting practice. Sketching with emphasis on accurate visualization.

Required course for freshman engineers; open to all students.

3. Descriptive Geometry. *One-quarter course.*

A continuation of the principles of orthographic drawing as applied to problems of location and description of bodies in space. It is concerned with the solutions of problems that arise in connection with the determination of distances, angles, and intersections. Emphasis is placed upon the application to practical engineering problems.

Two three-hour laboratory periods.

Required course for freshman engineers; open to all students.

- *4. Long Survey. *One week during the summer following the freshman year.*

Supplementary to Engineering 1. One week of continuous work in surveying and mapping, including running of levels and of a topographical survey by the stadia method.

Required course for freshman engineers; open to all students who have taken Engineering 1.

6. Kinematics. *Half course.*

A comprehensive study of the relative motions of links in a mechanism; the determination of the velocities and accelerations of these members; the development of cams, of gears and transmission machinery from the standpoint of motion. Drawing room solutions of problems of a practical nature.

Required course for sophomore engineers; open to all students.

7. Materials of Engineering. *Half course.*

Study of the chemistry and metallurgy, physical properties, practical and economic uses of the common metals and alloys, wood, cement, and concrete. Laboratory exercises and written reports. Trips to nearby plants.

Required course for sophomore engineers; open to all students who have had chemistry in high school or college.

8. Principles of Electrical Engineering. *One-quarter course.*

This course is open to all who are taking General Physics and Calculus. This is an introductory course to further work in Electrical Engineering in the junior year. It includes the study of fundamental electrical quantities and the solution of typical problems of electro-dynamics and simple electrical apparatus.

Required course for sophomore engineers who plan to major in Electrical Engineering; open to students who have taken Physics 1.

General Courses

- **10. Accounting. *Half course.*

Theory of corporate accountancy; the terminology, the functions and the interpretation of financial statements, including credit analysis and financial and operating ratios

Open to all students.

* These courses will not be given under the accelerated program.

** Courses No. 10 and 11, combined, are known as "Methods of Economic Analysis" (Economics 2, 3).

11. Business Statistics. *Half course.*
 Study and applications of fundamental statistical methods which can be used in an analysis of business conditions and changes, and which aid in a clearer understanding of economic data.
 Open to all students.
12. Industrial Management. *Full course.*
 A survey study of the organization and management of industrial activities, including historical background, organization, physical plant, standardization, job standardization, wages, personnel and control.
 Open to all students.
14. Art Metal and Wood Working. *One afternoon a week, all year. No credit.*
 Designed to give the student a chance to express himself with his hands. The medium is usually wood or metal, the project varying with the desire of the student. Emphasis is placed on both the artistic and the practical side, and on developing powers of observation of detail.
 Open to all students.
15. Contemporary Engineering Topics. *One hour per week, all year. No credit.*
 This course includes the preparation of at least three carefully written papers on contemporary engineering topics, and the oral presentation of the subject matter involved from notes. The program is varied by extemporaneous speeches by students, or talks by outside speakers.
 Required of all seniors majoring in engineering.

16. Analysis of Physical Problems. Mr. Garrahan. *Full course.*
 The origin, meaning, and method of solution of differential equations especially those arising from the behavior of physical systems; emphasis on linear differential equations with constant coefficients. The origin and solution of physical problems involving hyperbolic functions, elliptic integrals, Gamma and Bessel functions. Also Fourier series, Graeffe's general theory, infinite series, dimensional analysis, and other special topics.
 Open to students who have had Mathematics 12 and Physics 1.

CIVIL ENGINEERING

SCOTT B. LILLY, *Chairman.*

20. Analytic Mechanics. *Half course.*
 Composition and resolution of forces; center of gravity; moments; acceleration; velocity; collision of bodies; the integration of simple equations of motion. This course is a study of the behavior of particles and solid bodies, when acted upon by forces, assuming that the solid bodies do not change form under such action.
 Open to students who have taken Mathematics 12 and Physics 1.
21. Strength of Materials. *Half course.*
 This course treats of 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.
 Open to students who have taken Engineering 20.
22. Fluid Mechanics. *Half course.*
 Properties of fluids; statics of fluids; flotation; accelerated liquids in relative equilibrium; dynamics of fluids; impulse and momentum in fluids; dynamic lift and propulsion; the flow of viscous fluids, flow of fluids in pipes; flow with a free surface; flow through orifices and tubes; the resistance of immersed and floating bodies; dynamics of compressible fluids; thermodynamics of compressible viscous fluids; dynamic similarity.
23. Structural Theory and Design. Mr. Carpenter. *Full course.*
 Analysis of determinate and indeterminate structures; design of structural members and connections; design of reinforced concrete. The work of the first semester is arranged to meet the requirements of mechanical and electrical engineers.
 Open to students who have taken Engineering 20 and 21.
 Required of seniors majoring in civil engineering: Credit given for first semester to seniors majoring in electrical or mechanical engineering.

24. Engineering Economy. Mr. Lilly. *Half course.*

A study of the methods which the engineer uses when he investigates a proposed course of action in order that he may decide whether it will prove to be economical in the long run. Open to all students.

25. Civil Engineering Option. Mr. Lilly, Mr. Carpenter. *Full course.*

This course is designed to give the student an opportunity to apply the fundamental principles of the mechanics of solid bodies or of the mechanics of fluids to some particular field. This further training will include more fundamental theory. Especial emphasis will be placed on the methods of attacking problems in engineering rather than a minute application of the theory to practical problems. The subjects to be studied will be decided upon by the student and the instructor. In 1940-41 the students spent approximately one-third of their time on each of the following subjects: soil mechanics and foundations; water supply; sewerage systems and sewage disposal. These subjects will be studied in series.

29. Thesis. Mr. Lilly, Mr. Carpenter. *Half course.*

MAJOR IN CIVIL ENGINEERING

The curriculum for the first three years for a student who plans to major in civil engineering is given on page 58.

The courses which must be taken in the senior year are:

23. Structural Theory and Design

25. Civil Engineering Option

41. Heat Power Engineering

24. Engineering Economy

Since Heat Power Engineering and Engineering Economy are half courses, one-quarter of the student's time in the senior year is open, and he may elect any course in the Division of Engineering, Division of the Social Sciences, or Division of Mathematics and the Natural Sciences to complete his program. This elective must receive the approval of his course adviser and must be related to his course as a whole.

The fundamental theory of the Four Course Plan, under which the college is operating, is that the student shall confine his efforts to not more than four subjects at the same time. Therefore the two courses, *Structural Theory and Design*, No. 23, and *Civil Engineering Option*, No. 25, are broad in scope. *Course 23* includes a review of fundamental mechanics and continues with the computation of stresses, and the design of structures in steel, wood and concrete. *Course 25* may include highway engineering, soil mechanics and foundations, hydrology, water supply, sewage disposal and sewerage systems. The subject matter is varied in content and emphasis to meet the needs and interests of different groups. The subjects mentioned are taken up in series, making it possible to avoid repetition and increase the efficiency of the teaching.

ELECTRICAL ENGINEERING

A. E. VIVELL, *Acting Chairman.*

EE1. Electricity and Magnetism. Mr. Clothier.

Two lecture-recitation periods and one laboratory period per week.

Prerequisites: Physics II (PH2) and to be accompanied by Calculus I (M5).

The experimental bases of electricity and magnetism; elementary electrostatics and magnetostatics; direct-current circuits—voltage, current power, energy-induced electromotive forces; capacitance and inductance of parallel-plate condenser and toroid; elementary theory of alternating currents; elementary problems in ferromagnetism.

EE2. Electrical Engineering (A)—Elementary. Mr. Clothier.

Two lecture-recitation periods and one laboratory period per week.

Prerequisites: Physics II (PH2).

Electric and magnetic units; direct-current circuit theory; motors, elementary theory, construction, characteristics, application, losses, and efficiency of generators and motors. Direct-current starting and control equipment. Alternating-current wave forms, frequency, effective values, vector representation, power and power factor, three-phase circuits, power factor correction, single-phase and polyphase connections and circuits. General principles of design and performance of alternators, synchronous motors, induction motors, (squirrel-cage and wound rotor), and transformers. Elementary principles and applications of control equipment for the above alternating-current machinery. Elementary principles of light sources and illumination design.

EE10. Electrical Engineering I—Direct-Current Apparatus and Circuits. Mr. Clothier.

Three lecture-recitation periods and one laboratory period per week. This course in a condensed form may be given as two lecture-recitation periods and one laboratory period per week.

Prerequisites: Physics II (PH2) and Calculus II (M6).

Direct-current circuit and magnetic circuit theory and calculations; principles of design and construction of direct-current generators and motors; theory concentrating torque, flux, speed, voltage and speed regulation, commutation, and armature reaction of shunt and compound machines; parallel operation, and mechanical coupling of electrical machinery; theory and practice of direct-current control equipment for generators and motors.

EE11. Electrical Engineering II—Alternating-Current Apparatus and Circuits. Mr. Vivell.

Three lecture-recitation periods and one laboratory period per week.

Prerequisite: Electrical Engineering I (EE10).

Relations of simple harmonic electromotive forces and current, phase differences; active, reactive, and apparent power, power factor and reactive factor, resistance, inductance, and capacitance; series, parallel, series-parallel, and resonant circuits; polyphased circuits, balanced and unbalanced. The construction, characteristics, and operation of alternators, induction motors, transformers, synchronous motors, synchronous converters, mercury-arc rectifiers and their regulating and control devices. Brief review of lighting equipment and illumination design. Principles of the synchronous machine; the induction machine, the synchronous converter, and types of single-phase motors.

EE16-17. Radio Engineering I and II. Mr. Garrahan.

One lecture-recitation period and one laboratory period per week, extending over two terms.

Prerequisites: To be accompanied by Electrical Engineering I and II (EE10, 11).

Fundamental components of radio systems; alternating currents; resonant circuits; coupled circuits; oscillatory circuits; properties of vacuum tubes; vacuum-tube amplifiers; power amplifiers; oscillators and radio-frequency power amplifiers, modulation, vacuum-tube detectors; receiving systems; antennae and wave propagation, aids to navigation.

16. Analysis of Physical Problems. Mr. Garrahan.

The origin, meaning, and method of solution of differential equations, especially those arising from the behavior of physical systems; emphasis on linear differential equations with constant coefficients. The origin and solution of physical problems involving hyperbolic functions, elliptic integrals, Gamma and Bessel functions. Also Fourier series, Graeffe's general theory, infinite series, dimensional analysis, and other special topics.

Open to students who have had Mathematics 12 and Physics 1.

EE4. Alternating Current Circuit Theory. Mr. Vivell.

This course consists largely of the basic principles of alternating current circuit analysis, studied in both the classroom and laboratory.

This course is required of all electrical engineering majors.

Prerequisite, EE10.

32. Electronics. Mr. Garrahan.

A study of the fundamentals of electronic control devices. Vacuum tubes; thyatrons; amplifiers; oscillators; modulators; detectors; photo-electric control devices. Two laboratory conference periods per week in which fundamental principles are investigated.

33. Alternating Current Machinery. Mr. Vivell.

Study of all important types of alternating current power machinery such as transformers, synchronous machines, induction motors and others. One laboratory period a week. Required of all electrical engineering majors.

36. High Frequency Circuits. Mr. Garrahan.

An introductory study of complete communication systems. Transmission lines; electric wave filters; equalizing networks; bridge networks; bilateral amplifiers, radiation; antennae. One laboratory period per week in which fundamental principles are investigated.

39. Thesis. Electrical Engineering Department Staff.

MAJOR IN ELECTRICAL ENGINEERING

The general plan is that from the subjects listed above, and by courses offered elsewhere in the college, the student will work out a logically integrated, cognate, intensive study of one or more phases of the theory of electrical engineering.

It is expected that a student whose major is electrical engineering will have taken EE1 (*Electricity and Magnetism*) in the second semester of his sophomore year. Other courses which must be taken to fulfill the requirements for the Bachelor of Science with major in electrical engineering include:

(1) General science subjects as listed under the general statement of the Division of Engineering. These subjects are pursued in the first three years in classes with the students in other branches of engineering, and are considered the essential foundation for all persons studying applied science.

(2) Subjects in the Divisions of the Humanities or Social Sciences. At least three subjects not offered in the scientific division must be taken over the period of the four college years. The choice is optional, the only requirement being that the three courses should form a rational whole.

(3) Major studies in electrical engineering. According to the time available and the needs of the individual, *Alternating Current Machinery*, 33, and two of the following will be taken in the senior year:

- 32. Electronics
- 36. High Frequency Circuits
- 39. Thesis

(4) Additional subjects in allied scientific departments. Advanced calculus and differential equations or *Engineering 16* are required for electrical engineering majors; in addition all or part of the following courses will be recommended for certain students:

- 41. Heat Power Engineering
- 24. Engineering Economy
 - Electricity and Magnetism (Physics Honors 2)
 - Atomic Physics (Physics Honors 3)

MECHANICAL ENGINEERING

GEORGE B. THOM, *Chairman*

6. Kinematics.

Half course.

Prerequisite: D1; required course for sophomore engineers.

A comprehensive study of the relative motions of links in a mechanism; the determination of the velocities and accelerations of these members; the development of cams, gears and transmission machinery from the standpoint of motion. Drawing room solutions, both graphical and analytical, of problems of a practical nature.

7. Materials of Engineering.

Half course.

Prerequisite: One year of high school or college chemistry; required course for sophomore engineers.

Study of the physical properties of ferrous and non-ferrous metals, alloys, wood, concrete and plastics; analysis of the failure of materials and the crystalline structure of metals; brief treatment of methods of manufacture. Classroom work supplemented by laboratory tests and visits to local industries.

12. Industrial Engineering.

Full course.

Prerequisite: Junior standing.

Historical background of industry; development of industrial enterprises in the United States; organization; plant layout and specification of production facilities; standardization, simplification and diversification of product; time and motion study; methods of wage payment and wage payment plans; personnel relations; budgeting and administrative control.

40. Thermodynamics. Mr. Thom, Mr. Repscha, Mr. Moore.

Half course.

Prerequisite: Mathematics 12 and Physics 1.

Energy concepts and units; fundamental principles involved in the conversions of energy; properties of gases, vapors and mixtures; conservation of energy and thermal processes, steady flow and non-flow; analysis of gas and vapor cycles; classroom work supplemented by laboratory exercises.

41. Steam Power Plants. Mr. Thom, Mr. Repscha, Mr. Moore.

Half course.

Prerequisite: Engineering 40.

Application of the principles of thermodynamics to the design and analysis of steam engines, turbines, pumps, fans, boilers, and other heat transfer apparatus; study of modern power plant cycles. Classroom work supplemented by tests of power plant equipment.

42. Internal Combustion Engines. Mr. Moore. *Half course.*

Prerequisite: Engineering 20, 21, and 40.

Application of the fundamental principles of thermodynamics and mechanics to the design of internal combustion engines and gas turbines; combustion of actual mixtures; analysis of theoretical and actual cycles; carburetion and fuel injection; mixture, distribution; detonation; ignition; supercharging. Classroom work supplemented by laboratory exercises.

43. Refrigeration and Air-Conditioning. Mr. Thom. *Half course.*

Prerequisite: Engineering 40.

A comprehensive study of refrigerants, cycles and performance of refrigerating equipment; principles of air-vapor mixtures; humidification, dehumidification, and distribution of air; analysis of heating and cooling systems and apparatus. Principles of design and practical procedure are introduced where applicable. Classroom work supplemented by laboratory exercises.

44. Physical Metallurgy. *Half course.*

Prerequisite: Engineering 7 or Introduction to Physical Chemistry 3.

The crystalline structure of metals and alloys; binary alloy systems; the iron-carbon equilibrium diagram. Heat treatment theory and practice. Study of the physical characteristics of the newer structural alloys. Corrosion; fatigue; and creep. Techniques of microscopic examination and photomicrography. Classroom work supplemented by laboratory exercises.

45. Administrative Engineering. (Not offered 1944-45) *Half course.*

Prerequisite: Engineering 12.

The purpose of this course is to provide further training of a broad and practical nature for those whose interests and capabilities point toward executive participation in the operation of an industrial enterprise. Representative problems of equipment selection, plant layout, job analysis, production control and personnel relationship are evaluated; however, no attempt is made to provide specialized training in these fields. Although classroom work is supplemented by inspection trips to nearby plants, students planning to take this course are strongly urged to secure summer industrial employment for experience and background.

46. Mechanical Design. Mr. Moore. *Half course.*

Prerequisite: Engineering 23 (first term) and 42.

Application of the principles of analytical mechanics and strength of materials to the design of machines of a complex character. Emphasis is placed on dynamic loading, centrifugal effects, vibration, balancing and lubrication.

49. Thesis. Mechanical Engineering Department Staff. *Half course.*

MAJOR IN MECHANICAL ENGINEERING

Students in this group, having completed the first three years as outlined under the Division of Engineering, are required to take in their senior year:

- 23. Structural Theory (one term)
- 24. Engineering Economy
- 41. Heat Power
- 43. Internal Combustion Engines
- 43. Refrigeration and Air-Conditioning

The above courses, all being half courses, leave three-eighths of the senior student's time for electives. He may choose these from any division of the college, the only requirement being that the elective courses should be rationally related to the student's desired field of specialization. This is to be determined by consultation with his course adviser.

*ENGLISH

PROFESSORS: **HAROLD C. GODDARD, *Chairman.*

PHILIP MARSHALL HICKS, *Acting Chairman.*

EVERETT L. HUNT.

***ROBERT E. SPILLER.

ASSOCIATE PROFESSOR: **TOWNSEND SCUDDER, 3rd.

ASSISTANT PROFESSORS: ELIZABETH COX WRIGHT.

LUTHER S. MANSFIELD (*visiting*).

LECTURER: W. H. AUDEN.

INSTRUCTORS: **KEITH W. CHALMERS.

FREDERIC S. KLEES.

**BEATRICE BEACH MACLEOD.

HENRY FRANCIS POMMER.

1 (E2). Introduction to English Studies.

Full Course, made up of two of the following:

Elizabethan Literature. Mr. Klees.	<i>Half course.</i>
The Eighteenth Century. Mr. Pommer.	<i>Half course.</i>
The Romantic Movement. Mrs. Wright.	<i>Half course.</i>
Victorian Literature. Mr. Klees.	<i>Half course.</i>
American Literature. Mr. Spiller.	<i>Half course.</i>
Contemporary Literature. Mr. Hicks.	<i>Half course.</i>
Great Books. Mr. Hunt.	<i>Half course.</i>

The study of significant literature of selected periods, with critical writing and speaking. This course will meet the second half of the Navy V-12 requirement.

2. Chaucer. Mr. Klees. *Half course.*

3. Shakespeare. Mrs. Wright. *Full course.*

4. Milton and the Seventeenth Century. Mr. Hunt and Mr. Pommer.
Half course.
Poetry of the Old Testament, John Donne, Milton.

5. English Poetry. Mr. Pommer. *Full course.*
A study of a different period or aspect of English poetry each term.

6a. The Chronicle Novel. Mr. Hicks. *Half course.*

6b. The Dramatic Novel. Mr. Hicks. *Half course.*

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

*** Absent on leave, Spring Term.

- 7a. Comedy. Mr. Klees. *Half course.*
- 7b. Tragedy. Mr. Klees. *Half course.*
8. Social Criticism. Mr. Klees. *Half course.*
9. Modern Literature. Mr. Goddard. (Omitted in 1944-45) *Full course.*
A study of modern comparative literature.
10. World Literature. Mr. Goddard. (Omitted in 1944-45) *Half course.*
- 11c. Changing Factors in American Life. Mr. Mansfield. *Full course.*
12. Criticism. Mr. Auden. *Half course.*

Greek Literature in English. (Greek 9.) Mr. Shero. *Half course.*
Study in English translation of some of the masterpieces of Greek literature, including the Homeric epics, several of the dramas, Plato's *Republic*. No knowledge of Greek is required.

Latin Literature in English. (Latin 9.) Miss Brewster. *Half course.*
Study in English translation of some of the masterpieces of Latin literature with emphasis upon the lyric drama, satire, and philosophic writings, and their influence upon western thought and literature.

Writing and Speaking. Students in need of special training in Composition or Speech will be required either to take tutorial work or to complete one of the following half courses before admittance to the junior class:

- 14 (E1). English Composition. Mr. Auden and Mr. Pommer. *Half course.*
Training and practice in the fundamentals of communication in reading, writing and speaking. This course will meet the first half of the Navy V-12 requirement.
15. English for Engineers. *Half course.*
16. English Composition for Pre-Medical Students. *Half course.*

Student organizations and informal groups for practice in creative writing, acting drama, extempore speaking, and debating meet with members of the English faculty.

HONORS WORK

Prerequisites. For admission to honors work with a major in English, the requirements are at least one-half course in the *Introduction to English Studies*; and either *Chaucer, Shakespeare, or Milton and the Seventeenth Century*. Students are advised to take also *The History of Europe* or *The History of England*.

For admission with a minor in English, the requirement is one year in English, including at least one-half course in the *Introduction to English Studies*.

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

GROUP I

Chaucer. Mr. Scudder and Mr. Klees.

A study of Chaucer's poetry and age.

Shakespeare. Mr. Hicks and Mrs. Wright.

A study of Shakespeare's principal plays, with a rapid reading of the rest of his work.

Milton and the Seventeenth Century. Mr. Hunt.

Donne, Milton, and the poetry of the Bible.

GROUP II

Poetry. Mrs. Wright.

Victorian poetry.

Drama. Mr. Hicks and Mr. Klees.

Representative plays from different periods; the comic and tragic spirits.

Novel. Mrs. Wright.

The novel as a literary form; Fielding, Meredith, Hardy, and Conrad; selected contemporary novelists.

Literary Criticism. Mr. Hunt.

English literary criticism from Sidney to Pater, with some study of classical backgrounds and contemporary developments.

GROUP III

Modern Literature. Mr. Mansfield.

Masterpieces of English and European writers of the past 75 years, with emphasis on the Russians.

American Literature. Mr. Spiller.

The American mind as expressed in the writings of Emerson, Thoreau, Hawthorne, Melville, and Whitman.

Social Criticism. Mr. Mansfield.

Social theory in Modern American literature.

Problems of Literary Study. Mr. Spiller.

The methods of literary research and criticism as applied to the study of a single problem, usually the work of a major author, resulting in a thesis.

Linguistic Science. Mr. Reuning.

Admitted as a seminar in English for majors who concentrate on English or American language problems; may also be considered as a minor for students majoring in English.

Thesis

Students who wish to write theses not properly within the scope of the seminar on Problems of Literary Study may apply to the Chairman of the Department for permission to substitute such projects for the fourth seminar of major work.

Candidates for honors with a major in English must take at least one seminar from the first group and at least one from the second. Shakespeare shall be chosen from the first group if not previously elected in course. Four seminars are required for a major in English.

Candidates for honors with a minor in English may enroll in any two or three of the above seminars upon the recommendation of their major department.

WORK IN COURSES

Major: The work of the major in general courses normally consists of at least four full courses, including *Introduction to English Studies* in the first year, either *Chaucer*, *Shakespeare*, or *Milton* in the second year, and during the last two years a second one of these three courses (which shall be *Shakespeare*, if not previously elected), and a course in one of the types. The comprehensive examination at the close of the senior year is based on this work, but also includes questions on the other courses offered by the department for those prepared in these fields.

Minor: The work of the minor in general courses normally consists of three full courses elected upon the recommendation of the major department, including at least one-half course in *Introduction to English Studies*.

DEPARTMENTAL LANGUAGE REQUIREMENTS

The foreign language requirement may be fulfilled by a reading knowledge of one or more of the following: French, German, Latin or Greek. Students planning to continue English studies in graduate school are advised to acquire a reading knowledge of Latin, French, and German.

*FINE ARTS

ASSISTANT PROFESSORS: **ROBERT M. WALKER.

HELMUT VON ERFFA, *Acting Chairman.*

PART-TIME INSTRUCTOR: ETHEL STILZ.

1. Introduction to Art History. Mr. von Erffa. *Half course.*

A consideration of certain basic principles of design and expression in architecture, sculpture, and painting. An introduction to fundamental problems of art history and criticism. Analysis of selected examples from Egyptian, Greek, Roman, French Romanesque and Gothic civilizations.

Credit is given for Fine Arts 1, if taken without the sequence course, Fine Arts 2.
2. Introduction to Art History. Mr. von Erffa. *Half course.*

Further investigation of fundamental problems of expression by studying certain points of view as found in Renaissance and Modern European and American architecture, sculpture, and painting.

Prerequisite is Fine Arts 1. Fine Arts 1 and 2 are prerequisite for all other courses offered by the Department.
3. Art of the Renaissance. Mr. von Erffa. *Half course.*

A study of the points of view of the XV and XVI centuries in Italy as expressed in architecture, sculpture, and painting. Emphasis is placed on the work of the great Italian masters, such as Donatello, Leonardo, and Michelangelo.
4. Origins of Modern Painting. Mr. von Erffa. *Half course.*

Certain major movements and directions in European painting of the XIX and XX centuries, with special consideration for stylistic developments in France and their significance for American art.
5. Art of the Middle Ages. Mr. von Erffa. *Half course.*

Study of a civilization through its expression in architecture, sculpture, painting, and minor arts. The art of the cathedral: its origins and development.
6. Theory of Design. Miss Stilz. *Half course.*

The principles of design and of color and their application to the planning and furnishing of the interior of the house.
7. Renaissance Painting of Northern Europe. Mr. von Erffa. *Half course.*

A study of the artistic trends in the painting of the XV, XVI, and XVII centuries and their cultural backgrounds with special emphasis on the significance of the great masters: Van Eyck, Duerer, Holbein, Rembrandt, Rubens, Velasquez and El Greco.
15. Classical Art and Archaeology. Miss Brewster, Mr. Shero. (Department of Classics.) *Half course.*

A study of the methods of archaeological investigation, with a survey of the development of Greek and Roman architecture, town-planning, sculpture, painting, ceramics, and numismatics. Special attention is given to the early Greek period.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

HONORS WORK

Prerequisites. Introduction to Art History: *General Courses 1 and 2.*

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

1. Italian Painting: Fourteenth through Seventeenth Century. Mr. von Erffa.

Analysis of the work of a selected group of outstanding masters as a means of studying more intensively certain fundamental problems of art history and criticism.

2. Origins of Modern Painting. Mr. von Erffa.

Investigation of certain major movements and trends in European painting of the XIX and XX centuries with special emphasis on stylistic developments in France and their significance for American painting.

3. Master Print Makers. Mr. von Erffa.

Consideration of certain problems in the history of the book and print. A study of the significance of Durer, Rembrandt, Goya, and Daumier for the development of expression in the graphic media of woodcut, engraving, etching, lithograph. Special attention is given to the examination of originals.

4. Renaissance Painting of Northern Europe. Mr. von Erffa.

A study of the paintings of the great masters of the XVI, XVII, and XVIII centuries in Europe outside of Italy: Durer, Rembrandt, Rubens, Velasquez, Watteau and Reynolds. The Graphic work of Durer and Rembrandt will also be considered.

MAJOR IN FINE ARTS

By special arrangement qualified students may major in Fine Arts. A program is laid out with the cooperation of one of the neighboring institutions offering courses for which credit is given by the College. Though this work is usually carried out while the student is in residence at Swarthmore, a year's residence at another institution may be allowed.

*GERMAN LANGUAGE AND LITERATURE

PROFESSOR: WALTER SILZ, *Chairman.*

ASSISTANT PROFESSORS: **LYDIA BAER.

KARL REUNING.

INSTRUCTOR: PRISCILLA K. SILZ.

1. Elementary German. All members of the Department. *Full course.*
Training in grammar, composition, and reading, with some practice in speaking. Hagboldt & Kaufmann, *Deutsch für Anfänger.*
2. German Prose and Poetry, Grammar and Composition. Miss Baer, Mr. Reuning, and Mrs. Silz. *Full course.*
Reading of short stories and novels, plays and poems. Review of grammar, practice in written and oral German.
Prerequisite, Course 1 or equivalent.
- 2s. Second Year German for Science Students. Miss Baer and Mr. Reuning. *Full course.*
Reading of a limited number of novels, plays and lyrics throughout the year. First semester: Reading of edited science selections. Second semester: Special readings selected according to the scientific interests of the students. Review of grammar with emphasis on development of reading ability.
Prerequisite, Course 1 or equivalent.
3. Introductory Studies in German Literature. Mr. Silz. *Full course.*
A study of representative German authors from the classical period to the present; reading and discussion of dramas, stories, and lyric poems. Writing of critical reports.
Prerequisite, Course 2 or equivalent.
- 3 (special). Writing and Speaking German. Mr. Silz and Mr. Reuning. *Half course.*
Composition and conversation. Introduction to *Volkskunde*: the social and cultural backgrounds of modern Germany.
Prerequisite, Course 2 or equivalent.
4. Great Periods in German Literature. *Full course.*
5. The Romantic Movement in Germany. *Half course.*
6. German Literature in the Second Half of the 19th Century. *Half course.*
7. Goethe's Life and Works. Mr. Silz. *Full course.*
8. Schiller and His Age. Mr. Silz. *Half course.*
9. Eighteenth Century German Literature and Thought. *Half course.*
10. German Literature in the 20th Century. Miss Baer. *Half course.*
11. German Authors in English Translations. *Full course.*
12. Writing and Speaking German. (Advanced course.) *Half course.*
Intensive practice in writing and speaking German. The subject matter is taken from German literature and *Kulturgeschichte.*

By special arrangement, qualified students who begin German in college are enabled to choose German as a major or minor in course in their junior and senior years.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave, Winter Term.

HONORS WORK

German may be offered as a major or minor subject in the Division of the Humanities. For admission to honors work in German, *Course 3* or its equivalent is required. By doing special reading, competent students who begin German in college may take *Course 3* in their sophomore year. No other preparation is required, but allied work in other departments of the Humanities is arranged, according to the needs and interests of the student.

The following seminars are offered to 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).

1. Middle High German Literature and Philology. Mr. Reuning.

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.

2. The Age of Luther. Mr. Reuning.

Study of literary, historical, sociological and religious problems of the sixteenth century. Reading of outstanding authors of the period, such as Luther, Hans Sachs, Brant, Hutten, Fischart. A course or a seminar in History of the Reformation is recommended as preparation for this seminar.

3. Baroque Literature. Miss Baer.

A study of German literature in the seventeenth century: the reforms of Opitz, the poetry of Weckherlin, Fleming, and the Volkslied, the mysticism of Angelus Silesius and Jakob Böhme, the influence of the English Players on the German theatre, and the plays of Gryphius and the second Silesian School.

4. Goethe. Mr. Silz.

A study of the chief phases of Goethe's life and work in the classical age of German literature.

5. The Romantic Movement. Mr. Silz.

Romanticism as the dominant movement in German literature of the first half of the nineteenth century.

6. Poetic Realism. Mr. Silz.

Study of the works of Grillparzer, Hebbel, Ludwig, Keller, Meyer, and Storm, and other writers of the drama, novel, and "Novelle" in the second half of the nineteenth century.

7. German Literature Since 1900. Miss Baer.

Gerhart Hauptmann, Thomas Mann, Rainer Maria Rilke, Hugo von Hofmannsthal.

8. Linguistic Science (in cooperation with other departments in the Division of the Humanities). Mr. Reuning.

The most important problems of Linguistics, e.g., sound change, changes in accidence and syntax, semantic changes, geographical distribution and relation of languages. Indo-European, English and American language problems. Relationship between linguistics and psychology. Some knowledge of German, French, Latin, or Greek is desirable, reading knowledge of at least one foreign language required. Students who know non-Indo-European languages are especially welcome. The seminar is conducted in English. (See also schedules of Honors Seminars in English and Psychology.)

THESIS

Students who wish to write a thesis may apply to the Department for permission to substitute such a project for the fourth seminar of major work.

*HISTORY

PROFESSOR: FREDERICK J. MANNING.

VISITING PROFESSOR: ROGER H. SOLTAU.

ASSOCIATE PROFESSOR: MARY ALBERTSON, *Chairman*.

ACTING ASSOCIATE PROFESSOR: CARLTON C. QUALEY.

PART-TIME INSTRUCTOR: **FREDERICK B. TOLLES.

1. The History of Europe. All members of the department. *Full course.*
An introductory course, prerequisite to all other work in history, except courses H1, H2, and N3.
- H1. The Historical Background of the Present World War. Mr. Manning and Mr. Qualey.
The history of the United States, with the European background. A course in the V-12 naval program.
- H2. The Historical Background of the Present World War. Mr. Manning and Mr. Qualey.
A continuation of H1.
2. The History of England. Miss Albertson. *Half course.*
A survey of the history of the English people. Advised for students planning to do honors work in history. To be taken after course I.
3. The History of the United States to 1865. Mr. Manning. *Half course.*
The political, economic, and social history of the American people from the seventeenth century through the Civil War. This course or course 4 is required of students taking an honors seminar in American history. To be taken after course I.
- N3. Naval History and Elementary Strategy. Mr. Manning and Mr. Qualey.
A course in the V-12 naval program.
4. The History of the United States since 1865. Mr. Qualey. *Half course.*
The political, economic, and social history of the American people from the Civil War to the present. To be taken after course I.
5. The Mediterranean World: Greece and the East (Classics 10). Mr. Shero (Department of Classics). *Half course.*
A study of Greek civilization in its most significant aspects to the time of the Hellenistic kingdoms, preceded by a brief survey of the Oriental civilizations by which the Greeks were influenced. Special attention given to the sixth and fifth centuries B.C.
6. The Mediterranean World: Rome (Classics 11). Miss Brewster (Department of Classics). *Half course.*
Survey of the history of Rome from the earliest times to the accession of Marcus Aurelius, with emphasis upon the Republic and the Augustan principate. The course stresses the Roman genius for organization and administration.
7. The History of France. Miss Albertson and Mr. Soltau. *Half course.*
The history of France from Roman times to the present day. To be taken after course I unless with special permission of the instructor.
8. The History of Modern Europe. All members of the department. *Half course.*
The history of Europe from 1815 to the present day. To be taken after course I.
9. The History of Quakerism. Mr. Tolles. *Half course.*
The history of the Society of Friends to the present day. Attention is given to the mystical and sectarian backgrounds and to movements like puritanism, quietism, evangelicalism, and rationalism which have influenced the Society of Friends. The characteristic religious and social ideas of the Quakers are considered in their historical setting. A large part of the reading is done in the original sources.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

10. The History of the Labor Movement. Mr. Manning. *Half course.*

The social backgrounds and the economic, political, and legal problems of English and American labor, with emphasis on the importance of English precedent for the American story. For juniors and seniors.

11. Special Topics. All members of the department. *Half course.*

For seniors with the major in history.

HONORS WORK

The survey course in European history, the only course open to freshmen (except by special permission from the department), is prerequisite to any other courses or seminars in history. Students who expect to major in history, either in honors seminars or in regular courses, should elect European history in the freshman year, American and English history in the sophomore year. Students who expect to include history as a minor subject in honors work should elect European history in the freshman year, and either American or English history in the sophomore year if possible. *Course 2, the History of England*, is required for admission to the honors seminar on Modern England, and *Courses 3 or 4, the History of the United States*, is required for admission to honors seminars in American history, unless special permission is obtained in advance.

The following seminars are offered by the department each year to prepare for examinations for a degree with Honors. Although an endeavor will be made to offer in any term any seminar desired by a sufficient number of students, this will occasionally prove impossible and the department cannot guarantee in advance the terms in which some seminars will be given.

EUROPEAN HISTORY

1. The Renaissance and Reformation. Miss Albertson.
Topics in European history chiefly in the fifteenth and sixteenth centuries.
2. Modern Europe. Mr. Soltau.
The period from 1848 to the present day.

ENGLISH HISTORY

3. Mediaeval England. Miss Albertson.
The period from 1066 to 1485.
4. Tudor and Stuart England. Miss Albertson.
The period from 1485 to 1688.
5. Modern England. Miss Albertson and Mr. Manning.
The period from 1688 to the present time, with the main stress on the 19th century.

AMERICAN HISTORY

6. Problems in American History. Mr. Manning and Mr. Qualey.

Considerable attention is given to bibliography and the critical use of source materials important for any work in the social sciences or literary criticism in the American field.

ANCIENT HISTORY

Honors seminars in Greek and Roman history, conducted by the department of classics, are open to students who major in history. Requirements for a major in ancient history are two seminars in the ancient field and two seminars in mediaeval or modern history. See the statement of the department of classics.

HISTORY THESIS

For students with the major subject in history. The topic should be selected and approved by the end of the junior year. The thesis should be based upon original source materials.

WORK IN COURSES

Requirements for students who elect major or minor work in history do not turn on any particular total of courses, but rather upon the completion of such courses in history, together with related courses in the social sciences or the humanities as, in the opinion of the department, will facilitate a well-rounded preparation for their comprehensive examinations. A reading knowledge of French and some acquaintance with the principles of economic and political theory are essential for an intelligent appreciation of history. Most graduate schools require a reading knowledge of French, German, and Latin for any advanced degree in history.

The comprehensive examinations for major students at the end of the senior year are not based on particular courses taken at Swarthmore. They include questions on (1) European history; (2) English history; (3) American history; (4) Ancient history. Major students are expected to answer general questions in each of these fields, the standard being based on the work of any survey course offered in the College or independent reading in books recommended by the department. In at least two of the fields students should be able to answer more specific questions, based either on special courses taken in the College or on special reading undertaken with the department's approval. *Course 11, Special Topics*, is designed to help major students in their final preparation for these examinations. All major students should elect this course.

*MATHEMATICS AND ASTRONOMY

PROFESSORS: ARNOLD DRESDEN, *Chairman.*

ROSS W. MARRIOTT.

PETER VAN DE KAMP, *Director of Sproul Observatory.*

ASSOCIATE PROFESSORS: HEINRICH BRINKMANN.

JOHN H. PITMAN.

ACTING ASSISTANT PROFESSOR: RICHARD B. BRANDT.

INSTRUCTOR: JEAN WALTON.

LECTURERS: HANS FRIED.

FRANKLIN G. WILLIAMS.

RESEARCH ASSOCIATE:**K. AA. STRAND.

ASSISTANTS: ROY W. DELAPLAINE (part-time).

SARAH L. LIPPINCOTT.

MATHEMATICS

***1, 2, (M1 or 3, M2 or 4). First Year Mathematics. Mr. Brandt, Mr. Brinkmann, Mr. Fried, Mr. Marriott, Miss Walton and Mr. Williams.

Full course.

These courses, given in consecutive semesters, and together constituting a full course, are designed to deal with the material previously covered by the separate courses in College Algebra, Trigonometry and Analytical Geometry (Courses 1, 3 and 4 of the 1933 catalogue), and to introduce some of the concepts of the Differential Calculus. Topics belonging to each of these subjects are introduced in natural sequence so as to form a more closely knit whole.

Classes normally meet five times a week.

Rider, College, *Algebra*; Curtiss and Moulton, *Plane and Spherical Trigonometry*; Osgood and Graustein, *Plane and Solid Analytic Geometry*.

3. Invitation to Mathematics. Mr. Dresden.

Half course. (Omitted in 1944-1945.)

This course is intended for students who have a non-technical interest in mathematics. It does not take the place of the usual college courses, but aims to be an introduction to some of the important concepts of modern mathematics, to emphasize the fundamental ideas of the science rather than its technical processes, to provide a background for the study of its philosophical aspects, and to furnish a basis for an appreciation of its wider significance. Dresden, *Invitation to Mathematics*.

The class normally meets three times a week; occasionally a fourth hour will be used.

Prerequisite, a good high school course in mathematics.

5. Mathematics of Investment and Insurance. Mr. Dresden.

Half course. (Omitted in 1944-1945.)

The theory of compound interest; annuities; sinking funds; interest rates; theory of probability; mortality tables. Completion of this course, Courses Nos. 12 and 14, and an introduction to the Theory of Finite Differences should enable the student to proceed with the examinations for admission to the Actuarial Society of America.

Prerequisite, a good high school course in algebra.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

*** Courses 1, 2, 11, 12 and Astronomy 6 have been modified to some extent in order to make them fit into the Basic Curriculum of the V-12 Naval Training Course. While the accelerated program is in force, each of these 4 courses is offered each semester.

***11, 12, (M5, 6, 7). Differential and Integral Calculus. Mr. Brinkmann.

Mr. Dresden, Mr. Fried, Mr. Marriott and Miss Walton.

These courses carry forward the work begun in courses 1, 2 and are intended to give the student a sufficient introduction to mathematics to serve as a basis for more advanced work in analysis and its applications. Classes normally meet five times a week; Sherwood and Taylor, *The Calculus*.

Prerequisite, Courses 1, 2.

13. Integral Calculus. Mr. Marriott.

Half course.

This is a half-course designed especially for a group of Navy students. It is to meet three times a week, alternating with a half-course in Analytic Mechanics.

14. Theory of Equations. Mr. Dresden.

Half course.

Operations on complex numbers. Solutions of cubic and quartic equations. General properties of polynomials. Separation and calculation of roots of numerical equations. Weisner, *Theory of Equations*.

Together with Course 15 (below), this course supplies a year's work for students who pursue mathematics as a major or minor subject in course, usually to be taken in the junior year. Classes normally meet three times a week.

Prerequisite, Courses 1, 2, 11, 12.

15. Solid Analytical Geometry. Mr. Dresden.

Half course.

Metric theory of planes, lines and quadric surfaces in Euclidean three-dimensional space, emphasis on the use of determinants and matrices. Dresden, *Solid Analytical Geometry and Determinants*.

Together with Course 14 (above), this course supplies a year's work for students who pursue mathematics as a major or minor subject in course, usually to be taken in the junior year. Classes normally meet three times a week.

Prerequisite, Courses 1, 2, 11, 12, 14.

16. Advanced Calculus. Mr. Brinkmann.

Half course.

Total and partial derivatives; theory of infinitesimals; definite integrals; approximations. The aim of the course is three-fold: to ground the student in the elementary work which has preceded it; to give an introduction to more advanced topics; and to develop skill in the application of the principles of the Calculus to Geometry and Mechanics.

Together with Course 17 (below) this course makes possible a year's work for students who pursue mathematics as a major or minor subject in course, to be taken in the junior or senior year. Classes normally meet three times a week.

Prerequisite, Courses 1, 2, 11, 12.

17. Differential Equations. Mr. Brinkmann.

Half course.

A study of ordinary and partial differential equations, with their applications to geometrical, physical, and mechanical problems.

Together with Course 16 (above) this course makes possible a year's work for students who pursue mathematics as a major or minor subject in course, to be taken in the junior or senior year. Classes normally meet three times a week.

Prerequisite, Courses 1, 2, 11, 12, 16.

18. Statistics and Probability. Mr. Dresden.

Half course.

The purpose of this course is to give the mathematical background necessary for an understanding of the mathematical analysis of statistical data. The modern developments of statistical theory provide a very valuable application of the concepts and techniques acquired in courses in advanced calculus. *Mathematical Analysis*, by S. S. Wilks, is used as a textbook.

Prerequisite, Course 16.

31. Undergraduate Reading Course in Mathematics.

Half course or full course.

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.

*** Courses 1, 2, 11, 12 and Astronomy 6 have been modified to some extent in order to make them fit into the Basic Curriculum of the V-12 Naval Training Course. While the accelerated program is in force, each of these 5 courses is offered each semester.

Courses of graduate character are offered from time to time, in accordance with the needs of graduate and advanced undergraduate students. Normally advanced undergraduate students will do such work in Honors seminars (see below). The subjects of these courses are Projective Geometry, Theory of numbers, Theory of functions of a real variable, Theory of functions of a complex variable.

*ASTRONOMY

1, 2. Descriptive Astronomy. Mr. van de Kamp. *Full course.*

These courses, respectively, provide an introduction to the methods and results of Astronomy. The college entrance requirements are the only prerequisites. Fundamental notions of physics and mathematics are studied, as they are needed to provide an adequate scientific basis for the course. These courses are prerequisite for all further work in astronomy.

Three class periods each week, practical work to be arranged.

3. Practical Astronomy. Mr. Pitman. *Half course.*

Theory and use of the transit instruments; determination of time; the latitude of Swarthmore; determination of longitude. Intended for students of Astronomy and Engineering and those desiring to take the civil service examinations for positions in the United States Coast and Geodetic Survey.

Classes normally meet three times each week.

Prerequisites, Mathematics 1, 2 and Astronomy 1, 2.

4. Laboratory Astronomy. Mr. Pitman. *Half course.*

Theory and practice of micrometric measures of double stars, comets and asteroids. Visual and photographic photometry. Photography of selected objects. Since much of this work is dependent upon the weather, the class will adjust its program to conditions. Normally two class sessions and one laboratory period per week.

Prerequisites, Mathematics 1, 2 and Astronomy 1, 2.

6 [M8]. Navigation, Mr. Pitman. *Half course.*

Spherical trigonometry and use of logarithms; maps and charts; instruments for determining direction and measuring distance and their corrections; the sailings; piloting; constellations and the identification of celestial bodies.

7 [M9]. Navigation. Mr. Pitman. *Half course.*

Time, latitude and longitude. Solutions of observations for lines of positions; the Nautical Almanac and Air Almanac; use of special tables and Star Altitude Curves; problems in interception.

Three class periods each week.

Prerequisite, Mathematics 1 and 2, Astronomy 6.

31. Undergraduate Reading Course in Astronomy. *Half course or full course.*

Undergraduate students may, under direction, prepare papers upon subjects requiring a rather extensive examination of the literature of a problem.

Courses 32 and 51 to 55 are half courses, offered from time to time to meet the needs of graduate students and of advanced undergraduates.

32. Spherical Astronomy. Mr. van de Kamp.

51. Orbit Computation. Mr. Pitman.

54. Statistical Astronomy. Mr. van de Kamp.

55. Celestial Mechanics. Mr. Strand.

* Under the accelerated program, not all courses will be offered every term.

HONORS WORK IN MATHEMATICS

The following seminars prepare for examinations leading to a degree with Honors:

1. Advanced Calculus.

The differential calculus for functions of several variables and its geometric applications, double and triple integrals, improper integrals, line and surface integrals, the elements of vector analysis.

2. Differential Equations.

Ordinary differential equations of the first order, linear differential equations, with particular attention to special cases of the equation of second order; some aspects of the theory of partial differential equations, of Fourier series, of the calculus of variations and of functions of a complex variable.

For senior Honors students two or more of the following seminars are offered each year, according to the needs and interests of the students.

3. Theory of Equations.

The topics covered are the following: Properties of polynomials, solution of cubic and quartic equations, numerical solution of equations, Sturm's theorem and related theorems, symmetric functions, resultants, application to geometrical problems.

4. Solid Analytic Geometry.

The analytic geometry of 3-dimensional space is studied, along with the algebraic tools that are necessary for that purpose. The subjects taken up are: Determinants, matrices, systems of linear equations, lines and planes, transformation of coordinates, quadric surfaces, classification of the general equation of the second degree, special properties of quadric surfaces, such as rulings and circular sections, system of quadric surfaces.

5. Theory of Functions of a Complex Variable.

A fairly detailed study of the linear fractional transformation in the complex plane. Derivatives and integrals of analytic functions. Expansion in series. Contour integrals.

6. Foundations of Mathematics.

Postulational treatment of mathematics. The problem of consistency. Relation of logic and mathematics. Some of the systematic treatments of the foundation of logic. Modern developments.

7. Advanced Geometry.

An introduction to differential geometry, projective geometry, and more-dimensional geometry. Use of elementary matrix calculus; group theoretical concepts.

8. Statistics and Probability.

A study is to be made of elementary mathematical theories which are finding application in statistics. Applications are to be made to various fields in the social and in the natural sciences.

9. Theory of Numbers.

Among the subjects treated in this seminar are: Elementary properties of integers, the congruence relation, continued fractions, quadratic residues, simple examples of fields of algebraic numbers.

10. Analytic Mechanics.

The main subject matter of this seminar is the study of the motion of particles and rigid bodies when acted upon by forces. The equilibrium of such forces will be studied briefly. Many examples will be worked to illustrate the fundamental principles.

11. Advanced Calculus and Differential Equations.

This seminar combines in one term parts of the work described under seminars 1 and 2. It is designed to meet the needs of Honors students, majoring in other departments, whose program does not leave time for the more extended and more satisfactory preparation provided by seminars 1 and 2.

HONORS SEMINARS IN ASTRONOMY

Seminars on the following topics will be arranged for those desiring to take one or more papers in Astronomy.

1. Spherical Astronomy: A mathematical discussion of the reduction of visual and photographic observations of position; solution of visual and spectroscopic binary orbits.

Prerequisites, Astronomy 1, 2; Mathematics 11, 12.

2. Statistical Astronomy: Fundamental data. Stellar motions and parallaxes. Distribution of objects in space. The galactic system.

Prerequisites, Mathematics 11, 12.

3. Theory of Orbits and Computation of Orbit of an Asteroid or Comet.

Prerequisites, Astronomy 1, 2; Mathematics 11, 12.

4. Celestial Mechanics.

Prerequisites, Astronomy 1, 2; Mathematics 11, 12.

5. Photographic Astrometry.

Prerequisites, Astronomy 1, 2; Mathematics 11, 12.

REQUIREMENTS FOR MAJOR AND MINOR IN COURSE

For students who intend to major in mathematics in course the normal sequence of courses is the following: freshman year, courses 1, 2; sophomore year, courses 11, 12; junior year, courses 14, 15; senior year, courses 16, 17. Those who intend to pursue astronomy as a major subject in course should have in addition courses 1, 2 in that subject during the freshman or sophomore year; advanced courses selected from the list given above combined with work in mathematics constitute the further requirement.

For students who select mathematics or astronomy as their minor, the minimum of three courses should be selected from the following: Mathematics 1, 2; 11, 12; 14, 15; 16, 17; Astronomy 1, 2, 3. Completion of course 12 is the minimum requirement.

Prerequisites for admission to honors seminars in mathematics either

as a major or as a minor are the completion of courses 1, 2; 11, 12; the completion of the course in General Physics; a thorough reading knowledge of French or German. For honors work in Astronomy, completion of courses 1, 2 in that subject is necessary in addition to the requirements indicated above.

LIBRARIES AND OBSERVATORY

The astronomical part of the departmental library is located on the first floor of the Observatory; the mathematical section on the fifth floor of Parrish Hall. The library contains complete sets of nearly all the American mathematical and astronomical periodicals, and sets (some of which are complete, some of which are not) of the leading English, German and French periodicals. This library receives the publications of many of the leading observatories in exchange for the publications of the Sproul Observatory.

The principal instrument of the Sproul Observatory is the twenty-four-inch visual refractor of thirty-six-foot focal length, used almost exclusively for photography. The instrument 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. Results of departmental studies are published in the Sproul Observatory publications and in various scientific journals.

Advanced study in conjunction with the research program of the Observatory may be arranged in consultation with the directory of the Sproul Observatory.

The Students' Astronomical 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 and fourth Tuesday nights of each month, except those Tuesday nights that fall in a vacation period. Visitors thus have an opportunity of seeing, in the course of a year, many celestial objects of various types.

MUSIC

ASSOCIATE PROFESSOR: ALFRED J. SWAN, *Chairman.*

1a, b, c. Introduction to Music History and Appreciation. Mr. Swan. *Half course.*

Intended for those students who have a general interest in music without as yet possessing the necessary criteria in approaching it, listening to it intelligently and appraising it. Devoted to the study of the basic forms of musical art, an analysis of the modern orchestra, and the acquisition of a historical perspective. No prerequisites.

2a, b, c. Musical Craftsmanship. Mr. Swan. *Half course.*

A beginners' course for those who want to be initiated into musical composition. After disposing of the rudiments of music (notation, clefs, intervals, etc.), the student is taught the principles of melodic construction, and of writing in two parts melodically. Practice in the simpler contrapuntal, harmonic and rhythmic devices. Scoring for various instruments. No prerequisites.

Students who succeed in mastering the foundations of musical craftsmanship may go on with their studies in composition through one or two semesters following the above.

3. The Main Periods of Music History from the Renaissance to the 19th Century. Mr. Swan. *Full course.*

Three class hours and one laboratory period.
A study of the succession of styles in music (e.g., the Palestrina style, the Baroque, the Classical style of the Viennese masters, etc.). Analysis of motets, madrigals, concerti, sonatas, and symphonies.

Prerequisite, Music 1a,b,c, or some previous acquaintance with music.

4. Music since Beethoven. Mr. Swan. *Full course.*

Three class hours and one laboratory period.
Given alternately with preceding course and devoted to a complete study of the nineteenth century, the Romantic symphony, chamber music, piano music, the opera from Rossini to Verdi, Wagner and the Russians, the art song from Schubert to Wolf.

Prerequisite, Music 1a,b,c, or some previous acquaintance with music.

Music 3 and Music 4 are offered preferably in the form of a seminar on one afternoon weekly, the additional laboratory period being a part of the weekly assignment.

Honors Seminars. Mr. Swan.

1. Russian Music.

Intended for students who have, through modern Russian music, acquired an interest in Russian culture and history as a whole. The Russian music discussed in this seminar mounts up to the days of St. Vladimir (ca. 1000 A.D.), and includes a study of the mediaeval (znamenny) chant and the Russian folk songs.

Prerequisite, Music 1a,b,c, or Music 4 in course.

2. Beethoven.

Offered alternately with preceding, as an attempt to lead the student as far as possible along the path of musical form, structure, and analysis. Beethoven's works are studied as a culminating point in the classical scheme and its furthestmost expansion (later 19th century experiments with classical forms are also included).

Prerequisite, Music 2a,b,c, and Music 3 in course.

3. Modern Music.

A course explaining the various currents of the twentieth century, from Debussy's "Pelleas" to Stravinsky's "Sacre," the chaos after the First World War, and the signs of a return to time-honored precepts during the years preceding the Second World War.

Prerequisite, Music 1a,b,c, or Music 4 in course.

*PHILOSOPHY AND RELIGION

PROFESSOR: BRAND BLANSHARD, *Chairman.*

ASSOCIATE PROFESSOR: JOHN M. MOORE.

ASSISTANT PROFESSORS: RICHARD B. BRANDT.

**FRANCIS G. HEALEY.

MAURICE MANDELBAUM

1. Logic. Mr. Blanshard. *Half course.*
A study of the forms of reasoning, inductive and deductive. Special attention is given to the application of logical rules in the analysis of arguments and the detection of fallacies.
2. Introduction to Philosophy. All instructors. *Half course.*
A survey of the principal problems of philosophy and the alternative answers to them. Stress is laid on the writing of philosophical essays.
4. Ethics. All instructors. *Half course.*
An introduction to ethical theory, with a brief consideration of the various types of ethics and of the application of ethical principles in practice.
5. The Philosophy of Science. Mr. Brandt. *Half course.*
A critical study of the nature of modern science and of some of its leading problems, of the philosophical significance of some recent theories in the physical and mathematical sciences (such as the relativity and quantum theories), of metaphysical problems involved in fundamental concepts like space, material substance, causation, and emergent evolution.
- 6a. Greek Philosophy. Mrs. Blanshard. *Half course.*
The pre-Socratics, Plato, Aristotle, Stoics and Epicureans, Neoplatonists and Sceptics, early Christianity. Readings in the sources.
- 6b. History of Modern Philosophy. Mr. Mandelbaum and Mr. Brandt. *Half course.*
A review of the principal systems of thought from Descartes on. The greater philosophers are studied through selections from their works; these readings are coordinated through a standard history of philosophy.
7. Aesthetics. Mr. Mandelbaum. *Half course.*
A historical and critical study of the theory of beauty and of standards of literary and artistic criticism. Recommended for students majoring in literature or the fine arts.
8. Social Philosophy. Mr. Brandt. *Half course.*
An analysis of the structure of society; theories of social change, such as the Hegelian and the Marxian, and other central problems such as race and social progress; the theory of rights, justice, and democracy; the ideals of communist, socialist, and fascist society.
- 12a. The History of Religions. Mr. Moore. *Half course.*
A historical and comparative study of the great religions: Buddhism, Hinduism, Moham-
medanism, Judaism, Christianity.
- 12b. The Philosophy of Religion. Mr. Moore. *Half course.*
The psychology and interpretation of religious experience; the conflict between religion and science; the problem of religious knowledge; the validity and the difficulties of the Christian theology and ethic.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

13a. The Old Testament. Mr. Moore.

Half course.

The ethical and religious development of the Hebrew people. A study of the chief books of the Old Testament as history, theology, and literature.

13b. The New Testament. Mr. Moore.

Half course.

The life of Christ; the beginnings and the expansion of Christianity; an examination of the Christian view of the world and of human life.

15. Nature and Man in Modern Thought. Mr. Mandelbaum.

Half course.

The rise of modern science; the eighteenth-century conflict between science and religion; the growth of evolutionary thought; interpretations of nature and man after Darwin.

HONORS WORK

Prerequisites: For admission to honors study in philosophy, the requirement is at least two semester courses. It is strongly recommended that one of these be the Introduction to Philosophy (course 2). Students who do not take this course should consult their instructors to make sure that their combinations will be acceptable as prerequisites for honors work.

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

1. Moral Philosophy. Mr. Brandt, Mr. Blanshard.

A seminar in ethics, systematic and historical. Rashdall's *Theory of Good and Evil* (2 vols.) is covered in detail. A printed syllabus (75 pp.), containing lists of readings in the sources, references in recent literature, topics for papers, and questions for self-examination, has been prepared for this seminar.

2. Plato. Mr. Nason.

An examination of all the major and some of the minor dialogues of Plato in an effort to understand his contributions to ethics, politics, and metaphysics and to appreciate his importance for Western thought. Attention will be paid both to his historical setting and to his significance for contemporary problems. Recommended for students of classics and literature.

3. History of Modern Philosophy. Mr. Nason, Mr. Mandelbaum, Mr. Brandt.

The development of modern thought from Bacon and Descartes to Kant. If the group so desires, it may, with the approval of the instructor, exchange a study of certain of the pre-Kantian philosophers for a study of more recent philosophical movements. This seminar may appropriately be combined with work in any of the three divisions.

4. Classic Problems in Philosophy. Mr. Blanshard.

The first half of the study is devoted to the theory of knowledge; Montague's *Ways of Knowing* is used as a common basis and is supplemented by readings in contemporary philosophy. In the second half of the semester, selected problems in metaphysics are taken for discussion, including usually the mind-body problem, the issue between the mechanist and the vitalist, the nature of the self, the problem of freedom and the relation between philosophy and religion. Limited to seniors except for juniors with special permission.

5. Aesthetics. Mr. Mandelbaum.

A study, partly historical, partly systematic, of the philosophies of beauty and of art, including theories of tragedy and comedy, of the sublime, and of standards of criticism. Readings in the sources, ancient and modern; occasional visits to the art collections of Philadelphia. Recommended for students of literature and the fine arts.

6. Philosophy of Science. Mr. Brandt.

A consideration of the nature and scope of science and scientific method; and of the logical foundations of science, including the theories of induction and meaning, and the relation of epistemology to the interpretation of science. Examination of the concepts of space, time, causality, mechanism, vitalism, explanation, and other scientific concepts of importance for the student of philosophy.

7. Social Philosophy. Mr. Blanshard.

A study of the ethical basis of the state, and of rights and duties within it; of the current conflict between Fascist, Marxist, and democratic views of the state; of the ideas of equality, liberty, law, property, and justice. Recommended for students in the social sciences.

8. Concepts of Social Science. Mr. Mandelbaum.

A critical analysis of the organic and atomistic views of society, the idea of a group mind, of law and custom, of theories of progress, of the Hegelian and Marxian views of social change, and other cardinal notions of social theory. Recommended for students of the social sciences.

10. Thesis.

A thesis may be submitted by majors in the department for one of the Honors subjects, upon application by the student and at the discretion of the department.

PHYSICAL EDUCATION FOR MEN

ASSOCIATE PROFESSOR: CARL K. DELLMUTH, *Director of
Physical Education and Athletics.*

ASSISTANT PROFESSOR: ROBERT H. DUNN, *Assistant Director.*

INSTRUCTORS: AVERY F. BLAKE. ASSISTANTS: ALBERT M. BARRON.
E. J. FAULKNER. JAMES J. MCADOO.
WILLIS J. STETSON. GEORGE E. REIMER.

COLLEGE PHYSICIAN FOR MEN: DR. HAROLD ROXBY.

FACULTY REQUIREMENT

All male students must comply with the requirement regarding physical fitness laid down by the faculty. This requirement is a flexible one, which varies with the needs of the student. For purposes of administering it, students will be divided into three groups as described below.

At the beginning and in the middle of each semester, tests will be given to every male student in physical fitness and water proficiency. On the basis of these tests three groups will be recognized:

1. Men in superior physical condition. These men will be excused from all formal requirements, with the understanding that they will take responsibility themselves for maintaining their physical fitness.

2. Men in average condition. From members of this group the Department will require three periods of supervised exercise per week. The men, however, will be given their option of attending regular classes in physical fitness or taking part in some phase of the games program (Varsity, Junior Varsity, or Intramural).

3. Men whose condition is below average. For these men special programs of corrective exercises will be designed, not to exceed five periods a week. The earlier classes for this group will be concerned largely with body-building techniques, but later will combine such work with a program of games.

The Department of Physical Education will undertake to help men advance from the lower brackets to the higher as speedily as possible.

All men not excused for medical or other reasons are expected to fulfill this requirement under penalty of being asked to leave the College.

FALL ACTIVITIES

*Cross-Country	*Football	Tennis	Speed Ball
Swimming	*Soccer	Touch Football	Physical Fitness Class

WINTER ACTIVITIES

Badminton	Lacrosse	Tennis	Tennis
*Basketball	Life Saving		Track
Boxing	Paddle Tennis		Volley Ball
Fencing	Soccer		*Wrestling
Handball	*Swimming		Physical Fitness Class

SPRING ACTIVITIES

*Baseball	*Lacrosse	*Tennis	Physical Fitness Class
Golf	Softball	*Track	

SUMMER ACTIVITIES

*Baseball	*Golf	*Track	Riding
*Tennis	*Swimming	Softball	Physical Fitness Class

* Intercollegiate varsity and sub-varsity schedules are played in these sports.

PHYSICAL EDUCATION FOR WOMEN

ASSOCIATE PROFESSOR: VIRGINIA RATH, *Chairman.*

INSTRUCTORS: MAY E. PARRY.

Alice M. GATES.

ASSISTANT: JORMILA VOKRAL.

COLLEGE PHYSICIAN FOR WOMEN: DR. DOROTHY ASHTON.

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. Therefore 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, sophomores and juniors take three periods of activity each week. These may be elected from classes listed below except that freshmen are required to take Swimming on entering, and Body Mechanics in the winter term. Seniors in good standing may meet their requirement outside of instruction classes. A swimming test must be passed before graduation.

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

1. Hockey. Miss Parry, Miss Rath.
Class and Varsity.

Fall term.

2. Archery. Miss Rath.
Class and Varsity.

Fall and Spring.

3. Tennis. Miss Parry, Miss Rath, Miss Gates, Mr. Faulkner. *Fall, Winter and Spring.*
Class and Varsity, Winter and Spring.
4. Golf. *Fall and Spring.*
Class and Varsity.
5. Swimming. Miss Rath, Miss Gates, Miss Parry. *Fall, Winter and Spring.*
Beginner, intermediate and advanced classes in strokes, diving and Red Cross Life Saving, senior and Instructors' tests.
Class and Varsity.
6. Horseback Riding. *Fall, Winter and Spring.*
Class and Club.
7. Basketball. Miss Parry, Miss Rath. *Winter.*
Class and Varsity.
8. Fencing. Mrs. Vokral. *Fall, Winter and Spring.*
Class and Varsity.
9. Badminton. Miss Rath, Miss Parry, Miss Gates, Mr. Faulkner. *Winter and Spring.*
Class and Varsity.

RHYTHMIC ACTIVITIES

Miss Gates.

10. Dancing. *Fall, Winter and Spring*
Class and Club.
11. Tap Dancing. *Winter.*
12. Folk Dancing. *Fall, Winter and Spring.*

DEVELOPMENTAL AND HEALTH ACTIVITIES

14. Tumbling. Miss Rath. *Winter.*
15. Individual Gymnastics. Miss Rath. *Winter.*
For those students who need special exercises because of incorrect posture or minor orthopedic defects.
16. Body Mechanics. Miss Rath. *Winter.*
Required of all first-year students.
17. Conditioning Exercises. Miss Rath. *Winter.*

SERVICE ACTIVITIES

18. Recreational Leadership. Miss Gates. *Winter and Spring.*
For those interested in getting experience in the Recreational application of Folk Dancing, children's games, music, dramatics, nature crafts, etc. Theory, practice and practical experience.

Work Squad. Miss Rath.

Begun in 1943, this group has helped the manpower shortage on outdoor campus work.

Gardening.

Student conducted, under professional guidance.

Spring, Summer.

Farm Aid.

Fall.

Also under student leadership, this activity means half or whole days of work on nearby farms. Limited credit is given.

PHYSICS

PROFESSOR: WINTHROP R. WRIGHT.

ASSOCIATE PROFESSORS: MILAN W. GARRETT.

M. RUSSELL WEHR.

ASSISTANT PROFESSORS: *WILLIAM C. ELMORE.

HOMER C. KNAUSS.

RALPH P. SHUTT.

1 (PH. 1-2). General Physics. Staff.

Full course

Three lectures, one laboratory period and a conference weekly. Both semesters will be offered concurrently during the tenure of the Navy Program.

2 (PH. 3-4). Advanced General Physics. Mr. Garrett

Full course.

This course is the equivalent of courses PH 3-4 in the Navy V-12 Program. The second half will be offered in November, 1944. Calculus must precede or accompany this course.

The material for this course is drawn from the fields of mechanics, hydrodynamics, the kinetic theory, and thermodynamics. Three conferences and one laboratory period weekly.

HONORS WORK

The following seminars are those usually offered in preparation for a degree with Honors. During the war emergency the content and the subdivision into units may be modified but the descriptions will apply in general. The seminars will be open to all qualified students, whether in course or in honors.

1. Physical Optics.

Offered in November, 1944.

2. Electricity and Magnetism.

Offered in March, 1945.

3. Atomic Physics.

4. Theoretical Physics.

* Absent on leave.

*POLITICAL SCIENCE

ASSOCIATE PROFESSOR: J. ROLAND PENNOCK, *Chairman.*

ASSISTANT PROFESSORS: ARNAUD B. LEAVELLE.

**VERNON A. O'ROURKE.

BRYCE WOOD.

INSTRUCTOR: HERBERT G. SONTHOFF.

Political Science 1 is open to all students and is prerequisite to all other courses offered by the department. Other courses are open to all students who have had *Political Science 1* unless otherwise indicated.

1. Introduction to Political Science. All members of the department.

Full course.

The foundations of politics—sociological, psychological, and economic; nature and development of political institutions; types of government. An examination of government and politics in the principal countries of Europe, followed by a more detailed study of the national government of the United States.

2. American Political Parties. Mr. Leavelle.

Half course.

Structure, motivations, and techniques of political parties at the national, state and local levels. Problems of political sectionalism, party leadership, party responsibility, and the impact of pressure groups on the formation of public policy.

3. American State and Local Government. Mr. Leavelle.

Half course.

State and local government agencies, practices, and problems. Constitutions and charters, governors and city executives, legislatures and councils, problems of state and local administrative organization, and political parties. Intergovernmental relations and administration.

4. American Constitutional Law. Mr. Pennock and Mr. Leavelle. *Half course.*

The Constitution as developed by the Court; and the Court as seen through the cases. Stressing (a) the extent of national power, (b) constitutional limitations upon state legislation, (c) the nature of the judicial process in the American system of government.

5. Public Administration. Mr. Pennock and Mr. Leavelle.

Half course.

An analysis of the principles of administration in modern governments with illustrative material drawn chiefly from the national government of the United States and with particular references to the implication of recent changes. Problems of administrative organization, conduct of regulatory and managerial activities, financial administration, personnel, public relations, administrative legislation and adjudication.

Open to juniors and seniors only.

6. History of Political Theory. Mr. Pennock.

Half course.

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. Topics studied include: Greek political thought; medieval universalism and the divine right of kings; the Reformation and the development of contractual theory; sovereignty and the rise of the national state; the growth of liberalism and the roots of totalitarian ideologies.

7. Democracy and Dictatorship. Mr. Pennock.

Half course.

Reconsideration of the bases of representative government in the light of changed economic and social conditions in the modern State; examination of such alternative principles as those offered by Communism and Fascism; investigation of the problem of planning in a democracy; and an appraisal of present tendencies in political development.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

8. International Relations, Law, and Organization. Mr. Wood and Mr. Sonthoff.

Half course.

An introduction to the principles and problems of international relations and foreign policy, including: historical concepts of international society; development and basis of the national state system; nationalism and imperialism; diplomacy; growth and nature of international law and organs; the League of Nations; the impact of war on modern society; elements of future international organization and present plans for reconstruction.

9. Latin American Relations. Mr. Wood.

Half course.

Political, historical, cultural, commercial relationships between the United States and Mexico, Central America, the Caribbean area, and South America. Discussions of Pan-Americanism, the Monroe Doctrine, boundary disputes, trade agreements, the Good Neighbor Policy. American diplomatic history as seen by Latin America.

10. American Foreign Policy. Mr. Wood and Mr. Sonthoff.

Half course.

A historical and analytical study of the political, constitutional, geographic, and economic factors controlling American foreign policy, with particular reference to: American diplomacy; the Monroe Doctrine; Pan-Americanism; trade agreements and the Good Neighbor Policy; war-time policies and implications for the post-war international order.

11. European Public Administration. Mr. Sonthoff.

Half course.

Main elements of the local and national administrative structure of selected European countries, with particular regard to their social and historical background.

HONORS WORK

Prerequisite: Political Science 1. The following seminars prepare for examination for a degree with Honors:

1. Political Theory. Mr. Pennock.

The nature of the state, the basis of political obligation, sovereignty and the nature of law, problems of freedom and authority, theoretical analysis of forms of government, theories of revolution—all in the light of the theories set forth by writers on these subjects from Plato to the present.

2. Federal, State, and Local Politics. Mr. Leavelle.

Federal-state and state-local relations under modern conditions. State, municipal, and rural government. The various forces and factors which impinge upon the legislative process: inter- and intra-party politics, rural-urban cleavages, pressure groups, public opinion, the chief executive, and administrative agencies. Comparisons between state and federal politics.

3. Problems in Government and Administration. Mr. Pennock and Mr. Leavelle.

A detailed study of major problems of government, particularly on the administrative side, and especially as they manifest themselves in the national government of the United States. Topics studied include: public budgeting and financial control, administrative legislation and adjudication, governmental reorganization, administrative areas, governmental corporations, and problems of public service personnel administration.

4. International Relations and Organization. Mr. Wood and Mr. Sonthoff.

Basic factors of interstate relations—geography, resources, races, trade—considered in relation to nationalism, imperialism, and war. Also a study of efforts to restrain international rivalries and to avoid war.

5. American Foreign Policy. Mr. Wood and Mr. Sonthoff.

A study of the economic, political, and strategic factors in American foreign policy since 1890, with special attention to Pan-American affairs.

6. Thesis.

All members of the department.

Approval of the instructor immediately concerned must be secured early in the student's junior year.

*PSYCHOLOGY AND EDUCATION

PROFESSOR: WOLFGANG KÖHLER.

ASSOCIATE PROFESSOR: **ROBERT B. MACLEOD.

ASSISTANT PROFESSORS: RICHARD S. CRUTCHFIELD.

***EDWIN B. NEWMAN.

INSTRUCTORS: VERA FRENCH.

HANS WALLACH, *Acting Chairman.*

ASSISTANT: VIRGINIA BELL KLOPPER (part-time).

PSYCHOLOGY

1. Introduction to Psychology. Mr. Köhler, Mr. Wallach. *Full course.*
A study of the structure and organization of the mental life of the normal, human adult.
Recommended for sophomore year.
2. Experimental Psychology. The staff. *Half course.*
A laboratory course on problems in human psychology.
Prerequisite, Course 1.
3. Human Motivation. Mr. Wallach. *Half course.*
A study of the directive and the regulative aspects of human behavior.
Prerequisite, Course 1.
4. Social Psychology. Mr. Crutchfield. *Half course.*
Psychological analysis of the behavior of the individual as a member of social groups.
Prerequisite, Course 1.
5. Child Psychology. Miss French. *Half course.*
Intellectual, social and emotional development from birth through adolescence.
Prerequisite, Course 1.
6. Animal Behavior. Mr. Newman. *Half course.*
A presentation of those facts in animal psychology which contribute to our present knowledge of general psychology.
Prerequisite, Course 1.
7. Systematic Psychology. Mr. Köhler. *Half course.*
Observations and problems in different fields of modern psychology treated as parts of a developing system, with a consideration of the basic principles inherent in this development.
Prerequisite, Course 1.
8. Educational Psychology. Miss French. *Half course, alternate years.*
Psychology of individual differences, learning, motivation, and personality adjustment; special problems related to teaching.
Prerequisite, Course 1.
9. Psychological Tests and Measurements. Miss French. *Half course.*
Construction, administration and interpretation of tests, with special emphasis on clinical techniques.
Prerequisite, Course 1.
10. Advanced Experimental Psychology. The staff. *Half course.*
Special investigation of selected problems under the direction of a member of the department.
Open only to seniors.
Prerequisite, Courses 1 and 2.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

*** Absent on leave, part-time.

11. Psychological Tutorial. The staff. *Half course.*
 Supervised reading in fields that have not been adequately covered in courses. Required of seniors majoring in psychology.
12. Elementary Statistics. *Half course.*
 Study of the elements of statistical method, comprising treatment of certain principles in the organization and analysis of statistical data; application of these principles to data of the social sciences.
13. Diagnosis of Personality. Miss French. *Half course.*
 Theory and practice of methods employed in understanding personality: case histories, personal documents, projective techniques, measurement of interests, sentiments, and values.
 Prerequisite, Courses 1, 3 or 5, and 9.
- PS1. General Psychology. The staff.

EDUCATION

21. Introduction to Education. Miss French. *Half course.*
 A survey of the aims, organization and procedures of education; the opportunities and requirements in education as a profession.
22. History of Education. Miss French. *Half course, alternate years.*
 A historical survey of educational procedures from the period of the Greeks to the present, including a comparison of present-day systems in Europe and America.
23. Philosophy of Education. Miss French. *Half course, alternate years.*
 A study of the fundamental principles of education viewed in dynamic relation with our culture; special emphasis on the rôle of education in a democratic society.

REQUIREMENTS FOR MAJOR AND MINOR IN COURSE

Students intending to elect psychology as major subject are advised to take a course in philosophy and a course in biological or physical science, preferably during the freshman year. Students looking forward to graduate work should choose German as their foreign language. Major students in course take *Courses 1, 2 and 11*, and the equivalent of four further half courses in psychology. Minor students are expected to take *Course 1* and the equivalent of two further full courses in psychology. Courses in education, *21, 22 and 23*, will not be credited toward a major or minor in psychology.

Education alone may not be elected as a major or minor subject, and not more than two full courses in education will be accepted for credit toward the bachelor's degree. The Pennsylvania requirements for the certification of secondary school teachers include 21 hours of psychology and education. With the exception of 6 hours of practice teaching, which must be taken elsewhere, Swarthmore students may fulfill these requirements by taking *Courses 1, 8, 21, 22 and 23*.

HONORS WORK

Prerequisites: Introduction to Psychology (1) is the normal prerequisite for all honors work. This may be waived, however, in cases of candidates who have done advanced work in zoölogy and physiology,

and who propose to concentrate in the field of physiological psychology. All major students are advised to take introductory work in zoölogy or physics and in philosophy.

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

1. Systematic Psychology. Mr. Köhler.

A short historical survey of empirical psychology, followed by a discussion of (1) basic questions of methodology and (2) such psychological observations as tend to unite themselves into systematically related groups of facts. Particular attention is paid to the relations between psychology and other fields of knowledge.

2. Perception. Mr. Köhler, Mr. Wallach.

Deals systematically and experimentally with problems in the field of perception, no attempt being made to cover the whole field in any one semester; open to all qualified Honors students, but especially recommended for students of the natural sciences and of philosophy.

3. Learning. Mr. Köhler, Mr. Newman, Mr. Wallach.

The experimental study of memory and learning, with a view to finding optimal conditions of motivation, the nature and arrangement of material, temporal relations and the like, as well as formulating hypotheses about the nature of the learning process; open to all qualified Honors students.

4. Human Development. Mr. Newman.

The growth and development of psychological processes; the nature of learning and of intelligence; the world of the child contrasted with that of the adult. Open to all qualified Honors students, but may not be combined with Learning.

5. Motivation. Mr. Köhler, Mr. Crutchfield.

A systematic and experimental approach to the dynamics of behavior, based on material drawn from the laboratory and from the clinic; open to all qualified Honors students, but of particular interest to students of ethics and of the social sciences.

6. The Individual in Society. Mr. Crutchfield.

The relationship between man and his society, approached from the points of view of social psychology, sociology and cultural anthropology; open to all qualified Honors students, but especially designed for students of the social sciences.

7. Language and Thinking. Mr. MacLeod.

The psychological bases of communication, with special reference to the origin and development of language, the nature of linguistic symbolism, the disorders of linguistic behavior, creative imagination, and rational and irrational thinking; open to all qualified Honors students, but especially designed for students of literature, and recommended in conjunction with the seminar on Linguistics.

8. Animal Behavior. Mr. Newman.

A comparative study of animal behavior, with laboratory work. Recommended for students with a background in biology.

9. Psychophysiology. Mr. Newman.

An introductory study, roughly parallel to Psychology 1, designed for selected students in the natural sciences who have been unable to take the regular course. With permission, this seminar may be offered as a fourth seminar in zoölogy.

10. Thesis.

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 willing to undertake the direction of the thesis.

*ROMANCE LANGUAGES

PROFESSOR: EDITH PHILIPS, *Chairman.*

VISITING PROFESSOR: PHILIPPE SOUPAULT.

ASSOCIATE PROFESSORS: **HAROLD MARCH.

**LEON WENCELIUS.

ASSISTANT PROFESSOR: JAMES D. SORBER.

INSTRUCTORS: JOSE VAZQUEZ AMARAL.

MARION MONACO.

PART-TIME INSTRUCTOR: ELISA ASENSIO.

FRENCH

1. Elementary French.

Full course.

For students who begin French in college. Equivalent of two years' secondary school preparation.

2a. Reading, Grammar and Composition. Members of the department.

Half course.

Prerequisite, French 1 or two years' secondary school preparation and an achievement test.

2b. Reading, Grammar and Composition. Continued. Members of the department.

Half course.

Prerequisite, French 2a or three years' secondary school preparation and an achievement test.

3. Introduction to French Literature. Members of the department.

Half course.

Prerequisite, French 2b or four years' secondary school preparation and an achievement test.

Representative texts of modern French writers. Conducted in French with frequent written work in French.

10. Le roman avant 1800. M. Soupault.

Half course.

11. Le roman du dix-neuvième siècle. M. Soupault.

Half course.

12. Prosateurs et moralistes de la Renaissance et de la Réforme.

Half course.

13. La prose classique. M. Soupault.

Half course.

14. Les origines philosophiques de la révolution. Miss Philips.

Half course

16. La poésie lyrique jusqu'à l'époque classique. Miss Monaco.

Half course.

17. La poésie lyrique moderne. M. Soupault.

Half course.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

18. Origines et développement du théâtre classique. Miss Monaco. *Half course.*
19. Le théâtre moderne. Miss Monaco. *Half course.*
20. Histoire de la littérature française. Members of the department. *Full course.*
21. Advanced Composition. Miss Philips. *Half course.*

SPANISH

1. Elementary Spanish. Mr. Sorber. *Full course.*
For students who begin Spanish in college. Equivalent of two years' secondary school preparation.
2. Reading, Grammar and Composition. Mrs. Asensio, Mr. Amaral. *Full course.*
Prerequisite, Spanish 1 or two years' secondary school preparation and a placement test.
3. Introduction to Spanish Literature. Mr. Sorber. *Full course.*
Prerequisite, Spanish 2, or four years' preparation in secondary school and a placement test.
Representative texts of modern Spanish writers. Conducted in Spanish with frequent written work in Spanish.
10. La novela española del siglo XIX. Mr. Sorber. *Half course.*
For Honors work in Spanish, see page 108.
11. La poesía hispano-americana. Mr. Amaral. *Half course.*
12. El siglo de oro. Mr. Amaral.
13. La novela hispano-americana. Mr. Sorber.

ITALIAN

1. Elementary Italian. *Full course.*
A course aimed to give the student ability to read ordinary Italian with ease, and to write and speak simple Italian.
2. Second year Italian. *Full course.*
Grammar review and composition. Readings from Dante's Inferno.
3. Introduction to Modern Italian Literature. *Full course.*
Representative texts of modern Italian writers.

All students offering French or Spanish for entrance take a placement test. The results of this test, taken into consideration with the number of years of preparation, determine the student's assignment to *Course 2* or *Course 3*.

The department does not offer a major in Spanish or Italian.

HONORS WORK

French may be offered as a major or minor subject in the Division of the Humanities.

Prerequisites for majors: *French 3, Latin 1*, or its equivalent, *History of Europe* or *History of France, History of Philosophy* or *Introduction to Philosophy*.

Majors are expected to speak French with sufficient fluency to conduct a discussion in French with the examiner in the oral examination. Some indulgence is shown by the examiners to minors in respect to their spoken French, although all seminars are conducted in French.

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

1. La renaissance en France. Miss Monaco.
Rebelais, Calvin, Montaigne, Ronsard.
2. Le théâtre classique. Miss Monaco.
Corneille, Racine, Molière.
4. La pensée française au dix-huitième siècle. Miss Philips.
Montesquieu, Voltaire, Diderot, Rousseau.
5. La poésie lyrique au dix-neuvième siècle. M. Soupault.
The Romantic, Parnassian and Symbolist movements. Modern tendencies.
6. Quatre romanciers modernes. M. Soupault.
Balzac, Stendhal, Flaubert, Proust.

The seminars in French are planned with reference to the choices of the students and the convenience of the department, and the semester in which they are given varies from year to year. Majors are urged to elect four seminars which cover the four modern centuries.

Beginning with the academic year 1941-42, a minor in Spanish will be offered in honors work. Prerequisite, Spanish 3. The following seminars will be given:

1. La novela hispano-americana. Mr. Sorber.
2. La poesía hispano-americana. Mr. Amaral.
3. El siglo de oro. Mr. Amaral.
4. La novela española del siglo XIX. Mr. Sorber.

*ZOOLOGY

PROFESSORS: **LAURENCE IRVING, *Chairman*.

ROBERT K. ENDERS.

VISITING PROFESSOR: C. E. McCLUNG, *Acting Chairman*.

ASSOCIATE PROFESSORS: FRANK R. KILLE.

WALTER J. SCOTT.

ASSISTANT PROFESSOR: RUTH McC. JONES.

INSTRUCTOR: **C. BROOKE WORTH.

RESEARCH ASSOCIATES: **GEORGE A. EDWARDS.

**PER F. SCHOLANDER.

ASSISTANT: HANNAH T. BROOMELL.

1. Biology. Staffs of Botany and Zoölogy Departments. *Full course.*

This introductory course is designed to present the fundamental aspects of biology. Wherever possible, principles will be illustrated by both plants and animals with particular reference to their interdependence and interrelationships. The topics for consideration during the first semester (Biology 1a) include: protoplasm, the cell, structure and function in higher plants, genetics; and a brief survey of the plant kingdom. The topics in the second semester (Biology 1b) include: principles of vertebrate structure and physiology, embryology, a comparative study of a few invertebrate phyla, ecology and evolution. The course is a prerequisite for advanced courses in botany and zoölogy.

Three lectures or conferences and one laboratory period per week.

B1 and B2. Staffs of Botany and Zoölogy Departments. *Full course.*

V-12 introductory course in Biology, similar to Biology 1 in scope but schedules 2 lecture-recitation periods and 2 three-hour laborator yperiods per week. Open only to students who are in V-12 or who have the permission of the departments.

2. Comparative Vertebrate Anatomy. Mr. Enders. *Half course.*

A course of lectures, laboratory conferences and dissection presented from the comparative viewpoint. Dissection of several vertebrate types is undertaken.

Two lectures or conferences and two laboratory periods per week. Prerequisite, 1.

3. Elementary Physiology. Mr. Scott. *Half course.*

A consideration of the physiology of muscle, nerve, circulation, respiration, central nervous system, special senses, and digestion; the treatment is designed to give a broad understanding of the mechanism of the vertebrate body. In the laboratory standard experiments on living tissue are performed.

Two lectures, one conference and one laboratory period per week. Prerequisite, 1.

4. Embryology. Mr. Kille. *Half course*

A study of the developmental process in vertebrates. Laboratory periods are devoted to the developmental anatomy of amphioxus, frog, chick, and pig. Experimental analysis of development is introduced in the lectures and conferences.

Three lectures, one laboratory period per week. Prerequisite, 1.

* Under the accelerated program, not all courses will be offered every term.

** Absent on leave.

5. Invertebrate Zoölogy. Mr. Kille. *Half course in alternate years.*

A comparative study of the invertebrates exclusive of protozoa and insects. Special attention is given to the topics of regeneration, analysis of development, and invertebrate hormones. The living material used in the laboratory is collected by the class during field studies of marine, fresh water and land habitats.

One three-hour discussion-recitation period and one laboratory period per week, occasional field trips. Prerequisite, 1.

6a. Microscopic Anatomy. Mrs. Jones. *Half course.*

This course is concerned with the microscopic structure of vertebrate and invertebrate animals. Whenever possible the tissues are examined in the living condition. The student makes enough preparations to familiarize himself with the principal methods of modern microtechnique.

Two lectures and two laboratory periods per week. Prerequisite, 1.

6b. Advanced Microscopic Anatomy. Mrs. Jones. *Half course.*

A continuation of 6a. Methods of research are stressed, including bibliographic practice. Conferences generally replace lectures.

Prerequisite, 6a.

7. Mammalian Physiology. Mr. Scott. *Half course.*

A laboratory course of experiments illustrating the more important features of the circulatory, respiratory and nervous systems.

One lecture, one conference, and one laboratory period per week. Prerequisites, 1, 2, 3.

8. Special Topics. The staff.

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

9. Biology of the Vertebrates. Mr. Enders. *Half course.*

A course designed to integrate the students' knowledge in abstract sciences with living animals, both captive and wild. Field work is especially stressed during the warmer months. Open to zoölogy senior majors only.

10. Neurology. Mr. Scott. *Half course, alternate years*

After a brief review of the evolution of the nervous system phylogenetically an intensive study is made of the anatomy of the central nervous system in man with occasional reference to corresponding systems in lower mammals and in other vertebrates.

Prerequisites, 1, 2, 3, and 4.

REQUIREMENTS FOR MAJOR AND MINOR IN COURSE

Students in general course must complete during their four years the following: Two courses in chemistry, one course in mathematics, one course in physics, two courses in German (or their equivalent), four courses in zoölogy. Genetics (Botany Department) or botany may be offered as one advanced zoölogy course. With permission of the department a second course in physics, a second course in mathematics or a third course in chemistry may be substituted for the fourth course in zoölogy providing such a course is not being offered as part of the minor requirement.

The departmental requirements of two courses in chemistry and one in physics constitute a minor for zoölogy majors.

HONORS WORK

Prerequisites: for a major: one and one-half courses in zoölogy (1, 2), one and one-half courses in chemistry (1), one course in mathematics (1, 2), one course in physics (1), two courses in German (1, 2) or their equivalent.

For a minor, *Biology 1*. In addition seminars in physiology require one course in physics and two courses in chemistry.

Additional preparation in chemistry is desirable (2, 6). Further work in mathematics is recommended for those who have ability in the subject (11, 12). The additional courses in chemistry and mathematics are necessary for taking seminars in those departments.

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

Embryology. Mr. Kille.

The nature of the germ cells, experimental analysis of development and reproduction, and the developmental anatomy of vertebrates with laboratory emphasis on the chick and the pig.

Microscopic Anatomy. Mrs. Jones.

A study of the minute structure of animals by the examination of living cells and tissues, and by the analysis of prepared slides; most of these slides are prepared by the student who thus acquires a working knowledge of microscopical technique.

Neurology. Mr. Scott.

A preliminary consideration of the evolution of the nervous system is followed by a detailed study of the anatomy of the human brain with special emphasis upon the internal structure and its physiological implications. Frequent reference is made to corresponding features of the brains of lower vertebrates.

Physiology I. Mr. Scott.

A study is made of the nature of the physiological processes in muscle, nerve, something of the nature and function of the central nervous system with special emphasis upon the structure and function of the autonomic nervous system together with a study of the mechanisms of circulation and of respiration in various animal bodies such as amphibia and mammals.

Physiology II. Mr. Irving.

Respiration, considering the utilization of oxygen and the production of carbon dioxide, their transport and exchange with the atmosphere.

Physiology of Reproduction. Mr. Enders.

Sex and internal secretions in vertebrate animals.

Work at summer biological stations may be substituted for certain seminars and courses, permitting more choice in the student's college program.

PRE-MEDICAL PROGRAM

The department of zoölogy helps pre-medical students plan their programs to meet the requirements of the Medical Schools of their choice. Before the war, pre-medical students normally completed an eight-semester college course as candidates for the B.A. degree. Now this possibility is open only to women students, and to men who have been classed as 4F by Selective Service. During the period of the war emergency, some Medical Schools will accept students who have completed four or six semesters of college work. The longer and shorter programs are outlined as follows:

a. Eight-semester program.

Required and Recommended Courses.

Zoölogy: 1, 2, 3, 4, 6a, 7, 9; sometimes 5, 10, and 6b.

Chemistry: 1, 3, 6a, 6b; sometimes 5.

Physics: 1; sometimes 2.

English: 16; a choice of one of the following: 1, 6a, 10, 11a, 11b.

Social Science Division: one full course.

Foreign language: to meet the college requirement (p. 27).

A reading knowledge of German is desirable but not required.

The work of the junior and senior years may be taken in Honors seminars or in courses, according to the ability of the student.

b. Four-semester program.

Required Courses.

Zoölogy: 1, 2, 4.

Chemistry: 1, 3, 6a.

Mathematics: 1, 2.

Physics: 1.

English: 16, 1.

Social Science Division: one full course.

*GEOGRAPHICAL DISTRIBUTION OF STUDENTS

WINTER TERM

November-February, 1943-1944

Pennsylvania	265	Colorado	2
New York	159	North Carolina	2
New Jersey	102	Oklahoma	2
Maryland	49	South Carolina	2
Connecticut	29	Texas	2
Massachusetts	28	Uruguay	2
Ohio	20	West Virginia	2
Illinois	19	Canada	1
District of Columbia	18	Cuba	1
Indiana	13	Hawaii	1
California	11	Idaho	1
Virginia	10	India	1
Michigan	9	Iran	1
Delaware	8	Kansas	1
Missouri	7	Louisiana	1
Arkansas	4	Martinique	1
Iowa	4	Minnesota	1
Rhode Island	4	Mississippi	1
Florida	3	Montana	1
Mexico	3	Nebraska	1
New Hampshire	3	Oregon	1
Wisconsin	3	Paraguay	1
Arizona	2	South Dakota	1
Brazil	2	Total	805

SPRING TERM

February-June, 1944

Pennsylvania	229	Colorado	2
New York	133	Minnesota	2
New Jersey	81	North Carolina	2
Maryland	38	South Carolina	2
Massachusetts	27	Washington	2
Connecticut	24	West Virginia	2
District of Columbia	22	Wisconsin	2
Ohio	22	Arkansas	1
Illinois	16	Brazil	1
Virginia	12	Cuba	1
Michigan	10	Hawaii	1
Delaware	9	Idaho	1
Indiana	9	Iran	1
Missouri	7	Kentucky	1
California	6	Louisiana	1
Iowa	5	Nebraska	1
Arizona	4	Oregon	1
Florida	3	Rhode Island	1
Mexico	3	Tennessee	1
New Hampshire	3	Texas	1
Oklahoma	3	Uruguay	1
Canada	2	Total	697

* The list of students which has formerly appeared in the Catalogue is now printed as a separate Directory and is published every term. Copies may be obtained by applying to the Registrar.

SUMMER TERM
July-October, 1944

Pennsylvania	173	South Carolina	2
New York	84	Arizona	1
New Jersey	53	China	1
Ohio	25	Colorado	1
Maryland	23	Georgia	1
Illinois	14	Hawaii	1
Connecticut	13	Idaho	1
District of Columbia	13	Kansas	1
Delaware	11	Louisiana	1
Virginia	10	Mexico	1
Michigan	7	Mississippi	1
Missouri	5	New Hampshire	1
California	4	Oregon	1
Indiana	4	Tennessee	1
Iowa	4	Uruguay	1
Minnesota	4	Vermont	1
Kentucky	3	Washington	1
Florida	2	West Virginia	1
Nebraska	2	Wisconsin	1
Oklahoma	2		
Rhode Island	2	Total	474

DEGREES CONFERRED

OCTOBER 1943

BACHELOR OF ARTS

In the Division of the Humanities

HELEN BEYE (<i>High Honors</i>)	OLWEN MORFFYDD JONES
LYDIA BRINTON	NORMAN DAVIS KNOX (<i>High Honors</i>)
ATALA SCUDDER DAVISON	ALICE FAFIENA LIGHTWOOD (<i>Honors</i>)
ELIZABETH DENIORD	VIRGINIA GRAVES NOEHREN
KATHRYN LOUISE DETREUX	JOHN MAHLON OGDEN
MURIEL ERRERA	GERTRUDE HUNTINGTON WRIGHT (<i>High Honors</i>)
MARY JANE FELIX	
LOIS WALTON FREEMAN	
ELIZABETH COWING HAINES (<i>High Honors</i>)	

In the Division of the Social Sciences

HUGO EUGENE BRANDSTETTER	JANET ANN MCCLOSKEY
JAMES GARNER DEANE	JOANNA HAZEL MAXWELL (<i>High Honors</i>)
JEAN HAIRE FORSTER	PAUL BURTON POPKINS
WENDELL ALBERT HABERERN	ALICE SKODZUS (<i>Honors</i>)
JANE CAROLINE JABINE (<i>Honors</i>)	JANE HELEN STERN
VICTOR R. JOSE (<i>Honors</i>)	DAVID STANTON TAPPAN, JR.
JOSEPH WILLIAM KIMMEL	ERIKA ELISABETH TEUTSCH (<i>Honors</i>)
FELICE JEAN KLAU	
LUCINDA WHITE LOHR	

In the Division of Mathematics and the Natural Sciences

RICHARD S. BROKAW (<i>Honors</i>)	CYRUS LEVINTHAL (<i>High Honors</i>)
WILLIAM RICHARD BUSING (<i>High Honors</i>)	JANE MORSS
ORVILLE WRIGHT DONNELLY	ELIZABETH PEABODY
DAVID GALE (<i>High Honors</i>)	MARGARET JOAN WHITE

BACHELOR OF SCIENCE

In the Division of Engineering

RICHARD FREEMAN BARNES	WILLIAM JACKSON MARSHALL
NICHOLAS ANDREW BELDECOS	PETER PAGE SCHAUFFLER
CHARLES ANTHONY CIBELIUS, JR.	JOHN N. THOMAS
EDWARD HANES COOLEY	RICHARD MORSE TRAINER
DEAN WINSLOW FREED	BARCLAY WHITE, JR.
LAWRENCE ELDON LINDLEY, JR.	ROBERT JAMES WILLIAMS, III

FEBRUARY 1944

BACHELOR OF ARTS

In the Division of the Humanities

FRANCES LYDIA ALFORD	MARJORIE MILLS
MARY LOUISE DENTON	DORIS JANE MORRELL
PRISCILLA HILTON DUMOND	FREDERICK HAYNIE OHRENSCHALL
RUTH CHARLES ENION (<i>High Honors</i>)	NORMA JEAN SEILER
ALICE GALLOWAY HEAD	RUTH HOYT SHEPARD
KALA ROSENTHAL HERLANDS	MARIANNA LOUISE WALTON
HARRIET SUE MELLETT (<i>Honors</i>)	LOUISE MARSH ZIMMERMAN (<i>Honors</i>)

In the Division of the Social Sciences

BARBARA ROSE BAIR	MARY PHYLLIS LOHR
MARY CORNELIA BREWSTER	VIRGINIA PENNOYER
BARBARA ANNE BURT	ESTHER WILSON RIDPATH
ISABELLA GRANT (<i>High Honors</i>)	EMILIE KELLOGG SMITH (<i>High Honors</i>)
RUTH MADELEINE LABARRE	

In the Division of Mathematics and the Natural Sciences

HANNAH THOMPSON BROOMELL	DOROTHY JEAN KEEN
JOHN CHRISTOPHER COATES	ERNEST KETCHAM SMITH, JR.
GERTRUDE ELISABETH COURANT (<i>Honors</i>)	ANNE LOUISE STEVENS
SHIRLEY MARIE HIRST	DORA FAYE STEWART (<i>Honors</i>)
MARGARET ELLIS KEELER	GORDON PETERSEN WALKER
	LAURA MILLER YOST (<i>Honors</i>)

JUNE 1944

BACHELOR OF ARTS

In the Division of the Humanities

EDWARD FRENCH BABBOTT	CAROLINE ELIZABETH PAINE
JANE MARIE COX (<i>High Honors</i>)	DORIS ELLEN PARKER
SUE PEMBERTON DAVISON	MARGARITA ROBLES FERNANDEZ DE VILLEGAS
CATHERINE DOANE	MARGARET ANN SCHRODER (<i>Honors</i>)
MARGERY FINIGAN DODSON	FRED CROTHERS SELBY, JR.
RUTH HIDE DOHI	FRANCES WALLIN SHAW
PATRICIA ELY	ELMER AI TALCOTT, JR.
HELEN LOUISE FARNUM	CATHERINE REBECCA TAYLOR
AMY GREEN	VIRGINIA ANNE VERNON
SELDEN KIRBY-SMITH	(<i>High Honors</i>)
EVELYN JONES KLINE	ORA LOUISE WILLIAMS
ANNE WALTON MILLER	GLADYS WOOLFORD
FAITH NEUMANN (<i>High Honors</i>)	

In the Division of the Social Sciences

HOWARD BOWMAN	PHYLLIS ANN NELSON
STEPHEN PRICE BREDIN	(<i>High Honors</i>)
SARAH BRITT (<i>Honors</i>)	ANN ELIZABETH PIKE
MARCIA C. GAUGER (<i>Honors</i>)	(<i>Highest Honors</i>)
ELLEN THOMPSON JENNINGS	KATHRYN ANN SHIELDS
NANCY OLWEN MORGAN	BEATRICE JONES STOALABARGER
(<i>High Honors</i>)	ELIZABETH TWADDELL
RUTH THOMPSON MORGAN	(<i>Highest Honors</i>)

In the Division of Mathematics and the Natural Sciences

JOHN CRAIGE ADLER	GEORGE ARMSTRONG HEISE
WILLIAM GILMOUR CARSON	WILLIAM YOSHIO INOUE
WILLIAM WALLACE CLENDENIN	H. WALTER JONES
EDWARD WINSLOW COUNCILL	ANITA KELLEY
ROBERT LINCOLN EHRMANN	ROBERT WALDO KING, JR.
ELIZABETH DAVIES GIBSON	CATHARINE ELEANOR PRESTON
JOHN HORACE GITHENS, JR.	MARVIN HUNTER ROWE
EDITH ANN GRAEF	ROBERT SHEPPARD SANFORD
JUBERGEN WILHELM HEBERLE	

BACHELOR OF SCIENCE

In the Division of Engineering

FRANK AKUTOWICZ	TOMOMI MURAKAMI
ROBERT JUEL BECK	FRANK HENRY MUSTIN
HARRY C. BOARDMAN, JR.	HARRY WILLIAM NEED, JR.
WILLIAM POPE HUSTON	ROBERT NICHOLS STAUFFER
GEORGE TOSHIO INOUE	ALLEN KIRBY WHITE, II
EDWARD MCCLUNG THOMPSON JONES	JOHN EDWARD ZERBE

OCTOBER 1944

BACHELOR OF ARTS

In the Division of the Humanities

HELEN ELIZABETH BECKER
JULIENNE BROTT
GRETCHEN CHASE

SUZANNE FORWOOD
GERTRUDE BLOOD SEYBOLD
RACHEL ANN WRIGHT

In the Division of the Social Sciences

WINIFRED PETERS BOAK
MARJORIE ANNE GRIFFIN (*Honors*)
ELIZABETH CATE HOISINGTON

MARY PRISCILLA HOLMES
(*High Honors*)
JEAN TALBOT PARKER (*Honors*)

In the Division of Mathematics and the Natural Sciences

HARRIET JOAN BENDER
CRAIG LYON BENJAMIN
ARTHUR MILTON DANNENBERG, JR.

WILLIAM TAYLOR EVANS
MARTHA FUCHS
WILLIAM NELSON STECHER

BACHELOR OF SCIENCE

In the Division of Engineering

ROBERT KENTISH ANDREWS
GUY LESLIE CORNMAN, JR.
ROBERT EARLE RATH

DAVID HOLLISTER WINNE
JOSEPH BERND WOODSON

**CERTIFICATES PRESENTED
TO THE CHINESE NAVAL UNIT**

JUNE 1944

CHANG, HSIN-MIN	CHU, SHU-P'ING	LIU, FU
CHANG, YU	CHU, TZU-YU	LIU, YUNG
CH'ANG, YU-KUEI	HO, SHIH-EN	LO, HSU-FU
CHAO, TE-CHI	HSU, SHIH-FU	LO, TE-TAO
CH'EN, CHEN-I	HU, CHING-TUAN	LU, CHIN-MING
CH'EN, KUO-CHUN	HUANG, CHIH-CHIEH	LUNG, CHIA-MEI
CH'EN, WEN-HUI	HUANG, CH'UNG-JEN	MENG, HAN-CHUNG
CH'EN, YU-SHU	HUANG, HSI-LIN	P'IEN, PAO-CH'I
CHIANG, CHI-SHENG	HUANG, SZU-YEN	T'ANG, YUNG-KEN
CHIANG, TA-CHING	KAO, SHIH-TA	Ts'UI, SHU-YUAN
CHIANG, WEI-PANG	KUAN, MING	TU, HSIEN-CHUN
CH'EN, CHIEN-YUEH	LIANG, TSU-WEN	WANG, MIN-I
CH'EN, EN-PEI	LIN, CHEN-MING	WEI, TUNG-SHENG
CH'EN, HUAL-YUAN	LIN, CHUN-KUANG	WENG, CHIA-LAI
CHU, HUNG-WEN	LIN, HUNG-YUNG	YEH, YU-HU
CHU, PANG-I	LING, K'UEI	YEN, YING

FELLOWSHIPS, SCHOLARSHIPS AND STUDENT AID

FELLOWSHIPS

There are six fellowships offered to graduates of Swarthmore College.

Three fellowships are awarded annually by the faculty, on recommendation of the Committee on Fellowships, to graduates of the college for the pursuit of advanced work under the direction of the faculty or with their approval. Applications for these fellowships are now considered by the committee three times a year, after the dates: January 1, March 15, and August 15.

These 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 W. Lippincott, of the Class of 1875, in memory of his father.

The JOHN LOCKWOOD MEMORIAL FELLOWSHIP of \$600, founded by the bequest of Lydia A. Lockwood, New York, in memory of her brother, John Lockwood. It was the wish of the donor that the fellowship be awarded to a member of the Society of Friends.

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

The MARTHA E. TYSON FELLOWSHIP, founded by the Somerville Literary Society in 1913, is sustained by the contributions of life members of the society and yields an income of \$500 or more. It is awarded biennially by a 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 taught successfully for two years after her graduation and expects to continue teaching. 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.

SCHOLARSHIPS

The **ALUMNÆ 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 is valued at \$500.

ALUMNI SCHOLARSHIPS. Occasional scholarships are provided for men by Alumni clubs in cooperation with the college, on a regional basis. Applications should be addressed to the Dean of Men.

CHINESE SCHOLARSHIPS. The Chinese Naval Officers who attended Swarthmore College in 1943-44 contributed so much to the life of the institution as to interest an alumnus of the college and member of the Board in the possibility of bringing other Chinese students here in the future. He has established accordingly a scholarship fund of \$1,000 a year which may be awarded to one student or divided between two.

Both men and women are eligible to apply. Graduates of Chinese universities as well as undergraduates will be considered, but preference will be given to those whose age and background promise to make them easily adaptable to the life in a residential, undergraduate community. As long as travel from China continues to be difficult, applicants now resident in the United States may apply, provided that they intend to return to China after the war. Eventually it is hoped that scholarship holders will come directly from China and return to work there, in order that these awards may have the maximum use in increasing the friendship and understanding between the two countries.

A scholarship may be renewed if the holder's continued stay at Swarthmore College would seem profitable, the maximum tenure being eight terms. The academic program includes work in science, engineering and the liberal arts, leading to the degree of Bachelor of Arts or

Bachelor of Science. A catalogue giving full information will be sent upon request. A candidate should apply by March before the fall in which he wishes to enter.

The CHI OMEGA SCHOLARSHIP was established by members and friends of the Chi Omega Fraternity. The income provides an award of approximately \$225 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 the fraternity, but if in any year such a candidate does not apply, the committee will select a freshman woman to receive the award. Applications should be sent to the Office of the Deans before January 1st of the year in which the award is to be made. A member designated by the Fraternity serves on the Committee of Award.

CLASS SCHOLARSHIPS. Two scholarships are offered to the highest ranking student in the freshman and in the sophomore classes: the *Anson Lapham* and the *Samuel J. Underhill Scholarships*. Each has the value of \$200, if won by a resident student; of \$100, if won by a day student.

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 \$435. This sum is to be awarded either to freshmen or students in college, with preference given to descendants of the members of the Class of 1915. The Comptroller, the Deans and members of the Class of 1915 designated by Mr. McCabe shall constitute the Committee of Award.

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.

FRIENDS' COLLEGE SCHOLARSHIPS. Swarthmore College, with a group of other Friends' Colleges, has established two kinds of scholarships: (1) to assist Friends discharged from C.P.S. camps to continue their education; (2) to enable students from the smaller Friends' Colleges to spend a year at one of the three cooperating colleges in the Philadelphia area: Bryn Mawr, Haverford and Swarthmore. These scholarships will be granted in varying amounts according to need and ability.

The JOSEPH E. GILLINGHAM FUND, with an annual income of approximately \$2,250, was bequeathed to the College in 1907 with the stipulation, "I request but I do not direct that part of the income of this legacy may be used for free scholarships for meritorious students."

The AARON B. IVINS SCHOLARSHIP is awarded annually to a young man of the graduating class of Friends Central School, Overbrook, Philadelphia. It is awarded under the following conditions: The recipient must have been a student at Friends Central for at least two years, he must have good health, high grades, and must be the best all-around student in his class desirous of entering Swarthmore College. This scholarship, awarded by the faculty of Friends Central School, and subject to the approval of Swarthmore College, has the value of approximately \$450 for a resident student and a maximum of \$400 for a non-resident student.

The GEORGE K. and SALLIE K. JOHNSON FUND provides \$450 a year, to be used, at the discretion of the President of the College, in granting financial aid to young women during their senior year, it being the donor's desire that the President must be satisfied that the applicant is fitted to become a desirable teacher.

The income of the KAPPA ALPHA THETA SCHOLARSHIP FUND, given by members and friends of the Kappa Alpha Theta Fraternity at Swarthmore, is awarded annually to a woman student. The award amounts to approximately \$125 annually. One or more members of the fraternity who are on the Board of Managers serve on the Committee of Award.

The JESSIE STEVENSON KOVALENKO SCHOLARSHIP FUND, the gift of Michael S. Kovalenko in memory of his wife, provides an annual income of \$225. This sum is to be awarded to a student in the Department of Astronomy.

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

MEMORIAL SCHOLARSHIPS IN CLASSICS AND ANCIENT HISTORY. In memory of William Hyde Appleton, Ferris W. Price, and Walter Dennison, Professors of Classics at Swarthmore College prior to 1917, two scholarships are offered, one to a man, one to a woman who desires to specialize in Greek, Latin, Classics, or Ancient History. Each award

normally carries a stipend of \$200 a term. The scholarships are competitive. In addition to the requirements for the Open Scholarships, the candidate must make a high rating in a competitive Latin Reading test set by the Department of Classics.

The JAMES E. MILLER SCHOLARSHIP provides an annual income of approximately \$340 which may be applied toward the payment of board and tuition of students of Delaware County (preference to be given to residents of Nether Providence Township). The Chester-Cambridge Trust Company acts as Trustee of this fund and selects the holder of the scholarship, in consultation with the Superintendent of Schools of Delaware County and of the City of Chester, and subject to the approval of Swarthmore College.

OPEN SCHOLARSHIPS FOR MEN. Swarthmore College awards annually five four-year scholarships of \$500 a year 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. All candidates are required to take the Scholastic Aptitude and Achievement Tests given by the College Board. Blanks with further information may be obtained from the admissions office of the college.

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, in the names of Howard White, Jr., Serena B. White, and Walter W. Green. These scholarships are given to candidates who, in the opinion of the Committee of Award, rank highest in scholarship, character and personality. Each award normally carries an annual stipend of \$500 and is tenable for four years. All candidates are required to take the Scholastic Aptitude and Achievement Tests given by the College Board. Blanks with further information may be obtained from the admissions office of the college.

The HARRIET W. PAISTE FUND is limited by the following words from the donor's will: "the interest to be applied annually to the education of female members of our Society of Friends (holding their Yearly Meeting at Fifteenth and Race Streets, Philadelphia) whose limited means would exclude them from enjoying the advantages of an education at the college." The value of this scholarship is approximately \$360 annually.

The T. H. DUDLEY PERKINS MEMORIAL SCHOLARSHIP is awarded annually to a young man selected by a committee of the faculty appointed by the President of the college for the purpose. The award will be made on the basis of qualities of manhood, force of character and leadership; literary and scholastic ability; physical vigor as shown by participation in out-of-doors sports or in other ways.

The WILLIAM PLUMER POTTER FUND FOR THE ENCOURAGEMENT OF PUBLIC SPEAKING provides an income of approximately \$225 to be used for scholarships to upperclass students demonstrating proficiency in the discussion of public affairs. Juniors and seniors interested in the scholarship should register with Dean Hunt. Competitors submit these on public questions to a Faculty Committee and also present their main conclusions orally, after which they are cross-examined.

The MARY COATES PRESTON SCHOLARSHIP FUND. A sum of money has been left by will of Elizabeth Coates, the annual interest of which will be about \$450. This amount is given as a scholarship to a young woman student in Swarthmore College, preferably to a relative of the donor.

The WILLIAM G. AND MARY N. SERRILL HONORS SCHOLARSHIP is a competitive Honors Scholarship for Men, awarded to a candidate for admission to the college, based upon the general plan of the Rhodes Scholarships. It is tenable for four years, subject to the maintenance of a high standing in college. The annual stipend is \$375. Preference will be given to men who are residents of Abington Township, including Jenkintown and Glenside. Montgomery County, Pa., but if there is no outstanding candidate from this locality, the scholarship will be open to competition generally.

The ANNIE SHOEMAKER SCHOLARSHIP is granted annually to a young woman of the graduating class of Friends Central School, Overbrook, Philadelphia. The recipient must have been a student at Friends Central for at least two years, she must have good health, high grades, and must be the best all-around student in her class desirous of entering Swarthmore College. This scholarship, awarded by the faculty of Friends Central School, and subject to the approval of Swarthmore College, has the value of \$500 for a resident student and \$400 for a day student.

The HELEN E. W. SQUIER SCHOLARSHIP, originally one of the Anson Lapham Scholarships, is awarded annually by Mrs. Chester Roberts, of Swarthmore, to a student in need of financial aid.

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 \$472.50 annually.

The PHEBE ANNA THORNE FUND provides an income of approximately \$2,250 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. These scholarships are awarded by the college under the regulations fixed by the board.

The WESTBURY QUARTERLY MEETING, N. Y., SCHOLARSHIP, amounting to \$350, is awarded annually by a committee of that Quarterly Meeting.

The SAMUEL WILLETS FUND yields an income of approximately \$4,500 annually, "to be applied to educate in part or in whole such poor and deserving children as the Committee on Trusts, Endowments and Scholarships of said college may from time to time judge and determine to be entitled thereto."

In addition to the above fund, Samuel Willets gave scholarships in the name of his children, FREDERICK WILLETS, EDWARD WILLETS, WALTER WILLETS, and CAROLINE W. FRAME. These scholarships have the value of \$225 each. They are awarded by the respective parties, their heirs or assigns, or in the event that the heirs do not exercise their right, by the college authorities.

The I. V. WILLIAMSON SCHOLARSHIPS. Ten scholarships of the value of \$150 each for resident students and \$75 for day students are offered to graduates of designated Friends schools, under the following conditions:

Candidates must apply to the Office of the Deans at the college before March first.

Candidates must take the scholarship examinations given by the College Entrance Examination Board. The results of these examinations, together with other evidence of achievement and promise, will determine the ward.

The scholarships are distributed as follows: two each to graduates of Friends Central and George School, one in the boys' and one in the girls' department; and one each to New York Friends Seminary, Baltimore Friends School, Wilmington Friends School, Moorestown Friends School, Friends Academy at Locust Valley, Sidwells Friends School and Brooklyn Friends School.

Any income not utilized in accordance with these conditions is used for free scholarships in accordance with the will of the donor.

The EDWARD CLARKSON WILSON SCHOLARSHIP. A scholarship with an annual value of \$125 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. In any year when there is no outstanding candidate from the students of the Baltimore Friends School, the scholarship may be awarded to another young man or woman who shall meet the required standards and who is approved by the school faculty and the college.

The MARY WOOD FUND is limited by the following words from the donor's will: "the income thereof to be, by the proper officers thereof, applied to the maintenance and education at said college of one female student therein, one preparing for the avocation of a teacher to be preferred as the beneficiary, but in all other respects the application of the income of said fund to be in the absolute discretion of the college." The value of this scholarship is approximately \$62.50 annually.

Each of the following funds yields annually about \$225 and is awarded at the discretion of the college to students needing pecuniary aid:

- The BARCLAY G. ATKINSON SCHOLARSHIP FUND.
- The REBECCA M. ATKINSON SCHOLARSHIP FUND.
- The WILLIAM DORSEY SCHOLARSHIP FUND.
- The GEORGE ELLSLER SCHOLARSHIP FUND.
- The THOMAS L. LEEDOM SCHOLARSHIP FUND.
- The SARAH E. LIPPINCOTT SCHOLARSHIP FUND.
- The MARK E. REEVES SCHOLARSHIP FUND.
- The JOSEPH T. SULLIVAN SCHOLARSHIP FUND.
- The DEBORAH F. WHARTON SCHOLARSHIP FUND.
- The THOMAS WOODNUTT SCHOLARSHIP FUND.

STUDENT AID

From General Funds

In addition to the scholarships listed above, three kinds of assistance are provided from general college funds: honorary scholarships, college jobs, and grants-in-aid.

HONORARY SCHOLARSHIPS are granted in recognition of good scholastic standing and financial need.

COLLEGE JOBS afford opportunities to earn money by regular work at current wage rates in one of the college offices, shops, laboratories or libraries. A student may hold a "college job" in addition to a scholarship or a grant-in-aid and commonly receives notice of both types of assignment at the same time.

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

(OUTSIDE EMPLOYMENT. Students themselves operate various agencies and services and employ new students each year. Residents of the borough of Swarthmore often send requests for services to the college which cooperates in making these opportunities known to students. Many students secure profitable employment entirely on their own initiative.)

From Special Loan Funds

Several loan funds are administered by a committee to which application should be made through the comptroller of the college.

THE CLASS OF 1913 LOAN FUND was established by the Class of 1913 at their twenty-fifth reunion. Both principal and income are to be used to provide a loan fund for students in the three upper classes. Individual students may borrow up to \$200 in any one year, the loans to be repayable within five years with interest at four percent.

THE CLASS OF 1916 LOAN FUND was established by the Class of 1916 at their twenty-fifth reunion. The fund is designed to provide

loans to senior students, preferably descendants of members of the Class of 1916, or to other students at the discretion of the administering committee. The loans are repayable not later than five years after graduation, with interest at the rate of four percent.

THE CLASS OF 1917 STUDENT LOAN REVOLVING FUND was established by the Class of 1917 at their twenty-fifth reunion. The fund is designed to provide loans for needy students who are accelerating their college work due to the war emergency, and the Class of 1917 has provided that at the conclusion of the present war, this fund shall be utilized in connection with such general purposes as the committee shall deem advisable.

The JOHN A. MILLER LOAN FUND was established by the Class of 1912 at their twenty-fifth reunion. Both principal and income are to be used to provide a loan fund for students in the three upper classes. Individual students may borrow up to \$200 in any one year, such loans to be repayable within five years with interest at four percent.

The PAUL M. PEARSON LOAN FUND was established by a number of Dr. Pearson's friends as a memorial for perpetuating his life and spirit. Both principal and income may be used for loans to students, repayable not later than five years after graduation, with interest at the rate of four percent.

The SWARTHMORE COLLEGE STUDENT LOAN FUND was established by Mr. Clarence J. Gamble, who, feeling such a fund to be of unusual benefit to worthy students, gave a sum to the college on condition that the board should set aside an equal amount to be added to the fund. Both principal and income may be used for loans to students, repayable not later than five years after graduation, with interest at the rate of four percent.

The ELLIS D. WILLIAMS FUND. By the will of Ellis D. Williams, a legacy of \$25,000 was left to the college, the income from which is to be used for loans to students, repayable not later than five years after graduation, with interest at the rate of four percent.

SPECIAL AWARDS

The IVY MEDAL FUND was created by a gift from Owen Moon, '94. The income of the fund is used to purchase a medal which is placed in the hands of the faculty for award on Commencement Day to a male member of the graduating class. The regulations governing the award are as follows:

(1) The qualifications for the Ivy Medal are similar to those for the Rhodes Scholarships and include (a) qualities of manhood, force of character, and leadership; (b) literary and scholastic ability and attainments. These have been phrased by the donor in the words "leadership based upon character and scholarship."

(2) It is the wish of the donor that the medal should not be awarded on a mere basis of averages. Instead, it is desired that the winner should be a man who gives promise of distinction either in character or in intellectual attainments, as opposed to a man who has merely made the most of mediocre abilities.

(3) On the other hand, it is the wish of the donor that the medal should not go to a man who, while showing excellence in some one respect, has fallen seriously below the standard in others.

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

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

The CRANE PRIZE, a memorial to Charles E. Crane, Jr., of the Class of 1936, is an award of about \$20, given for the purchase of philosophical books, and presented annually to the junior who, in the opinion of the department, has done the best work in Philosophy.

The A. EDWARD NEWTON LIBRARY PRIZE, 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, endowed by the Delta Gamma Fraternity in memory of Katherine B. Sicard, ex '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 annual contests in public speaking are provided by two funds as follows: The ELLA FRANCES BUNTING EXTEMPORARY SPEAKING FUND awards \$45 in six prizes, three for men and three for women, for the best extemporaneous short speeches. The OWEN MOORE FUND provides the Delta Upsilon Speaking Contest prizes totalling \$25 for the best prepared speeches on topics of current interest.

The GEORGE FOX AWARD of \$100 is presented annually by an anonymous friend of the College to the undergraduate who writes the best essay on some phase of the history or testimonies of the Society of Friends.

The ELIZABETH FRY AWARD of \$50, together with an autographed copy of Janet Payne Whitney's biography of Elizabeth Fry, is presented annually by an anonymous friend of the College to the undergraduate who writes the best essay on some aspect of the social attitudes and activities of some Quaker individual or group, preferably of recent times.

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

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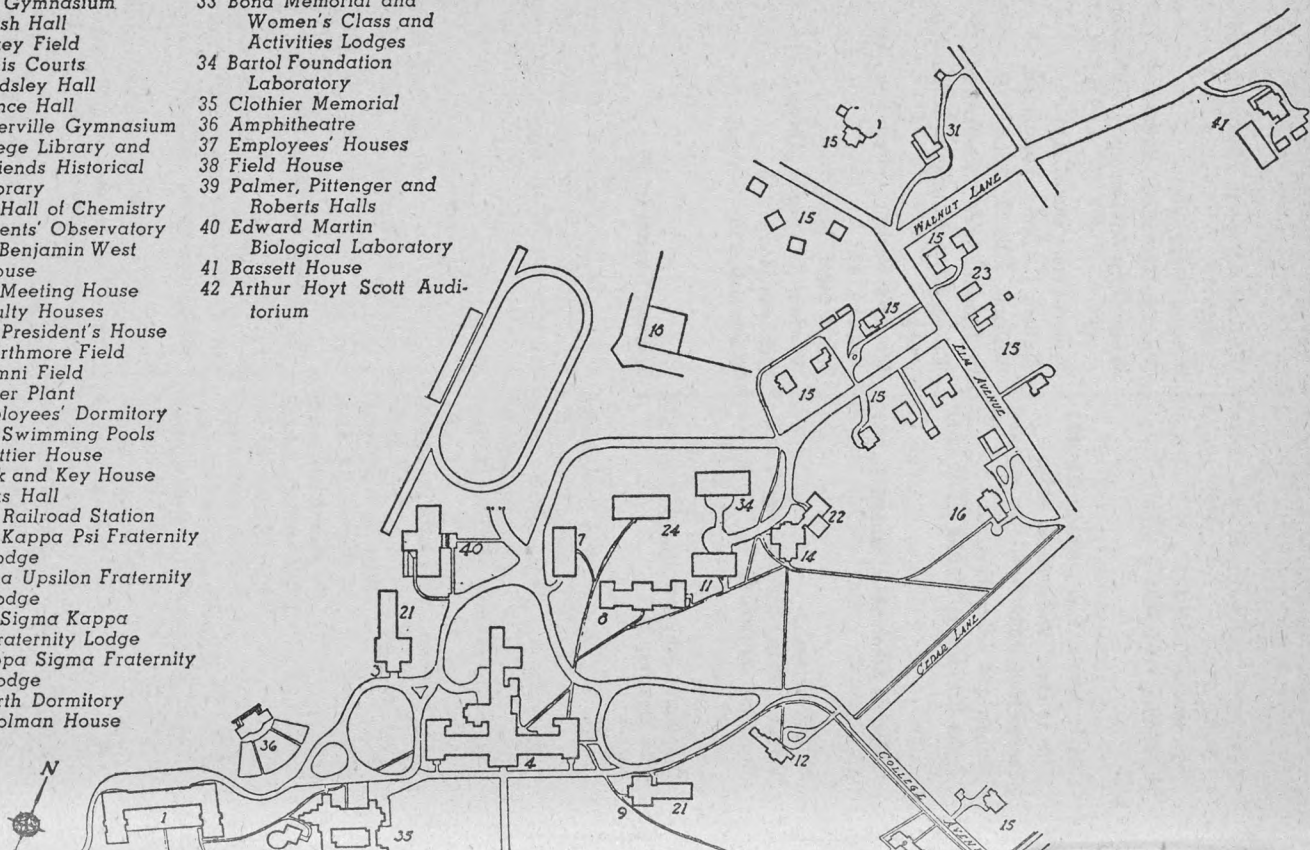
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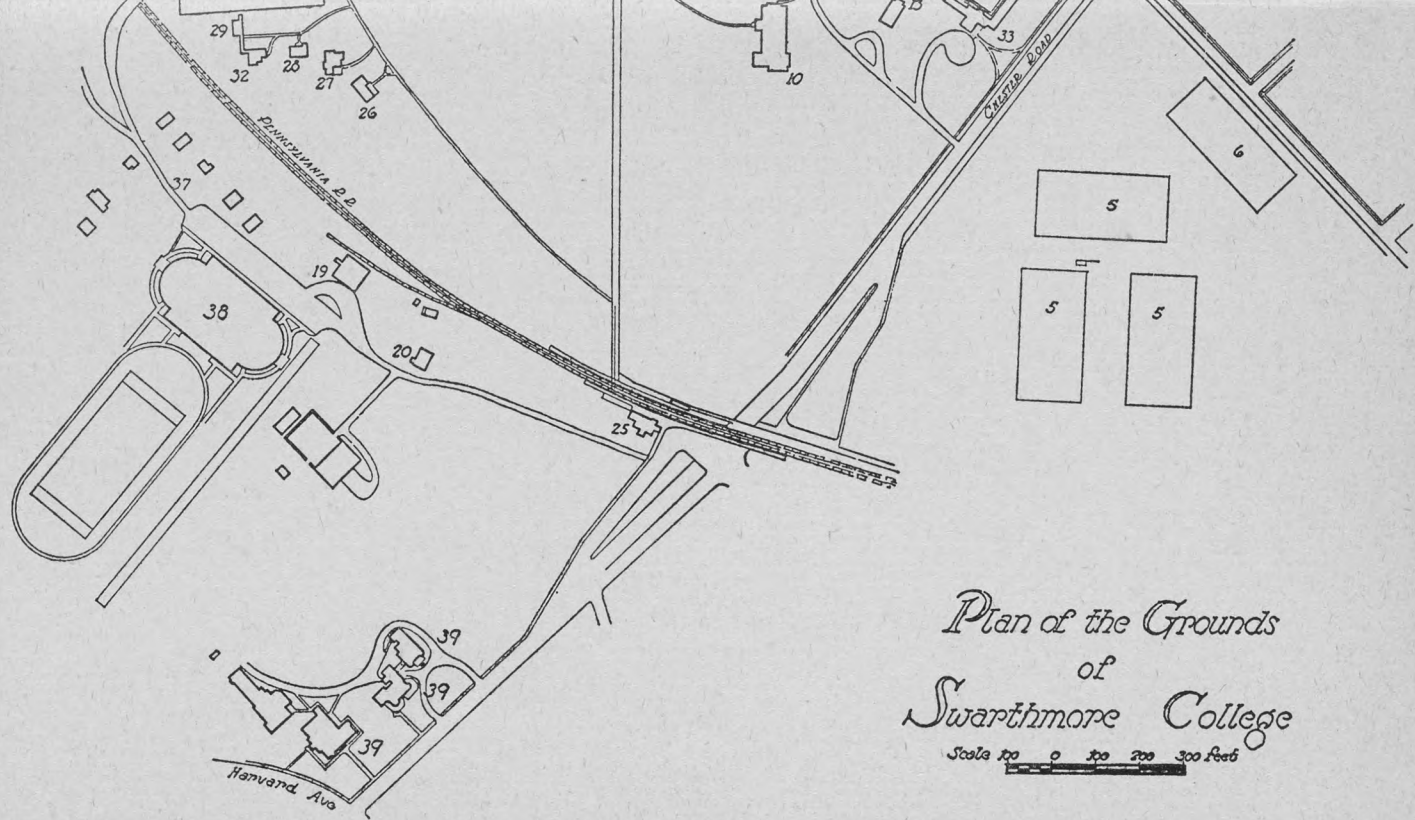
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*Plan of the Grounds
 of
 Swarthmore College*

Scale 100 0 100 200 300 feet

