

**SWARTHMORE
COLLEGE
BULLETIN**

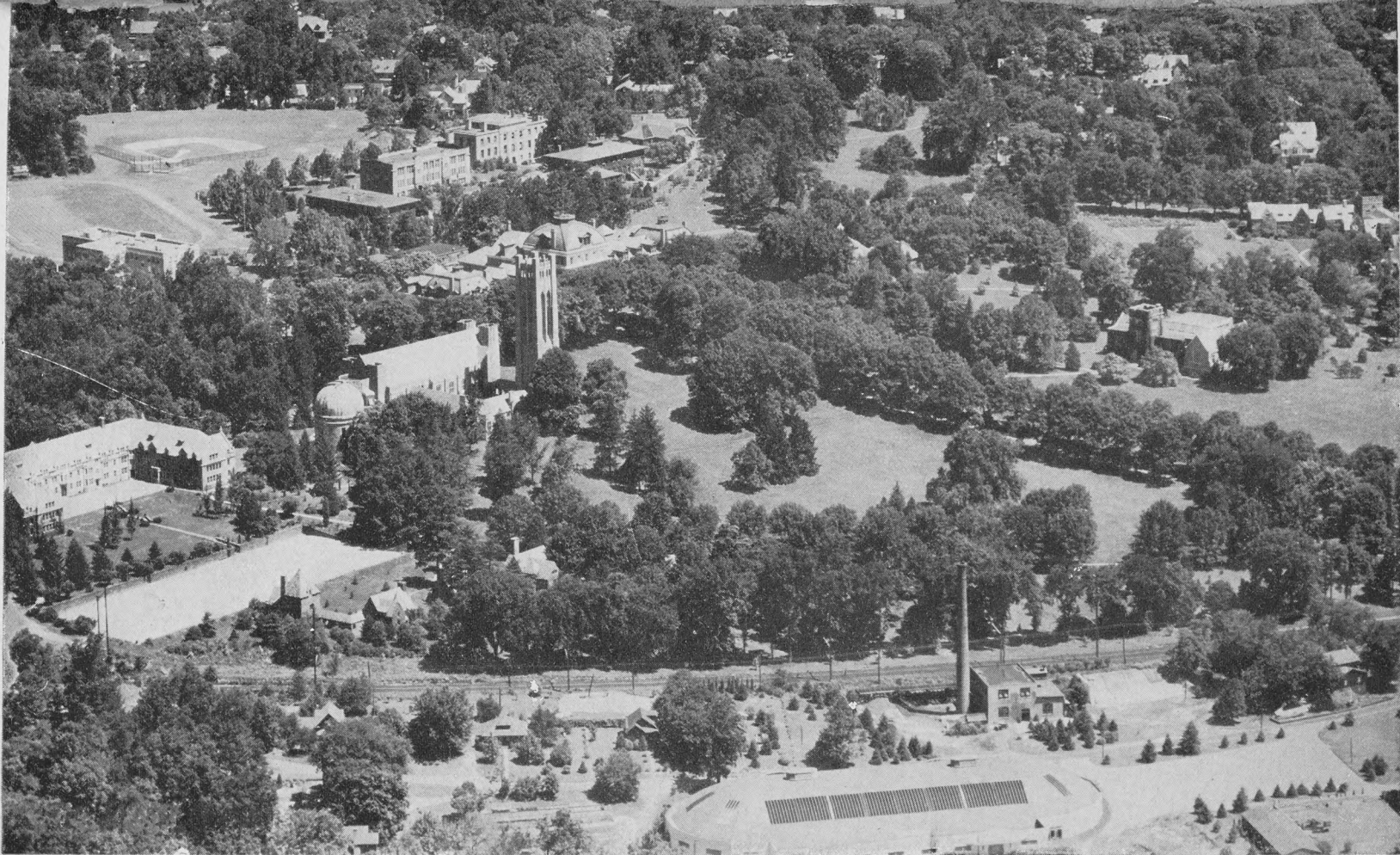
JAN 20 1947

**CATALOGUE
1946-1947**



The Bulletin, of which this publication is Volume XLIV, No. 3, is published quarterly by Swarthmore College, from the College Office, Swarthmore, Pa.

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.



The Campus from the Air.



The Isaac H. Clothier Memorial.

SWARTHMORE COLLEGE BULLETIN

CATALOGUE

1946-1947



SWARTHMORE, PENNSYLVANIA

Volume XLIV

Number 3

Twelfth Month, 1946

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1946-49

SWARTHMORE COLLEGE ● SWARTHMORE, PENNSYLVANIA

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1946

OCTOBER							NOVEMBER							DECEMBER							
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1947

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1948

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29							25	26	27	28	29	30	27	28	29	30						

College Calendar

1946

Winter Semester

- Ninth Month 27-29 Freshman placement days
Ninth Month 30 Meeting for organization of seminars, 10:00 a.m.
Registration and enrollment in classes, 1:30 to
4:30 p.m.
Tenth Month 1 Classes and honors seminars begin
Eleventh Month 28 Thanksgiving Day (holiday)
Twelfth Month 19 Christmas recess begins, 6:00 p.m.

1947

- First Month 3 Christmas recess ends, 8:00 a.m.
First Month 18 Classes end for second-semester seniors
First Month 23 Honors seminars end
First Month 25 Classes end
Registration and enrollment in classes, 1:30 to
4:30 p.m.
First Month 27, 28 Review period for course students
Senior written comprehensives
First Month 28 Honors written examinations begin
First Month 29 Mid-year examinations begin
Second Month 5 Honors written examinations end
Second Month 6 Mid-year examinations end
Second Month 7, 8 Honors oral examinations

Spring Semester

- Second Month 10 Classes and honors seminars begin
Third Month 28 Spring recess begins, 6:00 p.m.
Fourth Month 8 Spring recess ends, 8:00 a.m.
Fifth Month 22 Honors seminars end
Fifth Month 24 Classes end for second-semester seniors
Fifth Month 27 Honors written examinations begin
Fifth Month 31 Classes end
Enrollment in classes for winter semester, 1:30 to
4:30 p.m.
Sixth Month 2, 3 Review period for course students
Senior written comprehensives
Sixth Month 4 Honors written examinations end
Final examinations begin
Sixth Month 5-7 Honors oral examinations
Sixth Month 12 Final examinations end
Sixth Month 13 Class Day
Sixth Month 14 Alumni Day
Sixth Month 15 Baccalaureate Day
Sixth Month 16 Commencement Day

1947

Winter Semester

- Ninth Month 19-21 Freshman placement days
- Ninth Month 22 Registration, 1:30 p.m.
- Ninth Month 23 Classes and honors seminars begin
- Eleventh Month 27 Thanksgiving Day (holiday)
- Twelfth Month 20 Christmas recess begins, 11:00 a.m.

1948

- First Month 5 Christmas recess ends, 8:00 a.m.
- First Month 10 Classes end for second-semester seniors
- First Month 15 Honors seminars end
- First Month 17 Classes end
Registration, 1:30 p.m.
- First Month 19, 20 Review period for course students
Senior written comprehensives
- First Month 20 Honors written examinations begin
- First Month 21 Mid-year examinations begin
- First Month 28 Honors written examinations end
- First Month 29 Mid-year examinations end
- First Month 30, 31 Honors oral examinations

Spring Semester

- Second Month 2 Classes and honors seminars begin
- Third Month 27 Spring recess begins, 11:00 a.m.
- Fourth Month 5 Spring recess ends, 8:00 a.m.
- Fifth Month 13 Honors seminars end
- Fifth Month 15 Classes end for second-semester seniors
- Fifth Month 18 Honors written examinations begin
- Fifth Month 22 Classes end
Enrollment in classes for winter term, 1:30 p.m.
- Fifth Month 24, 25 Review period for course students
Senior written comprehensives
- Fifth Month 26 Honors written examinations end
Final examinations begin
- Fifth Month 27-29 Honors oral examinations
- Sixth Month 3 Final examinations end
- Sixth Month 4 Class Day
- Sixth Month 5 Alumni Day
- Sixth Month 6 Baccalaureate Day
- Sixth Month 7 Commencement Day

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Introduction to Swarthmore College

The College Community

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

Swarthmore is a residential college with an enrollment, in normal years, of seven hundred and fifty students, equally divided between men and women. Its students are drawn from a wide variety of backgrounds. (See table of geographical distribution of students, page 125.) The campus, a tract of about 250 rolling acres in Delaware County, contains the dormitories and class room buildings. In addition, a large number of faculty houses are within campus boundaries, making it possible for students to have valuable social contacts with their professors outside the class room.

The borough of Swarthmore is a small residential suburb within half an hour's commuting distance of Philadelphia on the West Chester Branch of the Pennsylvania Railroad. Situated on U.S. Highway No. 1 about twelve miles southwest of Philadelphia, Swarthmore is easily accessible by car.* Swarthmore students are therefore able to combine the advantages of a semi-rural setting with the opportunities offered by Philadelphia. Especially valuable is the cooperation possible with three other nearby institutions, Bryn Mawr and Haverford Colleges and the University of Pennsylvania.

The Educational Program

Swarthmore's educational program is based on the philosophy that self-discovery and self-development are more valuable than the simple demonstrative method of teaching. Therefore, whenever it is possible, students are encouraged to make their own analyses, based on original source material or on laboratory experiments.

Believing also that a liberal education is based on knowledge in many areas of human experience, the college requires that freshmen and sophomores take a wide variety of courses. This plan allows them to test their ability in subjects they have already studied and to

* To reach the college, motorists should turn off Route 1 to Pennsylvania State Highway 320 in the direction of Chester and continue south along Chester Road about half a mile until reaching College Avenue. There a right turn is made to the college campus.

explore new fields. By the end of their sophomore year, students are expected to make two decisions: first, what their field of concentration will be for the last two years; and secondly, whether they prefer to take "honors work" or to continue their study in regular courses.

"Honors work" (see pages 52 to 55) is a method of study open to juniors and seniors who have shown independence and responsibility in their academic work. They are freed from classroom routine and instead, meet with their instructors in small weekly seminar groups for discussion and evaluation of their work. Since a student pursues only one major and one related minor subject during a semester, this system facilitates greater concentration and greater independence than is possible under the usual academic routine. The development of the "honors" or seminar method was begun under President Aydelotte in 1922, and because of its success, has been widely imitated in other institutions.

Post War Adjustments

Swarthmore College sought to meet its obligations during the war emergency both 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 end in view, students were urged to carry on, as far as possible, the kind of program in which they would find their fullest personal development, in the confidence that they would thereby become capable of the richest possible contribution to their communities. The immediate need for preparing men and women for national service was met by a variety of courses, not only in the natural sciences and engineering, but also in the humanities and the social sciences, including a certain number of courses specially designed to fit the curricula of the U.S. V-12 Naval Unit which was stationed at the college from July 1943 to June 1946.

The termination of the V-12 program coincided with the discharge from war service of large numbers of veterans eligible for college training under the "GI Bill" and other legislation. In order to make room for former Swarthmore students and other carefully selected veterans, and to continue to accept a normal number of secondary school graduates, the college has temporarily expanded its pre-war enrollment by nearly forty per cent. Through the purchase of the buildings and property of the Mary Lyon School, the college has been able to house a considerably larger number of students in campus dormitories than was possible in previous years. In this way it is hoped that the community spirit which has been characteristic of Swarthmore life can be maintained.

Admissions Procedure

Applications for admission should be addressed to the Deans of the College: from men, to Dean Everett L. Hunt; from women, to Dean Susan P. Cobbs.

General Statement

Admission to the Freshman Class is normally based upon the satisfactory completion of a four-year program preparatory to advanced liberal study. Applicants are selected on the following evidence:

1. Record in secondary school.
2. Recommendation of the school principal or headmaster and of others who know the applicant.
3. Ratings in the Scholastic Aptitude Tests, and in three of the Scholastic Achievement Tests given by the College Entrance Examination Board. Other ratings will also be considered, and in some cases, special tests may be given by the college. The special tests for veterans are described on pages 27 and 28.
4. Personal interview with one of the Deans or an appointed representative.
5. Reading and experience, both in school and out.

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

Preparation

Applicants are urged to make their choice of college as early as possible in order to plan the work of their school years with the assistance of the Committees on Admission. In general, preparation should include:

1. *Skills:* The following skills are essential to success in college work and should be brought to a high level by study and practice throughout the preparatory period:

- a. The use of the English language with accuracy and effectiveness in reading, writing, and speaking.
 - b. The use of the principles of arithmetic, algebra, and plane geometry.
 - c. The use of one, or preferably of two, foreign languages to the point of reading prose of average difficulty at sight, and of writing and speaking with some ease and proficiency.
2. *Subjects:* All, or almost all, of the preparatory course should be composed of the subjects listed in the following four groups. Variations of choice and emphasis are acceptable although some work should be taken in each group.

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

Literature and Art: American, English, and foreign literatures, ancient and modern; music, art, architecture.

Natural Science and Mathematics: chemistry, physics, biology, astronomy; algebra, geometry, trigonometry. (A college major in science or engineering presupposes substantial work in algebra, in plane and, if possible, solid geometry, and in trigonometry.)

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

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. Four terms of study at Swarthmore College constitute the minimum requirement for a degree, two of which must be those of the senior year.

Applications and Examinations

Applications must be filed in the Office of the Deans by February 15 for women, by March 15 for men, of the year the candidate wishes to be admitted. A registration fee of \$5.00, which is not refundable, is required of all applicants. All candidates, except veterans, 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. In 1947 the date on which these tests are to be taken will be Saturday, April 12. For further information please write to the College Entrance Examination Board, Box 592, Princeton, N. J.

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

Veterans are permitted to take either the special aptitude test for veterans of the College Entrance Examination Board or the USAFI Tests of General Educational Development (college level). The former test is given bi-monthly in New York, Philadelphia, and certain other cities. Application blanks for the test may be obtained from the college. It consists of three parts: Verbal and Mathematical Aptitude, and a third section in which the candidate may choose either Spatial Relations or Physical Science or Social Studies Reading. Men who are planning to major in Engineering are advised to take the Spatial Relations test, while others should select that section which most nearly corresponds with their proposed field of study. Both this test and the tests of General Educational Development can be given at the College when necessary.

No additional tests are required of candidates for scholarships. Applicants for the competitive Open Scholarships, however, must write for a special application blank at least two weeks in advance of the date on which applications for admission are due (see above). The Open Scholarships, of which five are offered for men and three for women each year, have a value of \$500 per annum for four years; fuller information concerning them will be found on page 32.

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

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 veterans to follow an accelerated program if desired. No summer term was held at Swarthmore in 1946 but arrangements were made for veterans to attend the summer session in certain other institutions. It is expected that similar opportunities will be offered next summer.

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 expected to take either the special aptitude test for veterans of the College Entrance Examination Board or the Tests of General Educational Development (college level) of the United States Armed Forces Institute. Information about these tests may be secured by writing 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 (Public Law 346 as amended) provides for government aid to the veteran in completing his education. Application for this aid should be made on a form obtainable at the various branch offices of the Veterans Administration

or at the college. Eligible veterans will receive a Certificate of Eligibility and Entitlement which should be presented to the college at the time of registration. Disabled veterans may apply for vocational rehabilitation and training under Public Law 16. Veterans are eligible for college scholarships 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.

Expenses

Charges per academic year of two semesters:

Board, room, and tuition	\$1000
Fees	50

Total charges\$1050

While a general charge for board, room, and tuition is made, this may be divided into \$500 for tuition and \$500 for board and room. The uniform charge of \$25 per semester covers the costs of student health, class dues, athletic fees, arts and crafts, subscription to the undergraduate newspaper, and the support of several other extra curricular activities.

An additional deposit of \$25 is required of each student, payable in advance, to cover incidental bills. Students may charge purchases at the college bookstore, laundry, telephone, room breakage, and other incidentals against this deposit. When it has been exhausted a new deposit will be required immediately. Any unused balance is returned.

One half of the total sum is due not later than Registration Day at the beginning of the fall semester. Bills are mailed before the opening of the current term. Payments should be made by check or draft to the order of SWARTHMORE COLLEGE. 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 Business Manager, Mr. Charles G. Thatcher.

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 Business Manager at the time of withdrawal. Fees cannot be refunded for any reason whatever.

The Tuition Plan

Many of the parents of students may wish to pay all tuition, fees, and residence charges on a monthly basis. It is now possible to arrange this under The Tuition Plan. The cost is four per cent greater than when payments are made in cash in advance. Details of its operation will be furnished by the College with the first semester's bill in September.

Student Aid and Scholarships

The college furnishes scholarships and financial assistance to deserving students from its general funds and from special endowments. All applications for scholarships are handled by the Committee on Admissions and Scholarships and should be addressed to the Deans.

HONORARY SCHOLARSHIPS are granted by the college in recognition of good scholastic standing and financial need. The specially endowed scholarship funds are listed on pages 32 to 38.

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.

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. The distribution of jobs among those authorized to hold them is made by the Business Manager. Residents of the borough of Swarthmore often send requests for services to the college, which cooperates in making these opportunities known to students.

Special Loan Funds

Several loan funds are administered by a committee to which application should be made through the Business Manager 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 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.

Endowed Scholarships

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 **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.

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.



Worth Hall (a Dormitory for Women).



The Chinese Memorial Fountain and Part of Wharton Hall (a Dormitory for Men)

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. Underbill 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 Business Manager, the Deans, and members of the Class of 1915 designated by Thomas B. McCabe shall constitute the Committee of Award. This Fund will become a part of the General Endowment of the College on Alumni Day, 1970.

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 RACHEL W. HILLBORN SCHOLARSHIP was founded by Anne Hillborn Philips of the Class of 1892 in memory of her mother, with

the stipulation that the income shall go to a student in the junior or senior class who is studying for service in the international field. Preference will be given to a Friend or to one who intends to contribute to world understanding through diplomatic service, participation in some international government agency, the American Friends Service Committee, or similar activities. The annual income amounts to approximately \$450.

The 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 Michel Kovalenko in memory of his wife, provides an annual income of \$225. This sum is to be awarded to a student, preferably a woman, who is in her junior or senior year and who is a major in astronomy, or to a graduate of the college, preferably a woman, for graduate work in astronomy at Swarthmore or elsewhere.

The 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.

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 award.

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.

College Life

Housing

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

Residence Halls

There are four dormitories for men: Wharton Hall, named in honor of its donor, Joseph Wharton, at one time President of the Board of Managers; and three buildings on the newly purchased Mary Lyon School property.

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

Roberts Hall on South Chester Road has been converted into apartments for a limited number of married veterans.

Dining Rooms

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

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 exercises, save in so far as the brief devotional element in Collection (see below) may be so considered. 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.

An assembly of the college, called Collection, is held at 11.00 a.m. every Thursday in Clothier Memorial; attendance of students is required. There is regularly a period of silence according to the Friendly tradition and, when these are in keeping with the remainder of the program, the singing of hymns and a reading from the Bible. Lasting from one-half to three-quarters of an hour, Collection normally includes an address; but this is varied by the occasional introduction of musical, dramatic, and other programs.

Student Welfare

Health

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

Educational Resources

Following are descriptions of the libraries, foundations and special collections which enrich the academic background of the college:

The SWARTHMORE COLLEGE LIBRARY, in part the gift of Andrew Carnegie, contains reading rooms, offices, and a collection of 142,000 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 BIDDLE MEMORIAL LIBRARY is an attractive fire-proof structure of stone and steel given by Clement M. Biddle, '96, in memory of his father, Clement M. Biddle, who served for over twenty years as a member of the Board of Managers or as an officer of the Corporation of the College. This Library contains two important Collections: the Friends Historical Library and the Swarthmore College Peace Collection.

The Friends Historical Library, founded in 1870 by Anson Lapham, is one of the outstanding collections in the United States of manuscripts, books, pamphlets, and pictures relating to the history of the Society of Friends. The library is the central depository for the record of Friends' meetings belonging to Philadelphia Yearly Meeting (Race Street). The number of record books of these meetings totals about 900, 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. 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.

Also housed in the Biddle Memorial Library is the Swarthmore College 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.

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*. Philadelphia, University of Pennsylvania Press, 1941.

THE BENJAMIN WEST SOCIETY, an organization of alumni, members of the faculty, and friends of the college, is building up a collection of 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 original clay models and plaster casts of his works. It is not open to visitors, since the building in which it is temporarily stored for safe keeping is not suitable for exhibitions.

The JAMES D. EGLESON MURALS. In the Auditorium of Hicks Hall is a series of frescoes by James D. Egleson, '29, a former student of Orozco. The artist has depicted conditions and concepts out of the life of our times in America as they are affected by industrialization and the science of engineering.

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 forty-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.)

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.

Extra-Curricular Activities

In addition to the foregoing organizations, Swarthmore students have an opportunity to participate in a program of extra-curricular activities wide enough to meet every kind of interest. No credit is given for work in such varied fields as sculpture, play-writing, publishing the school newspaper or playing the cello in the orchestra. However the college encourages a student to participate in whatever group best fits his personal talents and inclinations, believing that satisfactory avocations are a necessary part of life for the well-rounded individual. It has provided instruction or advisors wherever there has been sufficient demand. A handbook describing all activities, written by the students themselves, can be had upon request to the Deans Office.

Vocational Office

The college provides vocational information and advice to assist students in their choice of a career. The Vocational Director for Men, Carl K. Dellmuth, and the Vocational Director for Women, Mrs. Cecile Beeman, periodically plan conferences and field trips, and arrange interviews with key employers. They offer help to students in finding employment. In addition, summer work is planned to give students job experience in various fields.

Alumni Office

The Alumni Office keeps records of the addresses of all living graduates and alumni of the college. It also publishes periodically the Swarthmore alumni magazine, *THE GARNET LETTER*. The Alumni Secretary acts as liason for the college with all alumni and alumni groups, interpreting to them present plans and policies of the college.

The Educational 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. For veterans and, in special circumstances, for other students an accelerated program of three terms a year is optional. See page 28.

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. Five full courses or their equivalent in half courses constitute the normal program for each of the first two years. A full course represents from eight to twelve hours of work a week for two terms, including class meetings and laboratory periods. The program for upper class students affords a choice between two methods of study: Honors Work, leading to a degree *with Honors*, and General Courses. An honors student concentrates on three related subjects which he studies by the seminar method. At the end of his senior year he must take a battery eight examinations on the work of his seminars, posed by competent outside examiners. (The system will be explained more fully below.) A student in general courses has a somewhat wider freedom of election and takes four full courses or their equivalent in each of the two years. He is required to pass comprehensive examinations in his major and minor subjects, posed by the members of those departments.

For variations from this basic plan in the Division of Engineering see pages 76 to 79.

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. 105 to 107) and must attend the Collection exercises of the college (see p. 56).

* For groupings of departments, see page 17.

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.

Program for Freshmen and Sophomores

The program for the first four terms is designed primarily to contribute to a student's general education by giving him an introduction to the methods of thinking and the content of knowledge in a variety of fields:

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.

The following subjects, therefore, designed to serve as a broad and sound background for the more specialized work of the last two years, are included in the program of the first two years for all students (except those in the Division of Engineering; see pages 76-78):

Foreign Language—through Course 2B (see below)

History—full course (except for science students who may substitute a second social science)

Literature—half course Philosophy—half course

Psychology—half course

Social Science—full course in either Economics or Political Science

Natural Science or Mathematics—full course or two half courses.

(A full course in Mathematics is required for science students.)

As far as possible, these requirements are to be completed during the first year. It is usual, however, to defer Psychology to the first term of the second year. Science students, moreover, must ordinarily

defer History (or the alternative second social science) to the second year.

In addition to the requirements listed above, prerequisites must be completed for the work of the last two years in major and minor subjects, and sufficient additional electives must be taken to make up ten full courses. In the Divisions of the Humanities and the Social Sciences it is strongly recommended that these electives shall include:

Half courses (preferably in the first semester of an academic year) in at least two of the following: Foreign Literature (classical or modern, either in the original or in translation), Fine Arts, Music.

A full course in whichever social science (Economics or Political Science) is not taken in fulfillment of the general requirements.

A third half course in a natural science or a half course in Mathematics or courses in each of these.

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

The requirement in foreign language (either classical or modern) is such that an exceptionally well prepared freshman may demonstrate his completion of it before entering college by his rating in an Achievement Test given by the College Entrance Examination Board. The results of the tests indicate, however, that most students need to devote from one to four terms to further language study. A complete statement of the requirement 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 sufficient concentration in one field to give an understanding of professional competence in that field. The major usually consists of four full courses in a single department and is supported by three full courses or six half courses in a related department or departments; these are selected in consultation with the course adviser in the major field. Before graduation the student must pass a comprehensive examination which will test his achievement in his major field and in the supporting subjects.

The student must make application to the chairman of his major department before the end of his sophomore year. His adviser will then submit his program for approval to the division most concerned. If a student is not acceptable to any department as a major, he cannot enter the junior class.

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

The completion of eighteen 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 substitute for one seminar the preparation of a thesis.

If a department, supported by the division concerned, is of the opinion that seven seminars instead of eight, plus one full course or two half courses, form a better educational program than the usual eight seminars, such a program will be allowed, and will be completed by seven examinations instead of eight.

A student whose work shows unusual distinction but who has not elected to read for honors at the end of his sophomore year may be permitted to take the regular honors examinations and receive the degree of honors recommended by the visiting examiners. He must petition the division concerned for this permission before the end of his seventh semester and must submit a list of eight examinations which he feels prepared to take.

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.

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.

* 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 February and June, 1946, see page 122.

Combinations of Majors and Minors for Honors Work

Division of the Humanities

Major and minor subjects include English, Fine Arts, French, German, Greek, History, Latin, Music, Philosophy, Psychology, and Spanish. 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.

Division of Engineering

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 to Honors Work

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.

Pre-Medical Program

The pre-medical student's program is planned and his work supervised by the Pre-medical Advisory Committee. There is more than one program of courses by which a student may prepare himself for admission to medical school. In mapping out a program for each student the Committee keeps in mind (a) the particular interests of the student, (b) the entrance requirements of the medical schools of the student's choice, (c) the need for an understanding of basic social problems and the cultivation of a sensitiveness for the enduring values

in the arts and literature, and (d) the value of intensive work in at least one field.

In order to meet medical school requirements most pre-medical students take Chemistry 1A, 1B, 6A, 6B or 2; English Composition; Mathematics 1, 2; Physics 1; Zoology 1, 2, 3, 4; a modern foreign language (preferably German) to a point equivalent to the completion of course 2. The work of the junior and senior years may be taken in the Honors program or in course. Intensive work may be carried out in a single field or in closely related departments. Pre-medical students may fulfill the major requirements in the department of their own choice, usually, but not necessarily, in chemistry, mathematics, physics, or zoology; or they may fulfill the requirement by completing three full courses in each of two related departments in the division of mathematics and the natural sciences. In the latter case the comprehensive examinations will be arranged jointly by the departments concerned.

Although some students have been admitted to medical schools upon the completion of three years of college work, many of the best medical schools strongly advise completion of four years of college.

Faculty Regulations

Attendance at Classes and Collection

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

When illness necessitates absence from classes the student should report at once to the nurses or to the college 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. 51 to 55 and p. 60.)

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 within one week of registration.

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.

Students may occupy their rooms between terms only 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 in June 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.

Requirements For Graduation

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 following requirements for graduation:

1. The candidate must have completed eighteen full courses or ten courses and eight seminars with an average grade of C.
2. He must have complied with the course requirements for the first two years.
3. He must have met the requirements in the major and minor fields during the last two years.
4. He must have passed satisfactorily the comprehensive examinations in his major and minor fields or met the standards set by visiting examiners for a degree with honors.
5. He must have completed four terms of study at Swarthmore College, two of which have been those of the senior year.
6. He must have completed the physical education requirements set forth in the statements of the Physical Education Departments (see pages 105 to 107).
7. He must have attended the Collection exercises of the College in accordance with the regulations (see page 57).
8. He must have paid all outstanding bills and returned all equipment and library books.

Advanced Degrees

Master of Arts and Master of Science

The degrees of Master of Arts and Master of Science may be conferred upon graduates of Swarthmore 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.

Awards and Prizes

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.

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. As the result of an accumulation of income in the fellowship funds, it is expected that one or more special appointments can be made in 1947 in addition to those normally available. Applications for fellowships must be in the hands of the committee by March 15.

These three fellowships are:

The **HANNAH A. LEEDOM FELLOWSHIP** of \$500, founded by the bequest of Hannah A. Leedom.

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

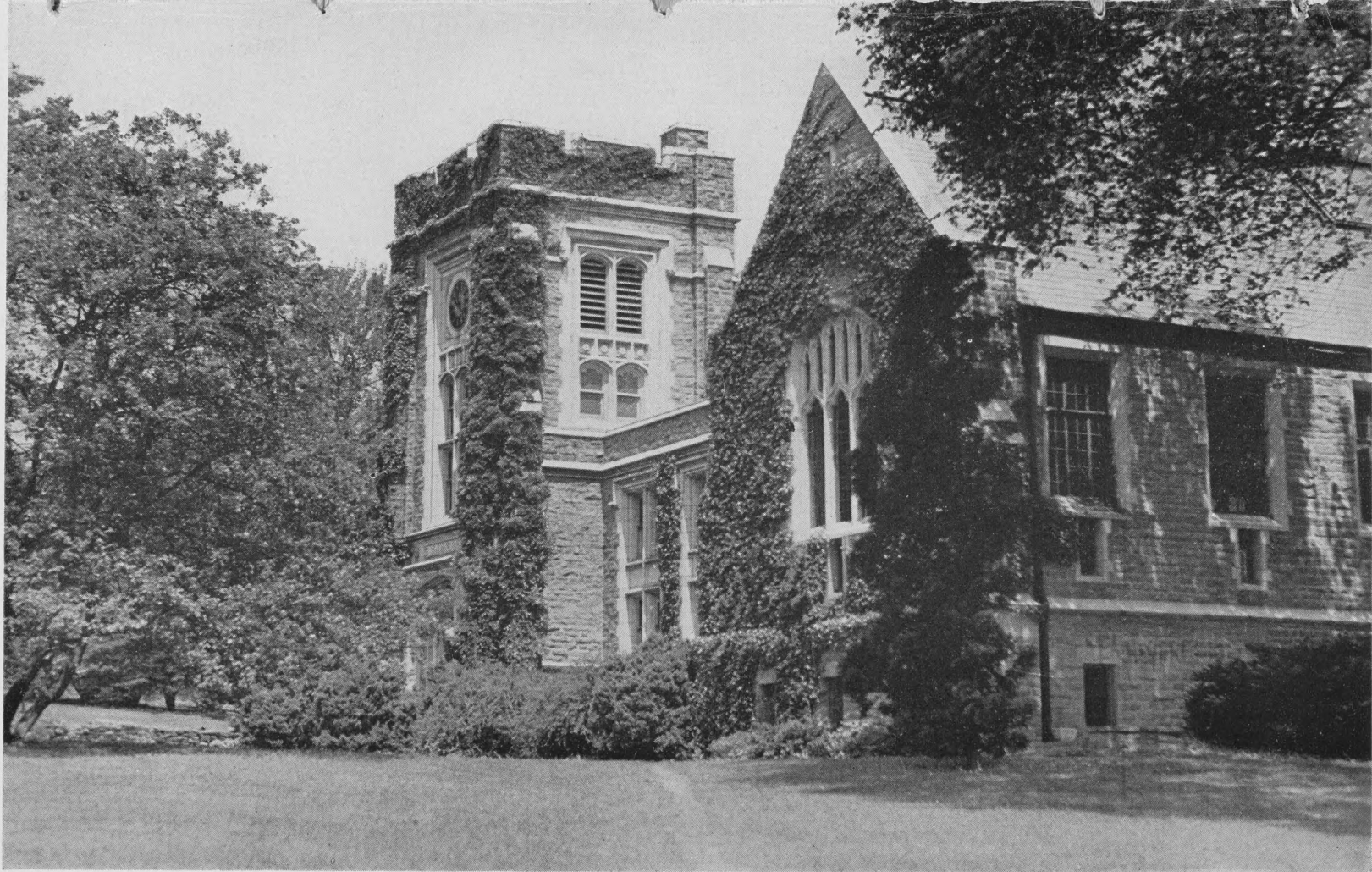
The JOHN LOCKWOOD MEMORIAL FELLOWSHIP of \$600, founded by the bequest of Lydia A. Lockwood, New York, in memory of her brother, John Lockwood. It was the wish of the donor that the fellowship be awarded to a member of the Society of Friends.

The other three fellowships are:

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.



A Corner of the Biddle Memorial Library and the Tower of the Main Library.



Parrish Hall.

Courses of Instruction

Botany

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

1. Plant Biology. Mr. Livingston. *Half course.*

This course is designed to introduce the student to the fundamental aspects of plant biology. Particular emphasis is placed on plant functions, and the relationships of plant functions to organisms generally, and to man. The main topics considered include protoplasm and the cell, structure and function in the higher plant, plant metabolism, growth and differentiation, reproduction, genetics, and a brief evolutionary survey of the plant kingdom. This course is a prerequisite for advanced courses in botany.

Three lectures and one laboratory period per week.
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. (Omitted in 1946-47) *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. (Omitted in 1946-47) *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. (Omitted in 1946-47) *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. (Omitted in 1946-47) *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.
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 Zoology 5 (Microscopic Anatomy).
10. Special Topics. Mrs. Jones, and Mr. Livingston. *Half course.*

Requirements for Majors and Minors 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. *Plant 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, *Plant 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

ASSOCIATE PROFESSORS: DUNCAN G. FOSTER.
WALTER B. KEIGHTON, JR.

INSTRUCTOR: HERMAN I. ENOS, JR.

1A. Inorganic Chemistry. Mr. Creighton or Mr. Keighton. *Half course.*

Three lecture and recitation periods and four hours of laboratory 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*.

1B. Inorganic Chemistry. Mr. Creighton or Mr. Keighton. *Half course.*

Three lectures and one laboratory period weekly. This course is a continuation of Chemistry 1A and is also concerned with the fundamental principles of chemistry. Textbooks: Those listed under Chemistry 1A.

2. Analytical Chemistry. Mr. Foster. *Half course.*

Three lecture and recitation periods and eight hours of laboratory weekly. The modern theory of solutions of electrolytes and its application to analytical chemistry. The practice of semi-micro qualitative analysis with an introduction to quantitative analysis. This course is designed to serve as the introductory course in analytical chemistry for chemistry majors and also to fulfill the requirements in the subject for admission to most medical schools. Textbook: Fales and Kenny, *Inorganic Qualitative Analysis*.

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

3. Analytical Chemistry. Mr. Foster. *Half course.*

Two lecture or recitation periods and eight hours of laboratory per week. The theory and practice of volumetric analysis. Textbook: Hamilton and Simpson, *Talbot's Quantitative Chemical Analysis*.

Prerequisite, Chemistry 2.

4. Analytical Chemistry. Mr. Foster. *Half course.*

One conference period and nine hours of laboratory per week. The theory and practice of gravimetric analysis. Courses 3 and 4 constitute the normal requirement in quantitative analysis for chemistry majors.

Prerequisite, Chemistry 3.

5. Physical Chemistry. Mr. Keighton. *Full course.*

Three hours of conference and lectures and four hours of laboratory 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.

Prerequisites, Chemistry 1B with a minimum grade of C, Physics 1, Mathematics 12. This course is offered to juniors and seniors.

6A. Organic Chemistry. Mr. Cox.

Half course.

Three lectures, four hours of laboratory and one optional conference hour per week. The course covers classification and nomenclature of compounds, elementary reactions and some theoretical matter in the field of organic chemistry. Both the aliphatic and aromatic series are surveyed and some twenty compounds in both series are prepared. This is a terminal course but is also preparatory to chemistry 6B. It is a prerequisite for admission to the honors seminar in organic chemistry and for entrance to some medical schools.

Prerequisite, Chemistry 2 with a minimum grade of C.

6B. Organic Chemistry. Mr. Cox and Mr. Enos.

Half course.

Two lectures and eight hours of laboratory per week. The course goes more deeply into the principles and practices of the subject than 6A. Advanced reactions, mechanisms, proofs of structure, and theory are considered. Half of the laboratory time is devoted to more advanced preparations and half to qualitative organic analysis. Students who do not major in chemistry are not required to pursue the work in analysis. The course is designed for both majors and minors and premedical students who wish more organic chemistry.

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

6C. Advanced Organic Chemistry. Mr. Enos.

Half course.

This course is one of the senior elective courses. Organic preparations are selected from *Organic Syntheses*. High and low pressure reductions as well as vapor phase dehydrations are included. Approximately six hours of laboratory work per week are required and in addition three hours are devoted to library search and review of organic chemical literature.

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

7. Advanced Inorganic Chemistry. Mr. Enos.

Half course.

Three hours of conference and lectures with an additional four hours per week devoted to selected readings on modern developments in inorganic chemistry.

Prerequisite, Chemistry 5.

Requirements for Majors and Minors

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 German to the completion of course 2.

Students who come to college with the intention of majoring in chemistry are strongly advised to take *Chemistry 1A* in their *first* term and *1B* in the second term. They also take mathematics in their first term, postponing history until later. Students may select chemistry as a major at some later date, but often at some sacrifice of flexibility in their program.

There are various arrangements of the curriculum which lead to graduation with a major in chemistry. The particular courses which make up the curriculum of any one student will depend upon his or her preparation, abilities, interests, and objectives. The following, however, is a typical curriculum for the student in course.

Freshman Year

Chemistry 1A, 1B
Mathematics 1, 2
German 2A, 2B
Philosophy 2 (Introduction)
English 1 (Modern Literature)
Economics 1A, 1B or
Political Science 1A, 1B

Junior Year

Chemistry 3, 5A, 5B, 6B
Electives (two full courses),
usually Physics 2A, 2B, and
Mathematics 16, 17

Sophomore Year

Chemistry 2, 6A
Mathematics 11, 12
Physics 1A, 1B
History 1A, 1B or Economics 1A,
1B or Political Science 1A, 1B
Psychology 1A
Elective (half course)

Senior Year

Electives in chemistry (three half
courses)
Electives not chemistry and ad-
visedly outside the Natural
Sciences (five half courses)

Honors Work

Before admission to honors work the chemistry major will have completed the curriculum of the first two years, outlined above, or its equivalent. For admission to minor honors work in chemistry, Chemistry 1A, 1B, and 6A are prerequisites. At the end of their senior year, honors students majoring in chemistry normally take four examination papers in chemistry, with the remaining papers usually selected from mathematics, physics, or zoology. The following seminars are offered as preparation for the examination in chemistry:

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.

In lieu of lectures, one three-hour seminar per week is devoted to discussions of the principles and practices of organic chemistry. The material covered is much like that given in 6B and 6C. Reports covering extensive readings are made from time to time. Eight hours of laboratory per week are devoted to the preparations of organic compounds and qualitative organic analysis. Students who do not major in chemistry are not required to pursue the work in analysis.

The seminar is especially designed for chemistry majors reading for honors. Minor students should have covered Chemistry 2, at least one semester of Chemistry 5, and Chemistry 6A, before entering the seminar.

Classics

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

DEAN SUSAN P. COBBS.

LECTURER: AGNES K. MICHELS.

ASSISTANT: EVA LOUISE PRICE (part-time).

Greek

1. Elementary Greek. Miss Cobbs. *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 and Plato's Apology are read.
3. Greek Survey. Mr. Shero. *Full course. (Offered as required.)*
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.

Latin

1. Sub-Freshman Latin. Miss Brewster. *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 Cobbs. *Full course or two half courses.*
Prose and verse (including Phaedrus, Gellius, Roman Law; Ovid, 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, Miss Cobbs. *Full course or two half courses.*
Selected Letters of Cicero and Pliny, selections from Tacitus; Catullus, Virgil's Eclogues and Georgics.
5. Roman Satire and Epigram. Miss Brewster. *Half course. (Offered as required.)*
6. Latin Philosophical Writings. Miss Cobbs. *Half course. (Offered as required.)*
7. Latin Language. Miss Brewster. *Half course. (Offered as required.)*
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. (Offered as required.)*
Review readings and supplementary reading in Latin authors and in modern authorities on Roman history, public and private antiquities, 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.

Ancient History and Civilization

10. The Mediterranean World: Greece and the East. 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. 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. Introduction to Classical 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 and to Pompeii.

Requirements for Majors and Minors

Greek or Latin may be offered as a major or minor subject in course or in Honors work. Prerequisites for students reading for Honors are given below. Major and minor students in course are required to take the following during the first two years:

Greek or Latin 3A and 3B (or, if the language is begun in college, through course 2b); Greek or Latin Literature in English, whichever is not read in the original language. (Adjustments may be made for special cases.)

Recommended for major and minor students during the first two years:

Latin 4 or Greek 3; ancient history or archaeology; a modern language and literature; Fine Arts 1 and 2.

Honors Work

I. *General prerequisite:* For a major in Greek or Latin: *Elementary Greek* (1), *Intermediate Greek* (2), *Latin Survey* (3). (Adjustments may be made for special cases.)

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

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

II. *Supplementary preparation advised:* *Greek 3* or *Latin 4*, ancient history or archaeology, philosophy, 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 104 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, Seneca, 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; Herculaneum, 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.

*HERBERT F. FRASER.

ASSOCIATE PROFESSOR: *PATRICK MURPHY MALIN.

ASSISTANT PROFESSORS: PHILIP S. BROWN.

FRANK C. PIERSON, *Acting Chairman.*

CALEB A. SMITH.

WOLFGANG F. STOLPER.

INSTRUCTOR: VAN DUSEN KENNEDY (part-time).

LECTURERS: FRANK W. FETTER.

FREDERICK N. SASS.

Introductory Courses

1. Introduction to Economics. Mr. Brown, Mr. Kennedy, Mr. Sass, Mr. Smith, and Mr. Stolper. *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. Accounting. Mr. Smith. *Half course.*

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

3. Statistics. Mr. Stolper or Mr. Smith. *Half course.*

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

Advanced Courses

4. Money and Banking. Mr. Stolper or Mr. Brown. *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.

6. International Economics. Mr. Brown or Mr. Stolper. *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. Economics of Business. Mr. Brown. *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.

8. Public Control of Business. Mr. Smith. *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.

9. 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.

10. Social Economics. Mr. Smith or Mr. Pierson. *Half 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.

* Absent on leave.

11. Economic Analysis. Mr. Stolper.

Half course.

An analysis of the processes by which prices of goods and services are determined under different market situations. A study of national income and general equilibrium conditions. The application of economic theory to public policy problems.

12. Special Topics. Mr. Pierson.

Half course.

Systematic readings in fields not covered by existing courses. Limited to senior economics majors. Weekly meetings for discussions and reports.

Courses 1, 2, 3, and 4 are offered annually. All other advanced courses are normally offered in alternate years. A single semester of Course 7 or 8 may be taken for half-course credit. Course 1 is prerequisite to all advanced courses. Advanced courses are open only to juniors and seniors.

Requirements for Majors

Economics 1 is prerequisite to all advanced courses and seminars in the department. *Economics 2* and/or *3* and *Political Science 1* are strongly recommended to all students who plan to major in the department. The *Money and Banking* course or the *Finance* seminar is required of all majors and should be taken 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.

Honors Work

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

1. Finance. Mr. Pierson.

The subject matter includes the material covered in Courses 5 and 7 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. Fetter.

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 Control of Business. Mr. Smith.

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

5. Social Economics. Mr. Pierson or Mr. Smith.

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.

6. Economics of Corporate Activity. Mr. Brown.

An analysis of the organization, policies and economic significance of the modern corporation, with special reference to problems of managerial control, financial policies and monopolistic pricing.

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.
JOHN D. MCCRUMM.
*ANDREW SIMPSON.

ASSISTANT PROFESSORS: C. JUSTUS GARRAHAN.
ROLAND L. HUMMEL.
MARK B. MOORE.

INSTRUCTORS: JOHN L. DUGAN, JR.
GILBERT B. MUSTIN, JR.
W. C. HAMPTON (part-time).

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

RESEARCH ASSOCIATE: DAVID NEWTON FONER.

Recent developments in the field of engineering, brought about by the coordinated efforts of great numbers of scientists, focus the attention of all upon the necessity of learning the fundamentals of science and of the importance of cooperative endeavor. The engineer must be so disciplined that he is not only technically proficient, but has a broad cultural background which will enable him to accept his position as a professional man. The Engineering staff is keenly aware of the advances in engineering made possible by new knowledge and new instruments, and feels a deep responsibility to educate student engineers to recognize, analyze and solve the problems with which they will be faced after graduation.

The courses required of all students in Engineering for the first two years conform, insofar as possible, with the general curriculum adopted by the college for the freshman and sophomore year. Engineering students are required to take Drawing and Surveying in their freshman year. These courses replace foreign language in the general curriculum, but engineers may take courses in foreign languages by substituting them for electives in the Division of the Humanities.

There are three departments of Engineering—Civil, Electrical and Mechanical. These departments offer a series of courses consisting of: (1) introductory courses which all freshman and sophomore engineers must take; (2) courses in Engineering throughout the junior and senior years as outlined in the curriculum and discussed on pages 80-84.

* Absent on leave.

Engineering students successfully completing this program qualify for the degree of Bachelor of Science with a major in Civil, Electrical or Mechanical Engineering.

Each curriculum provides that the student of Engineering will take about one-fifth of his work in the Division of the Humanities and Social Sciences, one-fourth of his work in the Departments of Chemistry, Mathematics, and Physics, and the remainder of his work in the three Departments of Engineering. The requirements for Civil, Electrical and Mechanical Engineering do not differ until the fifth semester. All students devote their last two years: (1) to certain basic courses required of all engineers; (2) to fulfilling the major requirements of one of the departments of Engineering; (3) to developing their special interests. It is possible for students in any of the three departments whose interests lie in the field of administration, physics, mathematics or chemistry, to elect courses having a more direct bearing on these subjects.

An engineering student may enter the Honors program at the beginning of the fifth semester. When the sections in Engineering are small, the methods of the seminar are followed in all upper classes. Therefore men who elect to take Honors examinations and those who do not may be in the same classes and are subject to the same disciplines.

Outline of the Curriculum in Engineering

First Semester

English Literature	3
Physics 1A	4
Mathematics 1	4
GE1 Drawing	2
CE1 Surveying	2
Social Science Elective	3
	18*

Second Semester

English Composition	3
Physics 1B	4
Mathematics 2	4
GE2 Descriptive Geometry	2
CE2 Surveying	2
Social Science Elective	3
	18*

Summer: GE3 Shop and GE4 Materials—5 weeks; Industry—2 months

Third Semester

Chemistry 1A	4
Mathematics 11	4
CE3 Statics	4
Arts Elective	3
Social Science Elective	3
	18*

Fourth Semester

Chemistry 1B	4
Mathematics 12	4
CE4 Dynamics	4
EE1 Electric and Magnetic Circuits	3
Social Science Elective	3
	18*

Civil Engineering

Fifth Semester

ME1 Thermodynamics	4
EE2 D.C. Apparatus	4
CE5 Mechanics of Materials and Lab.	4
**GE5 Industrial Management, or EE6 Analysis of Physical Problems	3
Arts Elective	3
	18*

Sixth Semester

ME2 Fluid Mechanics	4
EE3 A.C. Apparatus and Circuits	4
CE6 Structural Theory	4
**GE6 Industrial Management, or EE7 Analysis of Physical Problems	3
Arts Elective	3
	18*

Seventh Semester

CE7 Structural Design	4
CE9 Soil Mechanics	4
CE10 Sanitary Engineering	4
Engineering Elective	3
Free Elective	3
	18*

Eighth Semester

CE8 Advanced Structural Theory	4
CE11 Reinforced Concrete	4
CE12 Transportation	3
GE7 Engineering Economy	4
Free Elective	3
	18*

* This represents the number of meetings in class and laboratory per week.

** Those students whose interests lie in the field of administration rather than in the technical fields will elect the course in Industrial Management.

Electrical Engineering

Fifth Semester

ME1 Thermodynamics	4
EE2 D.C. Apparatus	4
CE5 Mechanics of Materials and Lab.	4
EE6 Analysis of Physical Problems	3
Arts Elective	3
	<hr/>
	18*

Seventh Semester

EE8 A.C. Machinery	4
EE10 Electron Tubes and Circuits	4
ME3 Heat Power	3
Science Elective	3
Free Elective	3
	<hr/>
	17*

Mechanical Engineering

Fifth Semester

ME1 Thermodynamics	4
EE2 D.C. Apparatus	4
CE5 Mechanics of Materials and Lab.	4
**GE5 Industrial Management, or EE6 Analysis of Physical Problems	3
Arts Elective	3
	<hr/>
	18*

Seventh Semester

ME3 Heat Power	3
ME5 Internal Combustion Engines	3
ME6 Physical Metallurgy	4
ME7 Machine Design	4
Free Elective	3
	<hr/>
	17*

Sixth Semester

ME2 Fluid Mechanics	4
EE4 A.C. Circuit Theory	4
EE5 Electronics	4
EE7 Analysis of Physical Problems	3
Arts Elective	3
	<hr/>
	18*

Eighth Semester

EE9 A.C. Machinery	4
EE11 Electrical Networks	4
EE12 Radiation	4
Science Elective	3
Free Elective	3
	<hr/>
	18*

Sixth Semester

ME2 Fluid Mechanics	4
EE3 A.C. Apparatus and Circuits	4
CE6 Structural Theory	4
**GE6 Industrial Management, or EE7 Analysis of Physical Problems	3
Arts Elective	3
	<hr/>
	18*

Eighth Semester

ME4 Heat Power	3
ME9 Refrigeration and Air Conditioning	4
ME8 Machine Design	4
GE7 Engineering Economy	4
Free Elective	3
	<hr/>
	18*

* This represents the number of meetings in class and laboratory per week.

** Those students whose interests lie in the field of administration rather than in the technical fields should elect the course in Industrial Management.

Courses of Instruction

General Courses

GE1 Drawing. Staff.

Orthographic projection and modern drafting practice. Sketching with emphasis on accurate visualization. Required course for freshman engineers. Open to all students.

GE2 Descriptive Geometry. Staff.

A continuation of the principles of orthographic drawing as applied to problems of location and description of bodies in space. This course 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. Required for freshman engineers; open to all students.

GE3 Shop and GE4 Materials. Staff.

These courses are designed to develop a conception of the normal function and varied uses of the metal and woodworking machines found in any typical shop. Shop practice is supplemented by a study of ferrous and non-ferrous metals, alloys, woods and plastics with laboratory tests to analyze methods of failure of materials, hardness and effect of heat treatment. Required for freshman engineers.

GE5 and GE6 Industrial Management. Mr. Mustin.

A survey study of the organization and management of industrial activities, including historical background, organization, physical plant, standardization, job analysis, methods of wage payment, personnel and control. Open to all students.

GE7 Engineering Economy. Mr. Lilly.

A study of the methods of determining the relative economy of engineering alternatives; compound interest and the calculation of annual cost, present worth and prospective rates of return. A method of analysis which the engineer uses when he investigates a proposed course of action to decide whether it will prove to be economical in the long run. Open to all students.

Civil Engineering Department: Samuel T. Carpenter, Chairman.

CE1 Surveying. Mr. Carpenter, Mr. Hummel.

Surveying instruments and their adjustment; practice in taping, leveling, running traverses. Required course for freshman engineers. Open to all students who have had trigonometry in high school or college.

CE2 Surveying. Mr. Carpenter, Mr. Hummel.

Taking topography, stadia work, preparation of profiles and maps from field notes.
Prerequisite, CE1 Surveying.

CE5 Statics. Mr. Lilly, Mr. Hummel.

Concept and definition of force, scalar, and vector quantities; combination and resolution of forces, parallelogram law, and triangle law; principle of moment and couples, including forces in space; graphical and analytical condition for equilibrium, force polygon, and string polygon; equilibrium of forces as applied to simple structures and machines, free body sketches, stress diagrams, method of sections, loaded cables; conditions of equilibrium for various force systems; coplanar and noncoplanar; centroids of areas, volumes, and masses; area and volume theorems. Open to students who have taken Mathematics 1 and 2 and Physics 1.

CE4 Dynamics. Mr. Lilly, Mr. Hummel.

Principles of dynamics, motion of a particle, Newton's laws, general equation of motion, rectilinear motion, displacement, velocity, speed, and acceleration, motion of a particle acted upon by a constant force, force proportional to displacement, simple harmonic motion, free and forced vibration, resonance, critical speed; inertia forces, work and energy, and relation between work and energy; momentum and impulse; curvilinear motion, velocity, tangential and normal acceleration, moment of inertia of masses; rotation, angular displacement, velocity and acceleration, centripetal acceleration, and centrifugal forces; kinetic energy of rotation, torque, and power; balancing of rotating bodies; relative motion, angular momentum and gyroscopic motion; combined translation and rotation.

Prerequisite, CE3 Statics.

CE5 Mechanics of Materials and Laboratory. Mr. Carpenter, Mr. Foner.

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

Prerequisite, CE4 Dynamics.

CE6 Structural Theory. Mr. Carpenter.

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

Prerequisite, CE5 Mechanics of Materials.

CE7 Structural Design. Mr. Carpenter.

Design of structural members and connections for steel and timber structures.

Prerequisite, CE6 Structural Theory.

CE8 Advanced Structural Theory. Mr. Carpenter.

A study of complex structural systems and advanced mechanics of materials. Photoelasticity and the study of structural models.

Prerequisite, CE6 Structural Theory.

CE9 Soil Mechanics. Mr. Carpenter.

The theory and practice of soil mechanics as applied to foundations, highways and airports.

Prerequisite, CE5 Mechanics of Materials.

CE10 Sanitary Engineering. Mr. Lilly.

This course deals with the important activities of the sanitary engineer, including the development and purification of water supplies; sewerage and sewage disposal.

Prerequisite, ME2 Fluid Mechanics.

CE11 Reinforced Concrete. Mr. Lilly.

The analysis and design of concrete structure, including concrete building frames, concrete bridges and retaining walls.

Prerequisite, CE6 Structural Theory.

CE12 Transportation. Mr. Lilly.

This course deals with the location, design and construction of highways and railroads, and the problems of engineering economy involved in the design and operation of these structures.

CE19 Thesis. Staff.

*Electrical Engineering Department: Howard M. Jenkins,
Chairman.*

EE1 Electric and Magnetic Circuits. Mr. Garrahan.

The experimental bases of electricity and magnetism; elementary electrostatics and magneto-statics; direct-current circuits—voltage, current power, energy-induced electromotive forces; capacitance and inductance; elementary theory of alternating currents; elementary problems in ferro-magnetism.

Prerequisite, Physics 1B, and to be accompanied by Mathematics 12.

EE2 Direct-Current Apparatus. Mr. Jenkins.

Principles of design and construction of direct-current generators and motors; theory concerning 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.

Prerequisite, EE1 Electric and Magnetic Circuits.

EE3 Alternating-Current Apparatus and Circuits. Mr. Jenkins.

Relations of simple harmonic electromotive forces and currents, phase differences; active, reactive and apparent power, power factor, resistance, inductance and capacitance; series, parallel, series parallel and resonant circuits; polyphase 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.

Prerequisite, EE2 Direct-Current Apparatus.

EE4 Alternating-Current Circuit Theory. Mr. McCrumm.

Instantaneous current and power; effective current and voltage; single phase circuit analysis; the use of complex impedance; non-sinusoidal waves; coupled circuits; balanced polyphase circuits, unbalanced polyphase circuits and symmetrical components; transients.

Prerequisite, EE2 Direct-Current Apparatus.

EE5 Electronics. Mr. Garrahan.

Motion of charged particles in electric and magnetic fields; thermionic cathodes; the high vacuum diode; electrical discharges in gases; rectifiers and thyratrons; power supplies and filters; the triode; the multi-electrode tube; voltage and power amplifiers.

EE6 Analysis of Physical Problems. Mr. McCrumm.

A study of the application of physical laws and selected branches of mathematics to the analysis and solution of physical problems. The selected branches of mathematics include: ordinary differential equations; determinants; graphical solutions; hyperbolic functions; infinite series.

Prerequisite, Mathematics 12.

EE7 Analysis of Physical Problems. Mr. McCrumm.

Further study of physical problems employing the following branches of mathematics: Gamma and Bessel functions; elliptic integrals; Fourier series; partial differential equations; operational calculus; vector analysis.

Prerequisite, EE6 Analysis of Physical Problems.

EE8 Alternating Current Machinery. Mr. McCrumm.

The transformer; equivalent circuits; determination of regulation and efficiency; parallel operation; polyphase transformers; autotransformers. Synchronous machines; alternators; determination of regulation; the two reaction theory of synchronous generators.

Prerequisite, EE4 Alternating-Current Circuit Theory.

EE9 Alternating Current Machinery. Mr. McCrumm.

Synchronous motors; the two reaction theory of salient-pole synchronous motors; efficiency. Parallel operation of alternators. Polyphase induction motors; single phase induction motors; induction generators. Commutator alternating current motors. Mercury arc rectifiers and inverters.

Prerequisite, EE8 Alternating Current Machinery.

EE10 Electron Tubes and Circuits. Mr. Garrahan.

Methods of analysis of electron tubes and circuits; analysis and design of voltage and current amplifiers; power amplifiers; modulation and detection; oscillators; trigger circuits and pulse generators; cathode ray tubes and circuits; receivers and transmitters.

Prerequisites, EE4 Alternating-Current Circuit Theory, EE5 Electronics, and EE7 Analysis of Physical Problems, or equivalent.

EE11 Electrical Networks. Mr. Garrahan.

Characteristics of four terminal networks; artificial lines; transmission lines with distributed parameters; lump loaded lines; conventional filter theory; impedance transformation; the transient behavior of filters; simulative and corrective networks; the transient behavior of long transmission lines.

EE12 Radiation. Mr. Garrahan.

Stationary electric and magnetic fields; oscillating systems; Maxwell's hypothesis; plane waves; propagation and reflection of electromagnetic waves; antennas; guided electromagnetic waves; characteristics of wave guides and high frequency transmission lines; resonant cavities.

Prerequisites, EE7 Analysis of Physical Problems, and EE10 Electron Tubes and Circuits, or equivalent.

EE13 Ultra-High Frequency Techniques. Staff.

An experimental study of ultra-high frequency phenomena. The topics investigated include: ultra-high frequency generators; pulse sharpening circuits; transmission lines; directional antennas; hollow wave guides. This course is offered as an elective to students whose interests lie in this field.

To be accompanied by EE12 Radiation.

EE14 Transient Circuit Analysis. Mr. Jenkins.

A theoretical and experimental study of the transient response of physical systems. Theoretical deductions will be verified experimentally in the laboratory. This course is offered as an elective to students having a particular interest in oscillography.

Prerequisites, EE4 Alternating-Current Circuit Theory, and EE6 Analysis of Physical Problems

EE15 Electrical Measurements. Mr. Jenkins.

A study of the precise measurement of electrical quantities. Emphasis will be placed on the experimental techniques required when high precision is desired. Offered to science students as an elective.

EE19 Thesis.

An engineering thesis may be substituted for a course or for the examination on the subject matter covered in a seminar, by special arrangement with the staff.

*Mechanical Engineering Department: Mark B. Moore,
Acting Chairman.*

ME1 Thermodynamics. Mr. Moore.

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.

Prerequisites, Mathematics 12 and Physics 1.

ME2 Fluid Mechanics. Mr. Moore.

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 viscous fluids; dynamic similarity and dimensional analysis.

Prerequisites, Mathematics 12 and Physics 1.

ME3 Heat Power. Mr. Mustin.

The conversion of heat energy into mechanical energy in the various heat engines. Application of the principles of thermodynamics and fluid mechanics to the analysis and testing of prime movers. Steam and gas turbines, reciprocating steam and internal combustion engines. Classroom work supplemented by laboratory exercises.

Prerequisite, ME1 Thermodynamics, and ME2 Fluid Mechanics.

ME4 Heat Power. Mr. Mustin.

A continuation of ME3 with special emphasis on selection of power plant equipment, economic analysis, and the design of heat power equipment to perform specified functions. Heat transmission. Classroom work supplemented by laboratory exercises.

Prerequisite, ME3 Heat Power.

ME5 Internal Combustion Engines. Mr. Dugan.

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.

Prerequisite, ME1 Thermodynamics.

ME6 Physical Metallurgy. Mr. Moore.

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.

Prerequisite, GE4 Materials, or Introduction to Physical Chemistry 3.

ME7 Machine Design. Mr. Moore.

Design of machine elements such as shafts, pulleys, gears, belts, chains, clutches, springs and fastenings; bearings, lubrication and friction; kinematics and mechanisms.

Prerequisite, CE5 Mechanics of Materials.

ME8 Machine Design. Mr. Moore.

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

Prerequisites, ME5 Internal Combustion Engines, and ME7 Machine Design.

ME9 Refrigeration and Air Conditioning. Mr. Dugan.

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.

Prerequisite, ME1 Thermodynamics.

ME19 Thesis.

English

PROFESSORS: PHILIP MARSHALL HICKS, *Chairman*.
EVERETT L. HUNT.

ASSOCIATE PROFESSORS: *TOWNSEND SCUDDER, 3RD.
*ELIZABETH COX WRIGHT.

ASSISTANT PROFESSORS: GEORGE J. BECKER.
CARVEL COLLINS.
FREDRIC S. KLEES.

INSTRUCTORS: ROLAND C. BALL, JR. (part-time).
WALTER MCINTOSH MERRILL.

1. Modern Literature: Introduction to English Studies. Mr. Ball, Mr. Becker, Mr. Hicks, Mr. Klees, Mr. Merrill. *Half course.*
This course is open only to entering freshmen, being the first course in the new curriculum.
2. Chaucer. Mr. Klees. *Half course.*
3. Shakespeare. Mr. Becker and Mr. Hicks. *Full course.*
4. Milton and the Seventeenth Century. Mr. Hunt. *Half course.*
Shakespeare and either Chaucer or Milton are required of English majors, and one of them must be taken before a candidate applies to be an English major at the end of the sophomore year.
5. English Poetry. Mr. Merrill. *Full course.*
- 6A. The Chronicle Novel. Mr. Hicks. *Half course.*
- 6B. The Dramatic Novel. Mr. Hicks. *Half course.*
- 7A. Comedy. Mr. Klees. *Half course.*
- 7B. Tragedy. Mr. Klees. *Half course.*
- 8A. Social Criticism. Mr. Becker and Mr. Klees. *Half course.*
- 8B. Biography and Travel. Mr. Klees. *Half course.*
9. Satire. Mr. Collins. *Full course.*
10. Literary Criticism. Mr. Hunt. *Half course.*
11. American Literature. Mr. Collins. *Full course.*
12. Realism. Mr. Becker. *Half course.*
13. English Composition. Mr. Ball, Mr. Merrill. *Half course.*
- Greek Literature in English (Greek 9). Mr. Shero. *Half course.*
- Latin Literature in English (Latin 9). Miss Brewster. *Half course.*

Writing and Speaking. Students in need of special training in Composition or Speech will be required to take tutorial work or to complete course 13 before admittance to the junior class.

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

* Absent on leave.

Requirements for Majors and Minors in Course

Major: The work of the major in general courses normally consists of at least four full courses, including *Modern Literature* in the first year, either *Chaucer* or *Milton* in the second year, and during the last two years *Shakespeare* 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. Majors in the department are expected to have taken a semester's work in foreign literature and a semester's work in either Fine Arts or Music during the first two years.

Minor: The work of the minor in general courses normally consists of three full courses elected upon the recommendation of the major department, including *Modern Literature*.

Departmental Language Requirements:

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

Honors Work

Prerequisites. For admission to honors work with a major in English, the requirements are *Introduction to English Studies*, and either *Chaucer* or *Milton and the Seventeenth Century*. Students are advised to take also *The History of England*.

For admission with a minor in English, the requirement is one year in English, including *Modern Literature*.

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.

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.

Drama. Mr. Hicks and Mr. Klees.

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

Novel. Mr. Becker and 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

Social Criticism. Mr. Becker.

Social theory in American and English literature.

Satire. Mr. Collins.

Masterpieces of satirical literature from Cervantes to the present day.

American Literature. Mr. Collins.

A study of major writers in this field.

Problems of Literary Study. Mrs. Wright.

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.

Fine Arts

ASSISTANT PROFESSOR: ROBERT M. WALKER, *Chairman.*

INSTRUCTOR: ETHEL STILZ (part-time).

1. Introduction to Art History. Mr. Walker. *Full course.*
An introduction to the work of art, the artist, and his time. A preliminary investigation of basic principles of design and expression in architecture, sculpture, and painting based on the study of originals and reproductions, and followed by an introduction to some fundamental problems of art history and criticism through an analysis of selected examples from certain significant periods in Ancient, European, and American civilizations.
The full course is a prerequisite for a Major or Minor in Fine Arts, but is specially designed for those students who can only take the first semester.
2. Art of Ancient Civilizations. Mr. Walker. *Half course.*
A consideration of certain aspects of the art of ancient civilizations of the Near East, Greece, and Italy, in view of their significance for the cultural heritage of the Middle Ages, the Renaissance, and the Modern World.
3. Art of the Middle Ages. Mr. Walker. *Half course.*
Study of a civilization through its expression in architecture, sculpture, painting, and industrial arts. The art of the cathedral: its origins and development.
4. Art of the Italian Renaissance. Mr. Walker. *Half course.*
A study of the points of view of the XV and XVI centuries in Italy as expressed in architecture, sculpture, painting, and the graphic arts. Emphasis is placed on the work of such great masters as Donatello, Leonardo, Raphael, Michelangelo, and Titian.
5. Renaissance Painting of Northern Europe. Mr. Walker. *Half course.*
A study of stylistic developments in the painting of the XV, XVI, and XVII centuries with special reference to the cultural background. Emphasis is placed on such great masters as Jan van Eyck, Duerer, Holbein, Rembrandt, Rubens, Velasquez, and El Greco.
6. Origins of Modern Painting. Mr. Walker. *Half course.*
Certain major movements and directions in European painting of the XIX and XX centuries, with special reference to stylistic developments in France and their significance for American art.
7. Theory of Design. Miss Stilz. *Half course.*
The principles of design and color and their application to the planning and furnishing of the interior of the house.

Prerequisites

The prerequisite for a Major or Minor in Fine Arts is the full course Fine Arts 1. All other students must take the first semester of Fine Arts 1, or satisfy the Department that they have already met this requirement.

Honors Work

Prerequisite. Fine Arts 1.

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

1. Italian Painting: Fourteenth through Seventeenth Century. Mr. Walker.

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 Contemporary Painting. Mr. Walker.

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

3. Renaissance Painting of Northern Europe. Mr. Walker.

A study of paintings and graphic work of the great masters of the XVI, XVII, and XVIII centuries in Europe outside of Italy: Duerer, Rembrandt, Rubens, Velasquez, Watteau, Reynolds.

4. Master Print Makers. Mr. Walker.

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

Seminars are planned with reference to the choice of the students and the convenience of the Department. At the discretion of the Department a student may elect a course for Honors credit. In this case additional study, special reports, and conferences with the instructor are required.

Major in Fine Arts

By special arrangement qualified students may major in Fine Arts. A program is designed 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 on 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. Members of the Department. *Full course.*
For students who begin German in college.
- 2A. Reading, Grammar, and Composition. Members of the Department. *Half course.*
Reading of German prose and poetry. Review of grammar, practice in written and oral German.
Prerequisite, German 1 or equivalent.
- 2B. Reading, Grammar, and Composition, continued. Members of the Department. *Half course.*
Prerequisite, German 2A or equivalent.
- 2Bs. German for Science Students. Mr. Reuning. *Half course.*
Special training in reading German scientific prose. Edited science selections followed by unedited material taken from the various scientific fields of the members of the class.
Prerequisite, German 2A or equivalent.
3. Introductory Studies in German Literature. Mr. Silz. *Half 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*.

Requirements for Majors and Minors

Prerequisites for students reading for Honors are given below. Major and minor students in course are required to take German 3 within the first two years. Recommended for major and minor students during the first two years:

An advanced course in German literature; Shakespeare; Modern Philosophy; Psychology; Fine Arts; courses in other literatures.

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.

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 varying 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 MHC 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.

Studies in 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 accent 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 Honors work.

History

PROFESSORS: MARY ALBERTSON, *Chairman.*

FREDERICK J. MANNING.

ASSISTANT PROFESSORS: PAUL H. BEIK.

GEORGE P. CUTTINO.

LAURENCE D. LAFORE.

THEODORE PAULLIN.

INSTRUCTOR: FREDERICK B. TOLLES (part-time).

1. The History of Europe. All members of the department. *Full course.*
An introductory course, prerequisite to all other work in history except course 11.
2. The History of England. Miss Albertson. *Half course.*
A survey of the history of the English people. For sophomores, juniors, and seniors.
3. The History of the United States to 1865. Mr. Manning and Mr. Tolles. *Half course.*
An advanced course on American history. For sophomores, juniors, and seniors.
4. The History of the United States since 1865. Mr. Paullin. *Half course.*
The half courses in American history may be taken independently of each other.
5. The Other American Republics. Mr. Lafore. *Half course.*
The emphasis is on Mexico, Brazil, and Argentina. For sophomores, juniors, and seniors. May be taken without a prerequisite by special permission of the instructor.
6. The History of France. Miss Albertson. *Half course.*
The history of France from Roman times to the present day. For sophomores, juniors, and seniors. May be taken without a prerequisite by special permission of the instructor.
7. The French Revolution and Napoleon. Mr. Beik. *Half course.*
The emphasis is on the relations between institutions and ideas. For juniors and seniors.
8. The History of Mediaeval Europe. Miss Albertson and Mr. Cuttino. *Half course.*
The history of western Europe from the decline of the Roman Empire through the thirteenth century. For juniors and seniors.
9. 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.
10. The History of Recent Europe. All members of the department. *Half Course.*
For juniors and seniors.
11. 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.
12. Special Topics. All members of the department. *Half course.*
For seniors with the major in history.

For courses on ancient history see the statement of the Department of Classics.

Courses on special periods or areas of contemporary interest are occasionally offered by the department. It is not always possible to announce them in advance. The following course was given in 1945-46:

0. The History of Russia. Mr. Byrnes.

Half course.

Requirements for a Major in History

Students who expect to major in history either in honors or in regular courses should take course 1 in the freshman year and, if possible, English history and one half course in American history in the sophomore year. It is also important to take, before the end of the sophomore year if possible, in addition to the basic college requirement, a half course in philosophy and in literature (preferably in a foreign language) and a full course in either economics or political science.

Course Work

The choice of courses in history in the junior and senior years should be made in such a way as to prepare for the comprehensive examinations. They include questions on (1) European history, (2) English history, (3) American history, and (4) ancient history. Major students are expected to answer general questions in each of these fields, more specific questions in at least two of the fields. Course 12 (Special Topics) is designed to help major students in their preparation for these examinations. All major students should elect this course. By special permission of the department, part of the work of the major may be done in closely related courses offered by other departments.

Honors Work

The following seminars are offered by the department each year to prepare for the examinations for a degree with honors. Although an effort 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 term in which some seminars will be given.

European History

- †1. Mediaeval Europe. Mr. Cuttino.
The twelfth and thirteenth centuries.
2. The Renaissance and Reformation. Miss Albertson.
Topics in European history chiefly in the fifteenth and sixteenth centuries.
3. Europe 1760-1860. Mr. Beik.
The decay of the old regime and the rise of liberalism.
4. Modern Europe. Mr. Beik.
Different aspects of the modern period are stressed from time to time in accordance with the interests of the students electing the seminar.

English History

- †5. Mediaeval England. Miss Albertson.
The period from 1066 to 1485.
6. Tudor and Stuart England. Miss Albertson.
The period from 1485 to 1688.
7. Modern England. Miss Albertson, Mr. Manning, and Mr. Lafore.
The nineteenth century is stressed.

American History

- †8. American Colonial History. Mr. Paullin.
The development of American institutions in the colonial period.
9. Problems in American History. Mr. Manning.
Considerable attention is given to bibliography and the critical study of historical materials.
- †10. The Supreme Court. Mr. Manning.
The Supreme Court and problems of American labor.

Thesis

A thesis may be substituted for one of the honors examinations only by special permission of the department. The topic should be selected and approved by the end of the junior year.

† Not given every year.

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.
- ASSISTANT PROFESSOR: WOLFGANG WASOW.
- RESEARCH ASSOCIATE: L. BINNENDYK.
- INSTRUCTORS: BERNARD MILLER.
PHYLLIS KINKEAD KELLEY (part-time).
- OBSERVER: ROY W. DELAPLAINE (part-time).
- ASSISTANT: SARAH L. LIPPINCOTT.

Mathematics

- 1, 2. First Year Mathematics. Mr. Brinkmann, Mrs. Kelley, Mr. Marriott, and Mr. Miller. *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.

Knebelman and Thomas, *Principles of College Algebra*, Curtiss and Moulton, *Plane and Spherical Trigonometry*; Osgood and Graustein, *Plane and Solid Analytic Geometry*.

3. Invitation to Mathematics. Mr. Dresden. (Omitted in 1946-47)

Half course.

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. (Omitted in 1946-47)

Half course.

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.

- 11, 12. Differential and Integral Calculus. Mr. Brinkmann, Mr. Dresden, Mr. Marriott, and Mr. Wasow. *Full course.*

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*; Dresden, *Introduction to the Calculus*.

Prerequisite, Courses 1, 2.

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. Wasow.

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. Wasow.

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.

An introduction to the mathematical theory of statistics in intimate relation with the theory of probabilities; the elements of sampling theory.

Prerequisite, Courses 1, 2, 11, 12, 16, 17.

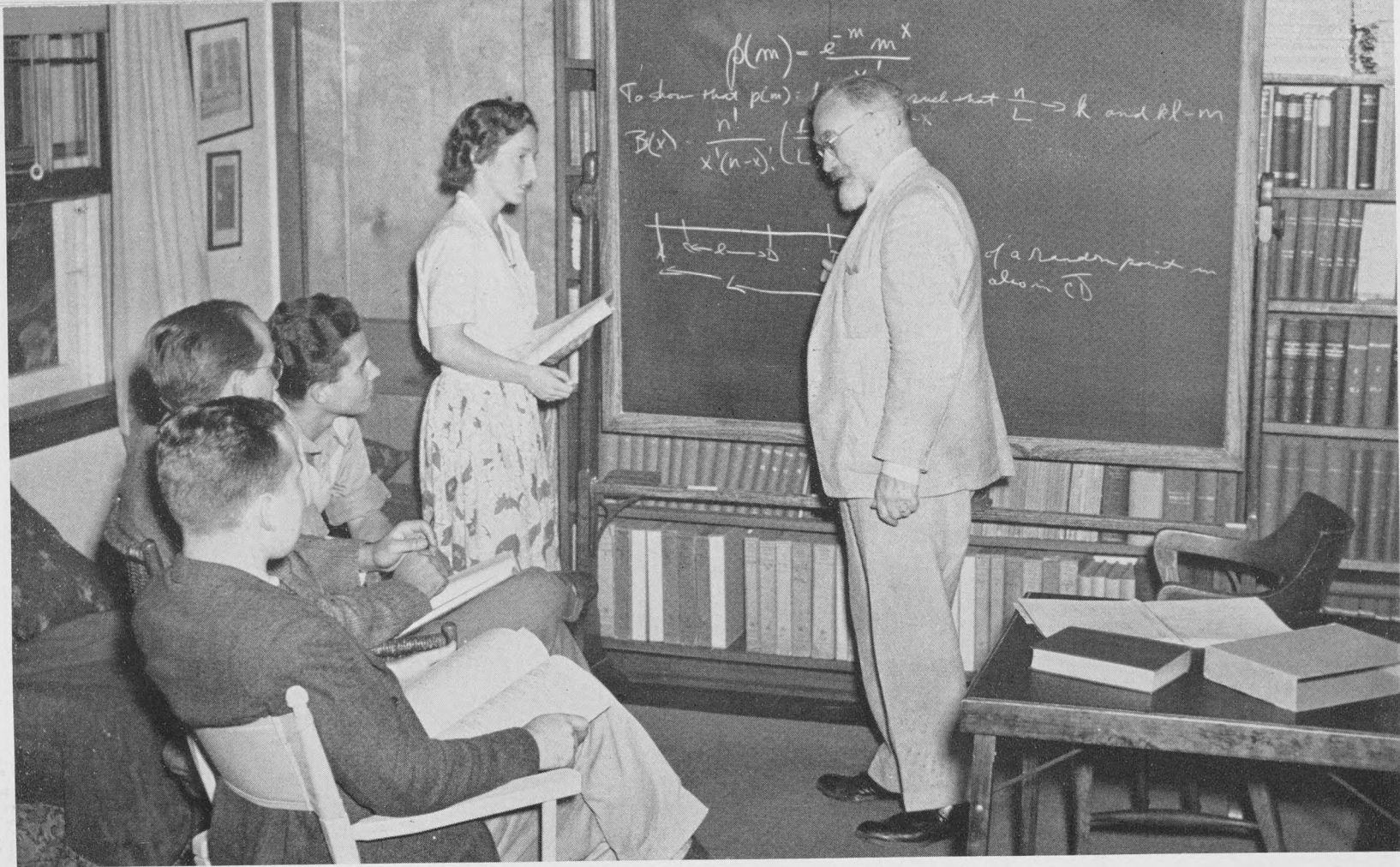
31. Undergraduate Reading Course in Mathematics.

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.



Commencement Exercises in the Arthur Hoyt Scott Outdoor Auditorium.



An "Honors" Seminar in Mathematics.

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.

8. Introduction to Astronomy. Mr. Pitman.

Half course.

This course is intended for those who desire to become acquainted with the various problems in astronomy and the overlapping of astronomy and other sciences. Those planning to take additional work in astronomy should enroll in Astronomy 1, 2.

Three class periods each week. Practical work as arranged. Text: Baker, *Introduction to Astronomy*.

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.

Requirements for Majors and Minors 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 in astronomy 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.

Honors Work in Mathematics

Prerequisites for admission to honors seminars in mathematics either as a major or as a minor are the completion of courses 1, 2 and 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 course 1, 2 in that subject is necessary in addition to the requirements indicated above.

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 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.

4. 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.

5. Advanced Geometry.

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

6. 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.

7. 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.

8. Statistics and Probability.

The purpose of this seminar 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 advanced calculus.

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.

6. Double Stars.

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

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 Director 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.

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Music

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

ASSISTANT PROFESSOR: IRMA WOLPE.

1. Foundations of Music. Mr. Swan.

Full course.

First Semester: The initial course in music begins with the study of the fundamental musical senses (scales, intervals, melody, modes, etc.) which the student will apply in the making of his own melodies. Two and three-part counterpoint is thereupon practised. At the end of the semester the student is expected to finish a short three-part motet. For models the works of Josquin des Pres, Palestrina and Victoria are used.

Second Semester: Vocal writing is here relinquished and writing for instruments taken in hand. The study of suitable themes for sonata developments. At the end of the semester the student should complete a short sonatina.

Texts: Medtner, *The Muse and the Fashion*; Morris, *Foundations of Practical Harmony and Counterpoint and Contrapuntal Technique of the 16th Century*; Nef, *Outline of a History of Music*; Rimsky-Korsakov, *Principles of Orchestration.*

2. Piano Literature. Mrs. Wolpe.

Full course.

The acquisition of the technique of piano playing through the study of Cramer, Bach's Inventions and French Suites, and Mozart and Beethoven sonatas. Prerequisite is a knowledge of the piano with at least two years of previous study.

3. Beethoven. Mr. Swan.

Half course.

Beethoven's themes and tonalities. Early individuality of Beethoven. The musical forms at his disposal. Sonata form from its inception around 1730. Thematic development. The great works of Beethoven.

In place of the above, half courses may be given in the Music of the 19th Century or Modern Music.

Honors Work

To be admitted to honors work a student must have completed both semesters of Music 1. Students minoring in music will take one seminar in Music History and one in Composition; those majoring in music, two in Music History and two in Composition. The Music History seminars deal chiefly with the Music of the Middle Ages and the Renaissance and take up the available sources from the *Ars Antiqua* to the last Netherlanders.

Texts: Bessler, *Die Musik des Mittelalters und der Renaissance*; Ludwig, *Die Werke Guillaume de Machaut's*; Apel, *The History of Musical Notation.*

Philosophy and Religion

PROFESSOR: WOLFGANG KÖHLER, *Research Professor of Philosophy and Psychology.*

ASSOCIATE PROFESSOR: *MAURICE MANDELBAUM, *Chairman.*

VISITING ASSOCIATE PROFESSOR: WILLIAM A. CHRISTIAN, JR.

ASSISTANT PROFESSORS: RICHARD B. BRANDT, *Acting Chairman.*
RODERICK FIRTH.

INSTRUCTORS: LYNE S. FEW.
DONALD KALISH.

1. 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. This course should be taken to satisfy the college requirement for the freshman year, unless special permission is granted by the department.
2. Ethics. All instructors. *Half course.*
An introduction to ethical theory, largely systematic in character. Various theories, including relativistic views, and the possibility of rational criticism are considered.
3. Logic. Mr. Few, Mr. Kalish. *Half course.*
A study of the forms of reasoning, inductive and deductive. Some time is devoted to symbolism and logical systems, and special attention is given to analysis of arguments and the detection of fallacies, both in formal reasoning and in scientific procedure. Recommended for science students, particularly mathematics majors.
4. Selected Modern Philosophers. Mr. Firth. *Half course.*
A systematic study of the work of two or three philosophers from Descartes to the present day, selected according to the interests of students and instructor. Briefer attention will be given to the historical setting of the authors discussed, and to related philosophical figures.
5. Plato. Mr. Firth. *Half course.*
A study of the dialogues of Plato in their historical setting. Recommended for students in literature.
6. Nature and Man in Modern Thought. Mr. Mandelbaum. (Not offered in 1946-47) *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.
7. Aesthetics. Mr. Mandelbaum. (Not offered in 1946-47) *Half course.*
A historical and critical study of the theory of beauty and standards of literary and artistic criticism. Recommended for students majoring in literature or the fine arts.
* Absent on leave.
8. Contemporary Problems. Mr. Brandt or Mr. Firth. *Half course.*
A more intensive study of some basic problems in the fields of epistemology and metaphysics, selected according to the interests of students and instructor.
9. The Philosophy of Science. Mr. Brandt. *Half course.*
A study of the logical structure of mathematics and the empirical sciences, including the theory of induction and probability; of the philosophical significance of some recent theories in the physical sciences; and of the meaning of basic concepts used in the sciences. Recommended for students in the sciences.

10. 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.
12. Religion in Modern Culture. Mr. Christian. *Half course.*
 Contemporary Judaism, Roman Catholicism, and Protestantism; some problems and trends in modern religious thought; the functions of religious groups in society.
13. History of Christian Thought. Mr. Christian. *Half course.*
 A study of the historical development of ideas about God, nature, man, and society. Problems and periods to be selected.
14. Religion in America. Mr. Christian. *Half course.*
 Religious thought, institutions, and movements as they have developed in American life.

Requirements and Recommendations for Majors

Applications to major in the department will normally not be approved until the student has completed course 1, and one other course from those numbered 2 to 10 if his principal interest is philosophy. Students whose principal interest is religion should consult the department about their programs. Students whose principal interest is philosophy should consult the department if they plan to offer courses in religion, in excess of one, as fulfilment of their major or minor course requirements in philosophy. Prospective majors in Honors should seriously consider including Logic somewhere in the program of the first two years. As supporting material, the department recommends a year's work in psychology and a semester's work in physics.

Honors Work

For admission to honors study, the requirement is at least two semester courses, one of which must be the *Introduction to Philosophy* (course 1), unless with the special permission of the department. Students should normally present as their second course one selected from courses numbered 2 to 10. It is recommended that students so plan their program that courses taken in the first two years do not deal with material to be covered in honors seminars.

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

1. Moral Philosophy. Mr. Firth and others.

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, Mr. Few, and others.

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. Brandt, Mr. Kalish.

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. Köhler, Mr. Brandt, Mr. Firth.

An intensive systematic study of some basic philosophical problems such as the theory of perception, the ontological status of physical objects, induction, the theory of meaning, the nature of consciousness and the mind, and the relation of the mind to the body. The subjects considered may vary somewhat from semester to semester, depending on the interests of students and instructors.

5. Aesthetics. Mr. Mandelbaum. (Not offered in 1946-47)

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 and others.

A consideration of scientific method, the logical foundations of science, including the theories of induction and meaning. Examination of the concepts of space, causality, explanation, and others of importance for the student of philosophy.

7. Concepts of Social Science. Mr. Mandelbaum and others.

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

DIRECTOR OF ATHLETICS AND PHYSICAL EDUCATION FOR MEN AND

ASSOCIATE PROFESSOR: CARL K. DELLMUTH.

ASSISTANT DIRECTOR AND ASSISTANT PROFESSOR: WILLIS J. STETSON.

ASSOCIATE PROFESSOR: ROBERT H. DUNN.

ASSISTANT PROFESSOR: EDWIN J. FAULKNER.

INSTRUCTOR: LEWIS H. ELVERSON.

ASSISTANTS: ROBERT ADAM.

ALBERT M. BARRON.

AVERY F. BLAKE.

RICHARD DiBAtISTA.

SAMUEL ECKERD.

JAMES McADOO.

JAMES MILLER.

HOWARD D. SIPLER.

COLLEGE PHYSICIAN FOR MEN: DR. HAROLD C. ROXBY.

Faculty Requirement

Physical Education is required of all non-veteran freshmen and sophomores unless excused by the College physician. During this two-year period, men students must attend a minimum of three classes per week.

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

Fall Activities

*Cross Country	*Football	Tennis	Speed Ball
Swimming	*Soccer	Touch Football	

Winter Activities

Badminton	Handball	Tennis	*Wrestling
*Basketball	Lacrosse	Track	
Boxing	*Swimming	Volley Ball	

Spring Activities

*Baseball	*Lacrosse	*Tennis
*Golf	Softball	*Track

* Indicates intercollegiate competition.

Physical Education for Women

ASSOCIATE PROFESSOR: VIRGINIA RATH, *Chairman.*

ASSISTANT PROFESSORS: MAY E. PARRY.

IRENE MOLL.

ASSISTANTS: PATRICIA STOCK, CONSTANCE RENNINGER.

COLLEGE PHYSICIAN FOR WOMEN: DR. MORRIS BOWIE.

The aim of this Department is to contribute to the education of all women students through the medium of physical activity. We believe this contribution can best be achieved through participation in a broad program of recreational, rhythmic and developmental activities. 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 and sophomores take three periods of activity each week. These may be elected from classes listed below with the stipulation that they: take swimming until a test is passed; take a rhythmic activity; take a team sport; take Body Mechanics if the posture grade indicates a need for it.

Regulation costumes should be ordered before college opens. Blanks for this purpose will be sent out from the Office of the Dean to all incoming students.

Sports

1. Hockey. Miss Parry, Miss Moll. *Fall term.*
Class and Varsity.
2. Archery. Miss Rath. *Fall and Spring.*
Class and Varsity.
3. Tennis. Miss Parry, Miss Rath, Mr. Faulkner. *Fall, Winter and Spring.*
Class and Varsity, Winter and Spring.

4. Golf. Miss Moll. *Spring.*
Class and Varsity.
5. Swimming. Miss Rath. *Fall, Winter and Spring.*
Beginner, intermediate and advanced classes in strokes and diving.
Class and Varsity.
6. Horseback Riding. Miss Stock. *Fall, Winter and Spring.*
Class and Club.
7. Basketball. Miss Parry, Miss Moll. *Winter.*
Class and Varsity.
9. Badminton. Miss Rath, Miss Parry, Mr. Faulkner. *Winter and Spring.*
Class and Varsity,
18. Soft Ball. Miss Moll. *Spring.*
19. La Crosse. Miss Staman. *Spring.*

Rhythmic Activities

10. Dancing. Miss Renninger. *Fall, Winter and Spring.*
Class and Club.
11. Folk Dancing. Miss Moll. *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, Miss Moll. *Winter.*
Required of all first-year students.
17. Conditioning Exercises. Miss Rath, Miss Moll. *Winter.*

Service Activities

20. Recreational Leadership. Miss Moll. *Winter.*
Theory and practice teaching in recreational activities of all kinds.
21. Red Cross Life Saving. Miss Rath and Red Cross Field Representative. *Winter and Spring.*
Senior and instructors' courses.

Physics

PROFESSOR: WINTHROP R. WRIGHT.

ASSOCIATE PROFESSORS: WILLIAM C. ELMORE.

IRA M. FREEMAN.

MILAN W. GARRETT.

1. General Physics. Mr. Wright, Mr. Garrett, and Mr. Elmore. *Full course.*

An introductory course in classical physics open to all students. No prerequisite other than those for college entrance is assumed. This course or its equivalent must precede any advanced courses or seminars in physics. It is required of most science majors. Three lectures, a conference and a laboratory period weekly.

2. Advanced General Physics. Mr. Elmore and Mr. Freeman. *Full course.*

The material for this course is drawn from the fields of mechanics, hydrodynamics, acoustics, kinetic theory and thermodynamics. Since free use is made of the calculus, a course in this subject must precede or be taken concurrently. This course is recommended for physics majors and should meet the needs of other students desiring a second course in physics. Three conference hours and one laboratory period weekly.

3. Modern Introductory Physics. Mr. Freeman. *Half course.*

A one-semester course primarily for non-science majors, designed to present selected subject matter in physics which illustrates the scope and method of physical science and provides a background for evaluating modern developments. Three class meetings and one laboratory period weekly. Not accepted as a prerequisite for advanced work in physics.

Honors Work

1. Physical Optics. Mr. Wright. *Second semester.*

Based on Robertson's *Introduction to Physical Optics*. The laboratory work includes measurements on thick and thin lenses, intercomparison of wave lengths by prism, grating and interference spectrographs, computation of series constants, quantitative observation of various interference and diffraction patterns and measurement of reflection coefficients.

2. Electricity and Magnetism. Mr. Garrett. *First semester.*

Based principally on Page and Adams' *Principles of Electricity*. It covers electrostatics, magnetism, electro-magnetic phenomena, electronics and some applications. It is accompanied by laboratory measurements involving direct, alternating and electronic currents, static charges and permanent magnets.

Prerequisite: Mathematics seminars in advanced calculus and differential equations.

3. Atomic Physics. Mr. Elmore. *Second semester.*

A seminar devoted to both the experimental and the theoretical aspects of modern atomic physics. The topics include gaseous conduction, atomic structure, isotopes, X-rays, photoelectricity, radioactivity, nuclear physics and related matters. The seminar discussion is accompanied by a full-day laboratory period. This seminar should be preceded by that in electricity.

4. Theoretical Physics. *Not offered regularly.*

A study of selected topics, mostly drawn from classical physics but including an introduction to quantum theory. Little duplication occurs of theoretical material covered in Seminars 1-3. This seminar is based on Page's *Introduction to Theoretical Physics*. Not accompanied by laboratory.

5. General Physics.

Offered tentatively for 1947-1948.

A seminar devoted to topics drawn from the entire field of physics. It is designed for students who desire a single honors seminar in physics but who do not wish to concentrate on one branch of the subject. The material covered includes theoretical mechanics, thermodynamics, electricity and magnetism, optics and some modern physics. The prerequisites are one full course each in the calculus and in general physics. Laboratory experiments supplement the discussion. This seminar will be given when needed provided that the current teaching load permits.

Students majoring in physics are expected to complete Physics 1 and 2, Chemistry 1, and Mathematics 1, 2, 11 and 12 in their first two years. It is recommended that German be used to fulfil the language requirement.

The work of the upper two years involves ordinarily an honors program. Mathematics is an essential minor and most physics students elect three seminars in this subject. The usual practice is to include either chemistry or electrical engineering as the second minor. This general pattern for the upper years is subject to considerable modification where special needs make it desirable.

Political Science

PROFESSOR: J. ROLAND PENNOCK, *Chairman.*

ASSISTANT PROFESSORS: LAURENCE D. LAFORE.
VERNON A. O'ROURKE.
BRYCE WOOD.

INSTRUCTOR: MORGAN THOMAS.

LECTURERS: DONALD HARTER.
PHILIP E. JACOB.

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. A study of examples of the major forms of government, followed by a more detailed study of the national government of the United States.

2. American State and Local Government. Mr. O'Rourke.

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.

3. American Political Parties. Mr. O'Rourke.

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.

4. American Constitutional Law. Mr. Pennock or Mr. Thomas.

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. Thomas.

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 implications of recent developments. 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, except by special arrangement.

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.

Open to juniors and seniors only, except by special arrangement.

7. Democracy and Dictatorship. Mr. Pennock.

Half course.

Analysis of the crisis of political liberalism. 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.

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

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; growth and nature of international law; the League of Nations; the impact of war on modern society; the United Nations Organization.

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.

Half course.

A historical and analytical study of the political, constitutional, geographic, and economic factors controlling American foreign policy, with particular reference to the development of policies toward Europe and the Far East since 1890.

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.

Requirements and Recommendations for Majors

In addition to the Introduction to Political Science (course 1), majors are required to take Economics 1. The second course in Political Science will normally be American State and Local Government (course 2). As supporting material the department recommends courses in American history (History 3, 4) and in Statistics (Economics 3).

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. Politics and Legislation. Mr. O'Rourke.

A study of the political process: public opinion; political parties; the electoral process; the legislative process.

3. Problems in Government and Administration. Mr. Thomas.

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.

Basic factors of interstate relations—geography, resources, races, trade—considered in relation to nationalism, imperialism, and war. The development of international organization, technical and political, from the Confederation of Europe to the United Nations Organization.

5. American Foreign Policy. Mr. Wood.

A study of the economic, political, and strategic factors in American foreign policy since 1890.

6. Public Law and Jurisprudence. Mr. Pennock.

Sources and nature of law; historical, sociological, philosophic, and "realistic" approaches to law; key problems of jurisprudence illustrated by study of the fields of federalism and civil liberties in American constitutional law.

7. 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, *Research Professor of Philosophy and Psychology.*

ASSISTANT PROFESSORS: RICHARD S. CRUTCHFIELD, *Chairman.*

DAVID KRECH.

BENBOW F. RITCHIE.

HANS WALLACH.

INSTRUCTOR: VERA FRENCH.

Psychology

1. Introduction to Psychology. Mr. Krech. *Half course, each semester.*
A study of the structure and organization of the experience and behavior of the individual.
Required for all further work in Psychology.
2. Psychological Methods. Mr. Crutchfield, Mr. Ritchie. *Half course, each semester.*
A study of the scientific methods of psychology: historical and systematic development of methods, experimental design, statistical techniques, methods of clinical and field investigation, psychometric methods.
Prerequisite: Course 1. Required for all further work in Psychology.
3. Cognitive Processes. Mr. Wallach. *Half course, each semester.*
A study of the problems and functions in human learning and perception; topics in perception are chosen for their relevance to other fields of psychology; in the discussion of learning, problems in understanding and thinking are emphasized.
Prerequisites: Courses 1 and 2.
4. Motivation. Mr. Ritchie, Mr. Crutchfield. *Half course, first semester.*
A study of the directive and regulative aspects of behavior.
Prerequisites: Courses 1 and 2.
5. Social Psychology. Mr. Krech. *Half course, second semester.*
Psychological analysis of the behavior of the individual as a member of social groups.
Prerequisites: Courses 1 and 2.
6. Child Psychology. Miss French. *Half course, second semester.*
Intellectual, social, and emotional development from birth through adolescence.
Prerequisites: Courses 1 and 2.
7. Educational Psychology. (Not offered in 1946-47) *Half course.*
The relation of psychological principles of learning and motivation to the educational process.
Prerequisites: Courses 1 and 2.
8. Psychological Tests and Measurements. Miss French. *Half course, first semester.*
Construction, administration and interpretation of tests; the psychology of individual differences.
Prerequisites: Courses 1 and 2.
9. Experimental Psychology. Mr. Wallach, Mr. Ritchie. *Half course, each semester.*
A laboratory course involving experimentation on problems of human behavior.
Prerequisites: Courses 1, 2 and 3.
10. Animal Behavior. Mr. Ritchie. *Half course, second semester.*
A comparative study of animal behavior, with laboratory work. Especially recommended for students of zoology.
Prerequisites: Courses 1 and 2.

11. Psychopathology. Miss French. *Half course, first semester.*
 A study of the main forms of mental disorders: psychoneuroses, psychosomatic disorders, and psychoses, with special consideration of etiological factors; principles and methods of therapy; the relation of pathological forms to normal personality structure.
 Prerequisites: Courses 1, 2 and 4.
12. Diagnosis of Personality. Miss French. *Half course, second semester.*
 Theory and practice of methods employed in understanding personality: case histories, personal documents, projective techniques, measurement of interests, sentiments and values.
 Prerequisites: Courses 1, 2, 4, 8 and 11.
13. Systematic Psychology. (Not offered in 1946-47) *Half course.*
 A study of recurrent problems of psychology, in historical perspective and in light of various systematic views. Restricted to senior majors in psychology and qualified students of philosophy.
 Prerequisites: Courses 1 and 2.
14. Advanced Experimental Psychology. The staff. *Half course, each semester.*
 Special investigation of selected problems under the direction of a member of the department. Open only to senior majors in psychology.
 Prerequisites: Courses 1, 2, 3 and 9.
15. Psychological Tutorial. The staff. *Half course, each semester.*
 Supervised reading in fields that have not been adequately covered in courses. Recommended for seniors majoring in psychology.

Education

21. Introduction to Education. The staff. *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. The staff. *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. The staff. *Half course, alternate years.*
 A study of the fundamental principles of education viewed in dynamic relation with our culture; special emphasis on the role of education in a democratic society.

Requirements for Majors in Course

Major students in course normally take *Courses 1, 2, 3, 4, 9* and three further half courses in psychology. Courses in education, *21, 22* and *23*, will not be credited toward a major in psychology.—

Education alone may not be elected as a major subject, and not more than two full courses in education will be accepted for credit toward the bachelor's degree. 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, 2, 7, 21, 22* and *23*.

Honors Work

Prerequisites. Courses 1 and 2 are prerequisite for all Honors work. All major students in Honors are advised to take introductory work in zoology or physics, and a second half course in philosophy. A reading knowledge of German is desirable.

Seminar program. A normal program of seminars for majors is Perception, Learning and Thinking, Motivation, and one other in psychology. Of the two seminars taken by minors, one should be Motivation. The following seminars prepare for examinations for a degree with Honors:

1. Perception. Mr. Köhler, Mr. Wallach.

Deals systematically and experimentally with problems in the field of perception. Open to all qualified Honors students, but especially recommended for students of the natural sciences and philosophy.

2. Learning and Thinking. Mr. Krech, Mr. Ritchie, Mr. Wallach.

Deals with principles of adaptive behavior; the functions of memory and thinking; the nature of understanding and problem-solving; the nature of intelligence. Open to all qualified Honors students.

3. Motivation. Mr. Crutchfield, Miss French, Mr. Köhler, Mr. Krech, Mr. Wallach.

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

4. Individual in Society. Mr. Crutchfield, Mr. Krech, ,

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.

5. Personality. Miss French.

A systematic approach to the understanding of the personality of the individual; techniques of study of personality, such as life history, interview, projective techniques, situational tests, measurement of sentiments; clinical and experimental facts concerning personality. Open to all qualified Honors students.

6. Language. (Not offered in 1946-47)

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. Open to all qualified Honors students, but especially designed for students of literature and recommended in conjunction with the seminar in Linguistics.

7. Systematic Psychology. Mr. Köhler.

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. Open to all qualified Honors students.

8. 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.*

ASSOCIATE PROFESSORS: HAROLD MARCH.
*LEON WENCELIUS.

ASSISTANT PROFESSORS: ADOLPHE PERVY.
JAMES D. SORBER.

INSTRUCTORS: JOSE VAZQUEZ AMARAL.
ELISA ASENSIO (part-time).
NEWELL BUSH.

FELLOW AND ASSISTANT: MONIQUE BIBAULT.

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.
- 3A. Introduction to French Literature. Members of the department. *Half course.*
Representative texts of modern French writers. Conducted in French with frequent written work in French.
Prerequisite, French 2B or four years' secondary school preparation and an achievement test.
- 3B. Introduction to French Literature. Members of the department. *Half course.*
Representative texts of Renaissance and classic writers.
10. Le roman avant 1800. Mr. March. *Half course.*
11. Le roman du dix-neuvième siècle. Mr. March. *Half course.*
12. Prosateurs et moralistes de la Renaissance et de la Réforme. Mr. Bush. *Half course.*
13. La prose classique. *Half course.*
14. Les origines philosophiques de la révolution. Miss Philips. *Half course.*
16. La poésie lyrique de Villon à La Fontaine. *Half course.*
17. La poésie lyrique moderne. Mr. March. *Half course.*

* Absent on leave.

18. Origines et développement du théâtre classique. Mlle. Bilbault. *Half course.*
19. Le théâtre moderne. Miss Philips. *Half course.*
21. Advanced Composition and Diction. M. Pervy. *Half course.*
Required of French majors.

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 117.
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 are placed according to the College Entrance Examination Board tests or 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*.

Requirements for Majors and Minors

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

Required in the first two years:

First course, French or Spanish. 3A.

Second course, French or Spanish 3B or its equivalent.

Supporting subjects recommended:

French History, Philosophy, Psychology, English or another foreign or classic literature, Fine Arts.

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

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

Honors Work

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

1. *La renaissance en France.* Mr. Bush.
Rabelais, Calvin, Montaigne, Ronsard.
2. *Le théâtre classique.* Mlle. Bilbault.
Corneille, Racine, Molière.
4. *La pensée française au dix-huitième siècle.* Miss Phillips.
Montesquieu, Voltaire, Diderot, Rousseau.
5. *Mouvement des idées.* Mr. March.
Literary and philosophical ideas since 1850.
6. Balzac, Stendhal, Flaubert. Mr. March.
7. Proust, Gide, Valéry. Mr. March.

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.

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.

ASSOCIATE PROFESSOR: WALTER J. SCOTT.

ASSISTANT PROFESSORS: RUTH McCLUNG JONES.
C. BROOKE WORTH.

RESEARCH BIOLOGIST: PER F. SCHOLANDER.

RESEARCH ASSOCIATES: KNUT SCHMIDT-NIELSEN.
BODIL SCHMIDT-NIELSEN.

RESEARCH ASSISTANT: SARAH C. FLEMISTER.

1. Elementary Zoology. Mr. Irving and Mr. Worth. *Half course.*
This introductory course is designed to present to the student the fundamental aspects of systematic zoology. The structure and classification of animals, as well as their economic and cultural aspects, are considered in survey fashion. Prerequisite to all advanced courses in zoology. Three lectures, one laboratory period per week.

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. Enders or Mrs. Jones. *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.

5. 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.

6. 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. These topics may include: Invertebrate Zoology (Mrs. Jones), Advanced Microscopic Anatomy (Mrs. Jones), and Neurology (Mr. Scott).

7. 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 zoology senior majors only.

8. Biology of Parasitism. Mr. Worth. *Half course.*
A consideration of parasitology with reference to ecology, evolution, epidemiology and physiology. Surveys are made of parasites in native animals. Classification and life cycles are reviewed. Prerequisites, 2 and 3.

Requirements for Major Study in Course

Students in course should complete during four years the following: two courses in chemistry, one course in mathematics, one course in physics, two full courses in a modern language (preferably German, although two full courses in French or two full courses in Spanish will be acceptable), four courses in zoology. Genetics (Botany Department) or botany may be offered as one advanced zoology 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 zoology, provided 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 zoology majors.

Honors Work

Prerequisites for a major study of zoology: one and one-half courses in zoology (1, 2, 3), two courses in chemistry (1, 2 or 3, 6A), one course in mathematics (1, 2), one course in physics (1), two courses in German (1, 2), or their equivalent.

Prerequisites for a minor study of zoology: one course in zoology (1, 2 or 3). In addition seminars in physiology require one course in physics and two courses in chemistry.

Additional preparation in chemistry is desirable. 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 certain seminars in those departments.

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

Embryology. Mr. Enders or Mrs. Jones.

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.

Physiology. Mr. Irving.

A survey of important subjects in general and comparative physiology.

Biology of Parasitism. Mr. Worth.

An intensified version of the course (8) with emphasis on individual projects by the students. An integration of problems in medical and veterinary sciences with conditions obtaining normally among wildlife.

Special Topics. The staff.

Open to students who, having satisfied all requirements, desire further work in the department. The following subjects are suggested: Neurology (Mr. Scott), Physiology of Reproduction (Mr. Enders), Biology of the Vertebrates (Mr. Enders). Frequently this will include acting as junior assistants in the research of staff members.

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

Reference Section

A directory of the students and faculty of Swarthmore College may be obtained by writing to the Registrar.

*Visiting Examiners of Candidates for
Degrees with Honors
February 1946*

Divisions of the Humanities and the Social Sciences

Economics: PROFESSOR WILLIAM N. LOUCKS, University of Pennsylvania.

English: DR. GEORGE J. BECKER, Swarthmore College; PROFESSOR RALPH M. SARGENT, Haverford College.

French: PROFESSOR LAURENCE W. WYLIE, Haverford College.

History: DR. PHILIP A. CROWL, Princeton University.

Linguistics: PROFESSOR ALFRED SENN, University of Pennsylvania.

Philosophy: PROFESSOR JOHN S. ADAMS, JR., University of Pennsylvania;
DR. J. GLENN GRAY, Swarthmore College.

Political Science: PROFESSOR LAWRENCE H. CHAMBERLAIN, Columbia University;
PROFESSOR D. BEATRICE McCOWN, Bryn Mawr College.

Psychology: PROFESSOR DONALD K. ADAMS, Duke University.

Division of Mathematics and the Natural Sciences

Astronomy: PROFESSOR JAN SCHILT, Columbia University.

Mathematics: PROFESSOR MARGUERITE LEHR, Bryn Mawr College.

Physics: PROFESSOR RICHARD M. SUTTON, Haverford College.

June 1946

Divisions of the Humanities and the Social Sciences

Economics: MR. KERMIT GORDON, Washington, D. C.; DR. RICHARD A. MUSGRAVE, Washington, D. C.

English: MISS DOROTHY A. KOCH, New Haven, Conn.; PROFESSOR GEORGE F. WHICHER, Amherst College.

Fine Arts: PROFESSOR RICHARD BERNHEIMER, Bryn Mawr College.

French: PROFESSOR MARGARET GILMAN, Bryn Mawr College.

German: PROFESSOR ERNST JOCKERS, University of Pennsylvania.

History: DR. WILLIAM O. AYDELOTTE, Princeton, N. J.; DR. PHILIP A. CROWL, Princeton University; DR. EDWARD W. FOX, Washington, D. C.

Linguistics: PROFESSOR ALFRED SENN, University of Pennsylvania.

Philosophy: PROFESSOR JAMES W. MILLER, College of William and Mary;
PROFESSOR PAUL WEISS, Bryn Mawr College.

Political Science: PROFESSOR D. BEATRICE McCOWN, Bryn Mawr College;
PROFESSOR MALCOLM MOOS, The Johns Hopkins University.

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

Spanish: PROFESSOR DOROTHY N. NEPPER, Bryn Mawr College.

Division of Mathematics and the Natural Sciences

Chemistry: PROFESSOR JAMES L. CRENSHAW, Bryn Mawr College.

Mathematics: PROFESSOR D. J. STRUIK, Massachusetts Institute of Technology.

Physics: PROFESSOR A. L. PATTERSON, Bryn Mawr College.

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

Degrees Conferred

February 24, 1946

BACHELOR OF ARTS

In the Division of the Humanities

CAROL PATRICIA BARNES	ELSIE CLARE KAMSLER
FRANCES MAYHEW BLACKBURN (<i>High Honors</i>)	ANNE JOY MURPHY
MARGARET ELIZABETH CARROLL	KIMI NAGATANI
VIRGINIA THOMSON COBB	DENISE PEI
ANNE GALE COLTON	JOHN ROSSELLI
MARY PATIENCE FROHMAN (<i>Honors</i>)	RUTH ISABEL SMITH (<i>Honors</i>)
MARY ANN GEHRES (<i>Honors</i>)	JEAN WINIFRED THOMPSON (<i>Honors</i>)
HELEN ODETTE HOLLINGSWORTH	KATHARINE ELIZABETH WOLFE

In the Division of the Social Sciences

HENRY McRAVEN BAIN, JR.	ELINOR LORAIN JONES
NINA JEANNETTE BALFOUR	ESTHER HOBSON MOORE
JOAN ELIZABETH BUESCHING (<i>Honors</i>)	ANNE NEWTON (<i>High Honors</i>)
MIRIAM MALCOLM DOUGLAS (<i>High Honors</i>)	JAMES HAAS SCHEUER
MARIANNE FREY	JOAN RUTH SEIDEL (<i>Honors</i>)
	JOHN BATTERSON STETSON

In the Division of Mathematics and the Natural Sciences

JUDITH SARA BRAUDE	BETTY ANN MATEER
VICTOR HIRSCH FRANKEL	EDWARD HAMILTON PAGE
WILLIAM ROSS HALLIDAY, JR.	NANCY LOIS RANDALL
	NANCY GRACE ROMAN (<i>Honors</i>)

BACHELOR OF SCIENCE

In the Division of Engineering

EDWARD LLOYD BRADLEY	PETER LUKENS MILLER
CARROLL IRVING CRAWFORD	DONALD WILLIAM SKELLEY
	DAVID CHARLES SOLT

June 24, 1946

BACHELOR OF ARTS

In the Division of the Humanities

MARY LOU BARTLE	NANCY PITT DODGE
MARJORIE COLWELL BOARDMAN	SELMA RAIKE DRELLER (<i>Honors</i>)
JOAN JESSOP BREWSTER (<i>High Honors</i>)	MARY LOU DUTTON
BEVERLY BROOKS (<i>High Honors</i>)	IDA LOUISE CURTIS ENNENGA
DORIS LIPPINCOTT BYE	PATRICIA FAYRE FRANK
JENNIE ELIZABETH COATES	NANCY KATHARINE FRICK
MARIE LOUISE COOLEY	ISABEL EMORY GAMBLE (<i>Highest Honors</i>)
JEAN MARIE CUPITT	JEAN BROOKES GIBSON
ROBERT MCCALL GILKEY, JR.	JEAN KNOWLES KISTLER
KATHARINE HELEN HILL (<i>High Honors</i>)	ELISABETH ANNE KITE
NANCY CAROL JONES	ELIZABETH BLANCHE LANDON
MARY LOUISE KEAY	MARILYN LOW

SARA ELIZABETH LUCAS (*High Honors*)
 SALLY LEE MACLELLAN
 ELIZABETH SUTHERLAND MARTINEZ (*Honors*)
 FRANCES DAYRELL MCCLURE
 HENRY EDGAR MCCONE, JR.
 DOROTHY MENZEL (*High Honors*)
 JANE GAMMON METZ (*Honors*)
 PATRICIA MONTENYOHL
 LOIS ROSE MORRELL
 ALICE EMILY MUSTIN

MARY JANET MUSTIN
 FREDERIKA NELSON
 JEAN PRESBREY
 ANNETTE HOPE RICHARDS
 ELIZABETH WILLITS ROBERTS
 JOHN WILMER STEER
 JEANNE ALICE THEIS (*Honors*)
 MARGARET VAN BOETZELAER
 SYLVIA CONANT WARD
 JANE FAIRFAX WELLS

In the Division of the Social Sciences

ROSEMARY MIZE ACCOLA (*High Honors*)
 DOROTHY GERTRUDE BOWMAN
 MARY ELIZABETH BROWN
 SCOT BUTLER
 CORNELIA STABLER CLARKE
 ANNA HIRES COOMBS
 ANNA MARY FITTS
 SUSAN EVERETT HARWIG (*Honors*)
 ELISABETH HEBER-SMITH
 MARTHA LYLE HILL
 JEROME SPIEGEL KOHLBERG, JR.
 RUTH NYE LEONARD
 SAMUEL MEGAW LOESCHER (*High Honors*)

ERNEST W. LUTHER (*Honors*)
 MARILYN PEELE RATH
 JOHN CRAWFORD RODGERS
 WALTER A. SCHEIBER
 SCHUYLER F. V. SCHMUCK (*Honors*)
 PAUL SEABURY (*High Honors*)
 CHARLES EDWIN SEILER, JR.
 NANCY ROBERTS SMITH
 VIRGINIA ELEANOR STAMAN
 JEANNETTE DEFRANCE STREIT (*High Honors*)
 ELEANOR CARTER TIMBRES (*Honors*)
 VALERIE JUNE WILES (*High Honors*)
 DOROTHY ELIZABETH WILLENBUCHER (*Honors*)

In the Division of Mathematics and the Natural Sciences

DAVID AULD
 BARBARA BOWEN
 HELEN M. DEAN (*Honors*)
 SARAH HARRISON DEMOND
 WILLIAM T. EVANS
 JOHN HENRY FERRER
 ELLEN CLARE FUNKE
 NANCY JANE GARVER
 BARBARA M. GAWTHROP
 KATHE SOLIS-COHEN JACOBY (*Honors*)
 GRACE ELIZABETH KEMP

PHYLLIS HELEN KINKEAD
 PAUL JOHN VAN METER KOPSCHE
 WARNER EDWARDS LOVE
 MARY LOUISE McCLAIN
 H. PHELPS POTTER, JR.
 OSCAR MORGAN POWELL, JR.
 RAYMOND JAMES STARRELS
 MARY ELIZABETH STORM
 NORMAN JULES WINSTON
 MILTON ALEXANDER WOHL
 RICHARD DOERR WOLTMAN

BACHELOR OF SCIENCE

In the Division of Engineering

ROBERT DEAN AGLER
 DONALD MERLE ANDERSON
 GEORGE CLIFTON BEEBE
 RUSSELL WILLIAM CHRISTIE
 FREDERICK WHITFIELD DEWITT
 JOSEPH BROWN DILLENBECK
 ALAN LOUIS DUKE
 WILLIAM WARD HAYS
 VERNE HOAR, JR.
 HERBERT WARREN JACOBS
 ROGER DERRILL KEENAN
 MICHAEL GEORGE KOBLANSKI

ALBERT LENGYEL
 ABRAHAM WILLIAM MARTIN
 HUGH HAYNESWORTH McCALLUM, JR.
 NOBLE TYRUS McHUGH
 BRUNO MUSSETTO
 GERALD EMILE NOLIN
 JOHN ERWIN PIXTON, JR.
 ERVIN N. SCOTT
 ROBERT FRANKLIN STOLL
 HILDRETH HUBBARD STRODE
 LAWRENCE WILLIAM YEARKER

Geographical Distribution of Students

1946-1947

Pennsylvania	384	Washington	2
New York	194	Arizona	1
New Jersey	107	Arkansas	1
Massachusetts	42	Kansas	1
Illinois	39	Kentucky	1
District of Columbia	33	Maine	1
Maryland	33	Nebraska	1
Ohio	22	Oregon	1
Connecticut	21	South Carolina	1
Michigan	18	Utah	1
Indiana	17	Vermont	1
California	13	Total of U. S. Students	1002
Virginia	12	China	5
Delaware	9	Greece	3
Colorado	5	Brazil	2
Missouri	5	Canada	2
West Virginia	5	Colombia	1
Wisconsin	5	Cuba	1
Florida	3	France	1
Georgia	3	Hawaii	1
Iowa	3	India	1
Texas	3	Mexico	1
Alabama	2	Morocco	1
Minnesota	2	Norway	1
Mississippi	2	Philippine Islands	1
Oklahoma	2	Trans-Jordan	1
Rhode Island	2	Turkey	1
South Dakota	2	Total of Others	23
Tennessee	2	Grand Total	1025

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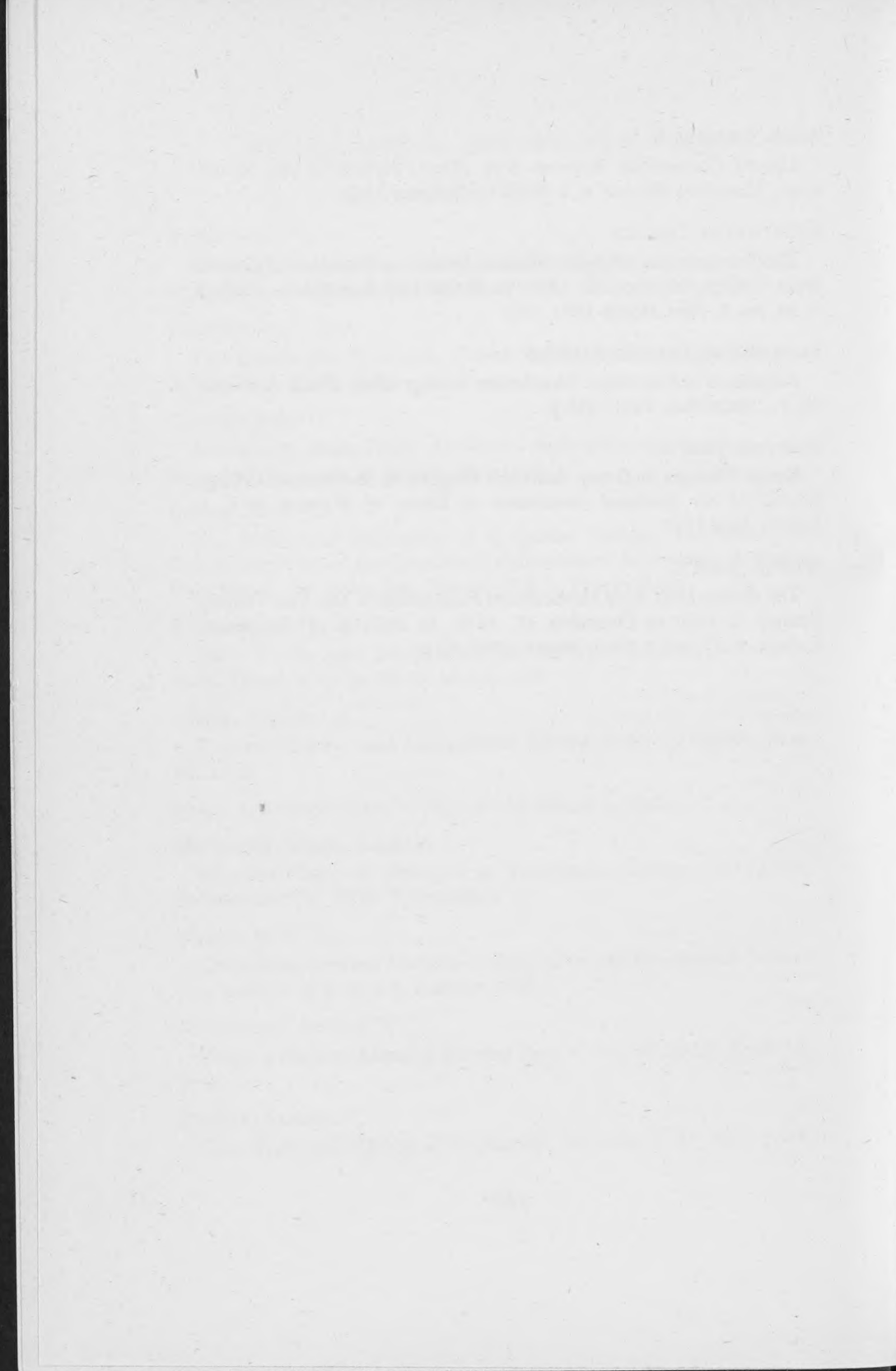
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 Parrish Hall
 Roberts Hall
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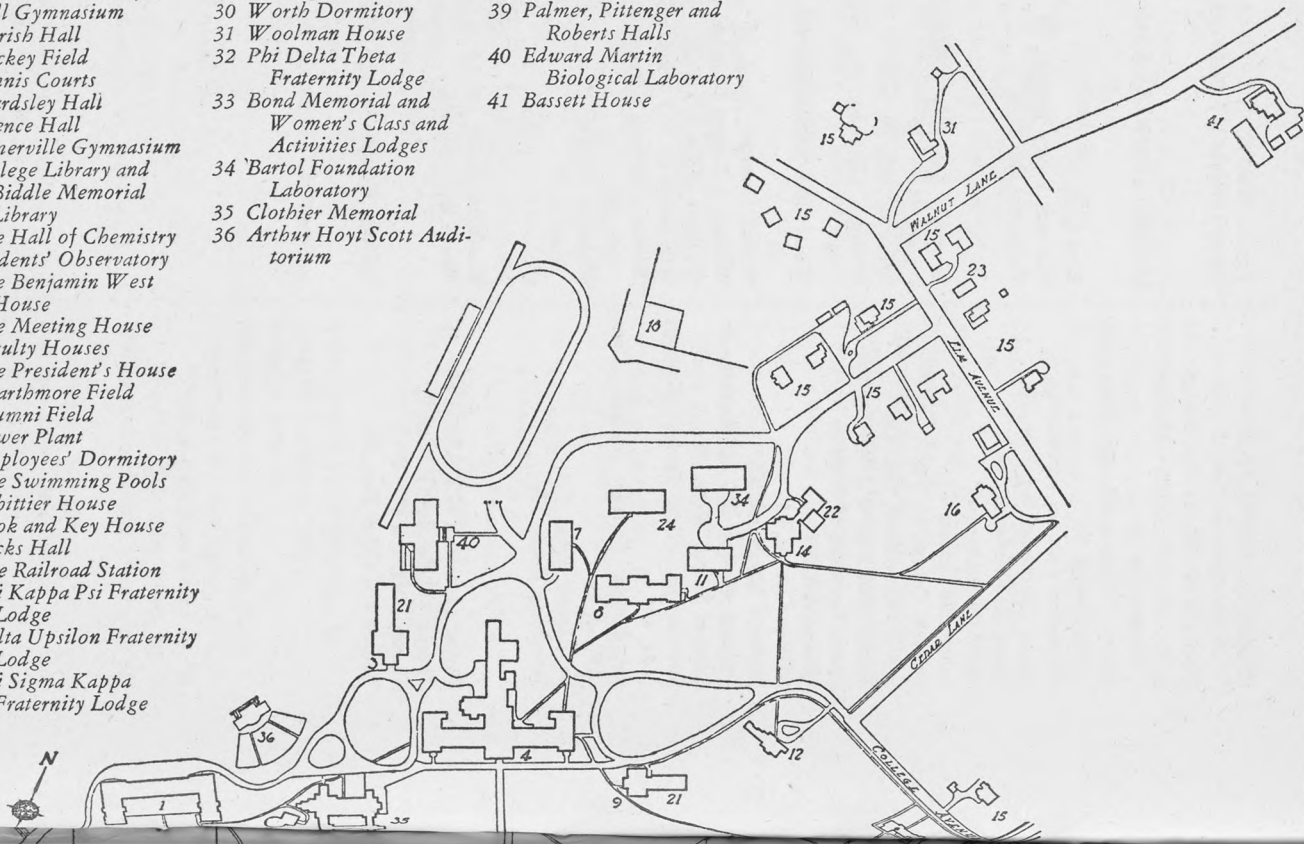
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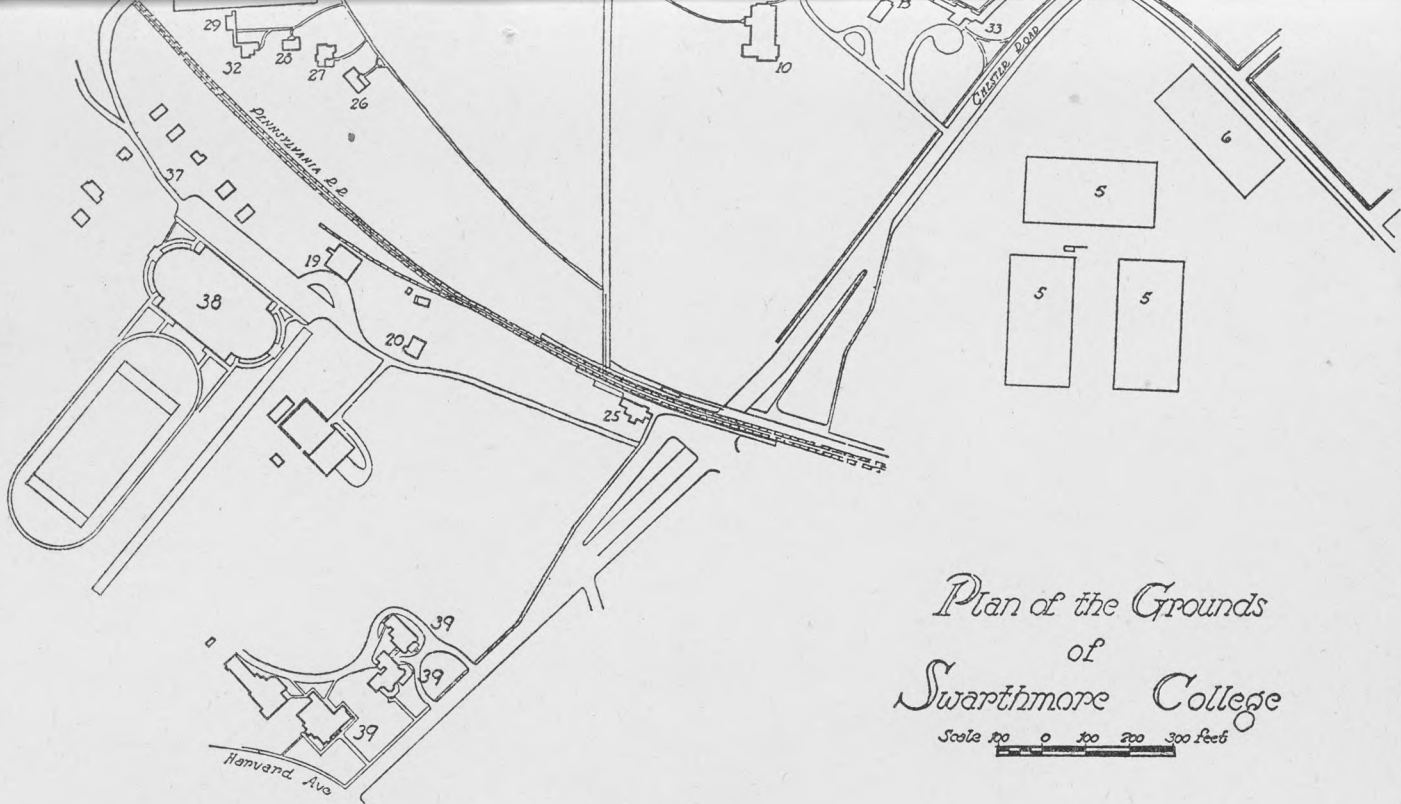
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|--|--|--|
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| 2 Sproul Observatory | 30 Worth Dormitory | 38 Field House |
| 3 Hall Gymnasium | 31 Woolman House | 39 Palmer, Pittenger and Roberts Halls |
| 4 Parrish Hall | 32 Phi Delta Theta Fraternity Lodge | 40 Edward Martin Biological Laboratory |
| 5 Hockey Field | 33 Bond Memorial and Women's Class and Activities Lodges | 41 Bassett House |
| 6 Tennis Courts | 34 Bartol Foundation Laboratory | |
| 7 Beardsley Hall | 35 Clothier Memorial | |
| 8 Science Hall | 36 Arthur Hoyt Scott Auditorium | |
| 9 Somerville Gymnasium | | |
| 10 College Library and Biddle Memorial Library | | |
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| 27 Delta Upsilon Fraternity Lodge | | |
| 28 Phi Sigma Kappa Fraternity Lodge | | |





*Plan of the Grounds
of
Swarthmore College*

Scale 100 0 100 200 300 feet