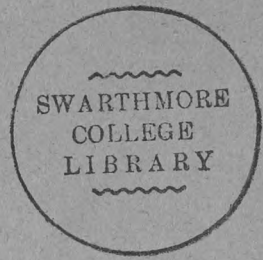


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**SWARTHMORE
COLLEGE
BULLETIN**

**CATALOGUE
1949-1950**

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The Campus from the Air.



SWARTHMORE COLLEGE

BULLETIN

CATALOGUE

1949-1950

SWARTHMORE, PENNSYLVANIA

Volume XLVII

Number 1

Tenth Month, 1949

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1949

| OCTOBER | | | | | | | NOVEMBER | | | | | | | DECEMBER | | | | | | | |
|---------|----|----|----|----|----|----|----------|----|----|----|----|----|----|----------|----|----|----|----|----|----|---|
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1950

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| FEBRUARY | | | | | | | JUNE | | | | | | | OCTOBER | | | | | | | |
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| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | |
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| MARCH | | | | | | | JULY | | | | | | | NOVEMBER | | | | | | | | | |
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| APRIL | | | | | | | AUGUST | | | | | | | DECEMBER | | | | | | | | |
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1951

| JANUARY | | | | | | | MARCH | | | | | | | MAY | | | | | | |
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| FEBRUARY | | | | | | | APRIL | | | | | | | JUNE | | | | | | |
|----------|----|----|----|----|----|----|-------|----|----|----|----|----|----|------|----|----|----|----|----|----|
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| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 25 | 26 | 27 | 28 | | | | 29 | 30 | | | | | | 24 | 25 | 26 | 27 | 28 | 29 | 30 |

College Calendar

1949

Winter Semester

| | |
|-------------------|--|
| Ninth Month 22-25 | Freshman placement days |
| Ninth Month 26 | Registration, 1:30 p.m. |
| Ninth Month 27 | Classes and honors seminars begin |
| Tenth Month 4 | Meeting of the Board of Managers |
| Eleventh Month 3 | Executive Committee of the Board of Managers |
| Eleventh Month 24 | Thanksgiving Day (holiday) |
| Twelfth Month 6 | Annual Meeting of the Board of Managers |
| Twelfth Month 20 | Christmas recess begins, 6:00 p.m. |

1950

| | |
|-------------------|--|
| First Month 3 | Executive Committee of the Board of Managers |
| First Month 4 | Christmas recess ends, 8:00 a.m. |
| First Month 14 | Classes end for second-semester seniors |
| First Month 19 | Classes end |
| First Month 20 | Registration, 1:30 p.m. |
| First Month 20-21 | Review period for course students Senior written comprehensives |
| First Month 21 | Honors seminars end |
| First Month 23 | Mid-year examinations begin |
| First Month 30 | Honors seminars begin for spring semester |
| Second Month 2 | Mid-year examinations end |

Spring Semester

| | |
|-------------------|--|
| Second Month 6 | Classes begin |
| Second Month 7 | Executive Committee of the Board of Managers |
| Third Month 7 | Meeting of the Board of Managers |
| Third Month 25 | Spring recess begins, 11:00 a.m. |
| Fourth Month 3 | Spring recess ends, 8:00 a.m. |
| Fourth Month 4 | Executive Committee of the Board of Managers |
| Fifth Month 2 | Executive Committee of the Board of Managers |
| Fifth Month 13 | Honors seminars end |
| Fifth Month 20 | Classes end for second-semester seniors |
| Fifth Month 22 | Honors written examinations begin |
| Fifth Month 25 | Classes end |
| Fifth Month 26 | Enrollment in classes for winter semester, 1:30 p.m. |
| Fifth Month 26-27 | Review period for course students Senior written comprehensives |
| Fifth Month 29 | Final examinations begin |
| Fifth Month 30 | Honors written examinations end |
| Sixth Month 1-3 | Honors oral examinations |
| Sixth Month 8 | Final examinations end |
| Sixth Month 9 | Meeting of the Board of Managers |
| Sixth Month 9 | Class Day |
| Sixth Month 10 | Alumni Day |
| Sixth Month 11 | Baccalaureate Day |
| Sixth Month 12 | Commencement Day |

1950

Winter Semester

| | |
|-------------------|--|
| Ninth Month 21-24 | Freshman placement days |
| Ninth Month 25 | Registration, 1:00 p.m. |
| Ninth Month 26 | Classes and honors seminars begin |
| Tenth Month 3 | Meeting of the Board of Managers |
| Eleventh Month 9 | Executive Committee of the Board of Managers |
| Eleventh Month 23 | Thanksgiving Day (holiday) |
| Twelfth Month 5 | Annual Meeting of the Board of Managers |
| Twelfth Month 20 | Christmas recess begins, 6:00 p.m. |

1951

| | |
|-------------------|--|
| First Month 2 | Executive Committee of the Board of Managers |
| First Month 4 | Christmas recess ends, 8:00 a.m. |
| First Month 18 | Classes end |
| First Month 19 | Registration, 1:30 p.m. |
| First Month 19-20 | Review period for course students |
| First Month 20 | Honors seminars end |
| First Month 22 | Mid-year examinations begin |
| First Month 29 | Honors seminars begin for spring semester |
| Second Month 1 | Mid-year examinations end |

Spring Semester

| | |
|-------------------|--|
| Second Month 5 | Classes begin |
| Second Month 6 | Executive Committee of the Board of Managers |
| Third Month 6 | Meeting of the Board of Managers |
| Third Month 24 | Spring recess begins, 11:00 a.m. |
| Fourth Month 2 | Spring recess ends, 8:00 a.m. |
| Fourth Month 3 | Executive Committee of the Board of Managers |
| Fifth Month 1 | Executive Committee of the Board of Managers |
| Fifth Month 12 | Honors seminars end |
| Fifth Month 19 | Classes end for second-semester seniors |
| Fifth Month 21 | Honors written examinations begin |
| Fifth Month 24 | Classes end |
| Fifth Month 25 | Enrollment in classes for winter semester, 1:30 p.m. |
| Fifth Month 25-26 | Review period for course students Senior written comprehensives |
| Fifth Month 28 | Final examinations begin |
| Fifth Month 29 | Honors written examinations end |
| Fifth Month 31 | Honors oral examinations |
| Sixth Month 1-2 | Honors oral examinations |
| Sixth Month 7 | Final examinations end |
| Sixth Month 8 | Meeting of the Board of Managers |
| Sixth Month 8 | Class Day |
| Sixth Month 9 | Alumni Day |
| Sixth Month 10 | Baccalaureate Day |
| Sixth Month 11 | Commencement Day |

PERSONNEL
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SWARTHMORE COLLEGE

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Meeting House Road, Jenkintown, Pa.
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* Nominated by the Alumni Association.

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The President is ex-Officio a Member of Every Committee

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* Absent on leave, Fall Semester.

† Absent on leave, Spring Semester.

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Acting Vocational Director of Men, KENNETH ALLEBACH, B.A., Swarthmore College.

CAMPAIGN OFFICE

Director, HARRIET M. WELSH.
Secretary, BARBARA HELD.

PUBLICITY OFFICE

Director, JANET M. BALDWIN, B.A., Swarthmore College.
Assistant, JOHN I. BROOKS, B.A., Swarthmore College.

HEALTH SERVICE

Physician, MORRIS A. BOWIE, B.A., University of Colorado; M.D., Harvard University.
Consulting Psychiatrists:
LEON SAUL, B.A. and M.A., Columbia University; M.D., Harvard University.
J. W. LYONS, B.A., University of Scranton; M.D., University of Pennsylvania.
Nurses:
ANNE AUSTIN, R.N., BLANCHE DEVEREUX, R.N., REGINA L. HOLTZMAN, R.N., CAMILLE JONES, R.N.

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JESSE MERRITT.....Farmingdale, L. I.
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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 eight hundred and fifty students, equally divided between men and women. Its students are drawn from a wide variety of backgrounds.* 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.

* (See table of geographical distribution of students, page 163.)

** To reach the college, motorists should turn off U.S. 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.

THE PURPOSES AND POLICIES OF
SWARTHMORE COLLEGE

The purpose of Swarthmore College is to make its students more valuable human beings and more useful members of society.

Swarthmore shares this purpose with every other educational institution. Each in its own way seeks the development of human beings as individuals. Each seeks to direct their energies and talents toward the common good. American education is a direct result of our democratic principles. Democracy is based upon the infinite worth of each individual. It can operate successfully only when men are willing to seek together a common good. It depends upon knowledge and understanding of the complex problems of modern society. The debt of our educational system to democracy is equalled only by the debt of democracy to education.

While a common purpose underlies all American education, each school and college and university seeks to realize that purpose in its own way. Each must select those tasks it can do best. Only in this way can it be most effective. Only by such selection can it contribute to the diversity and richness of educational opportunity which is a part of the American heritage and of the American strength. This statement attempts to outline those goals and policies which define Swarthmore's place and function.

THE RELIGIOUS TRADITION

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

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

unceasing re-examination of any view which may be held regarding them. That is the kind of ethical and religious character which Swarthmore seeks to develop.

THE COMMUNITY LIFE

Swarthmore is a small college by deliberate policy. It is semi-rural in location, residential and co-educational in character. These features create an ideal environment for personal growth. Co-education provides the most natural atmosphere for both men and women, who in their common work and play come to value each other for their true worth. The residential character is the basis for a community life in which the ideals of the college influence every member. Growth in emotional maturity, necessary both for personal satisfaction and for effective action, is an integral part of the total educational program.

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

ACADEMIC EXCELLENCE

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

Education is largely an individual matter, for no two students are exactly alike. Some need detailed help, while others profit from considerable freedom. The program of honors study, in which Swarthmore pioneered, is designed to give recognition to this fact. It is the most distinctive feature of our educational program. For many stu-

dents it provides an enriching and exciting intellectual experience. It has as its main ingredients freedom from class work, maximum latitude for the development of individual responsibility, concentrated work in broad fields of study, and close association with faculty members in small seminars. The honors program and the course program are parallel systems of instruction for students during their last two years. Both are designed to evoke the maximum effort and development from each student, the choice of method being determined by individual need.

ADMISSIONS

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

In the competition for admission preference is given to the children of Friends and alumni who can meet the requirements. It is also the policy of the College to have the student body represent not only different parts of the United States but many foreign countries, both public and private secondary schools, and various economic, social, religious, and racial groups.

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

A college is never static. Its purposes and policies are always changing to meet new demands and new conditions. The founders of Swarthmore would find in it today many features they never contemplated when they shaped the College in the middle of the nineteenth century. Swarthmore, if it is to remain alive, must be forever changing. And many people are continually engaged in shaping its destiny—the Board of Managers, administration, faculty, students, alumni, parents, and the community as a whole. The goal is to achieve for each generation, by means appropriate to the times, that unique contribution and that standard of excellence which have been guiding ideals of Swarthmore from its founding.

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 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 56 to 59) 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.

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. In some cases, special tests may be given by the college. The special tests for veterans are described on page 31.
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 Test 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 of the year in which the candidate wishes to be admitted. An application fee of \$5.00, which is not refundable, is required of all candidates.

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

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

In 1949-50 these tests will be given in various centers throughout this country and abroad on December 10, January 14, March 11, May 20, and August 9. Applicants are normally expected to take the required tests in March of their Senior year. They may take the Scholastic Aptitude Test in December or January if they wish. Those who wish to take the tests *for practice* at the end of the Junior year are encouraged to do so. All such applicants must repeat the tests in their Senior year, however, in order to give themselves the advantage of maximum preparation.

Application to take the tests should be made directly to the College Entrance Examination Board, Box 592, Princeton, New Jersey. A bulletin of information may be obtained without charge from the Board. Students who wish to take the tests in any of the following western states, territories, and Pacific areas, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, Alaska, Hawaii, Australia, and all Pacific Islands except Formosa and Japan, should address their inquiries and send their applications to the College Entrance Examination Board, Box 775, Berkeley 4, California. Application should be made to the Board at least a month before the date on which the test will be taken.

No additional tests are required of candidates for scholarships. They must, however, write for a special application blank at least two weeks in advance of the date on which applications for admission are due. There are five Open Scholarships for men and three for women, offered each year in amounts ranging from \$100 to \$1000. Fuller information concerning these and other scholarships will be found on pages 33 to 40.

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

Veterans. Admission requirements for veterans are, in general, the same as those for other candidates. Veterans who have returned to high school for academic work should take the regular Scholastic Aptitude and Achievement Tests of the College Entrance Examination Board, as described above. Other veterans may take the Special Aptitude Test for Veterans, also administered by the Board. Consideration will be given to the results of the General Educational Development Tests, administered by USAFI, or the tests given by the Veterans Administration, but these tests may not ordinarily be substituted for those of the College Entrance Examination Board.

Expenses

Charges per academic year of two semesters:

| | |
|--------------------------------|---------|
| Board, room, and tuition | \$1200* |
| General fee | 100 |
| | ----- |
| Total charges | \$1300 |

While a general charge for board, room and tuition is made, this may be divided into \$600 for tuition and \$600 for board and room. The general fee of \$100 per year covers the costs of student health, library and laboratory fees, athletic fees, arts and crafts, and the support of several other extra curricular activities.

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

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 absence or withdrawal from the college, due notice having been given to the Business Manager, there will be a refund for board for any time in excess of six weeks. Fees cannot be refunded for any reason whatever.

* An advance deposit of \$25 is required of all new students in order to reserve a place in college for the coming year. A similar deposit of \$15 is required of returning students. These deposits are credited against the bill for tuition, board, and room. They are returnable if the registration is cancelled before August 1st.



Worth Hall (a Dormitory for Women).



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

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 percent 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. During the current academic year the college has budgeted more than \$80,000 for scholarships. About one-quarter of that sum is provided by the endowed scholarships listed below. 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 named scholarship funds are listed below.

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 under the direction of 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.

SCHOLARSHIPS FOR MEN

The GEORGE F. BAKER SCHOLARSHIPS. The George F. Baker Scholarships, to be awarded for the first time in 1950, have been given to the college as part of a national scholarship program. They are the gift of the George F. Baker Foundation and will be awarded to four freshmen men each year for three years. The actual amount of the

scholarships, in part determined by financial need, will be a maximum of \$1,200 for each year of the student's college career. Students will be chosen for these awards primarily on the basis of achievement and promise of leadership in business, government and the professions.

OPEN SCHOLARSHIPS FOR MEN. Swarthmore College awards annually five four-year scholarships to men entering the freshman class. These scholarships, based on the general plan of the Rhodes Scholarships, are given to candidates who, in the opinion of the Committee of Award, rank highest in scholarship, character and personality. The amount of the annual award varies from \$100 to \$1000 according to the financial need of the winner.

The **SCOTT B. LILLY SCHOLARSHIP**, endowed by Jacob T. Schless of the Class of 1914 at Swarthmore College, will be offered for the first time to a student entering Swarthmore College in the fall of 1950.

This scholarship is in honor of a former distinguished Professor of Engineering and, therefore, students who plan to major in engineering will be given preference.

The stipend will be a maximum of \$900 a year for four years; the exact amount of the award will be determined by the financial needs of the winning applicant.

The **DONALD RENWICK FERGUSON SCHOLARSHIP**, established by Mrs. Amy Baker Ferguson, in memory of her husband, Donald Renwick Ferguson, M.D., of the Class of 1912, who died during the Second World War, is awarded to a young man who is looking forward to the study of medicine. The scholarship will pay \$600.

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 \$600.

The **T. H. DUDLEY PERKINS MEMORIAL SCHOLARSHIP** is awarded annually to a young man selected by a committee of the faculty ap-

pointed by the President of the college for the purpose. The award having a value of \$500 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 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 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.

SCHOLARSHIPS FOR WOMEN

OPEN SCHOLARSHIPS FOR WOMEN. Mr. and Mrs. Daniel S. White, of the Class of 1875, on the occasion of the Fiftieth Reunion of that class, established three open competitive scholarships for women, 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. The amount of the award varying from \$100 to \$1000 is determined in the same way as the scholarships for men.

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

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 enter-

ing 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.

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 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 HARRIET W. PAISTE FUND is limited by the following words from the donor's will: "the interests 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 \$350 annually.

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." The value of this scholarship is approximately \$225 annually.

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 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 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 \$65 annually.

SCHOLARSHIPS OPEN TO MEN AND WOMEN

The EDWARD CLARKSON WILSON SCHOLARSHIP. A scholarship with an annual value of \$625 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 CLASS OF 1915 SCHOLARSHIP FUND was established on the occasion of the Twenty-fifth Reunion of the Class and provides an income of approximately \$550. This sum is to be awarded either to freshmen or 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 DANIEL UNDERHILL SCHOLARSHIP, given by Daniel Underhill '94, in memory of his grandfather, Daniel Underhill, member of the first Board of Managers, provides \$500 annually for a deserving student in need of financial aid.

The 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, participa-

tion in some international government agency, the American Friends Service Committee, or similar activities. The annual income amounts to approximately \$450.

The JONATHAN K. TAYLOR SCHOLARSHIP, in accordance with the donor's will, is awarded by the Board of Trustees of the Baltimore Monthly Meeting of Friends. This scholarship is first open to descendants of the late Jonathan K. Taylor. Then, while preference is to be given to members of the Baltimore Yearly Meeting of Friends, it is not to be confined to them when suitable persons in membership cannot be found. The value of this scholarship is approximately \$450 annually.

MEMORIAL SCHOLARSHIPS IN CLASSICS AND ANCIENT HISTORY. In memory of William Hyde Appleton, Ferris W. Price, Walter Dennison, and Ethel Brewster, Professors of Classics at Swarthmore College, 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 \$400 a year. 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 PHEBE ANNA THORNE FUND provides an income of approximately \$2250 for scholarship 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 JAMES E. MILLER SCHOLARSHIP. Under the will of Arabella M. Miller, who died Sixth Month 24th, 1922, the sum of \$5,986 was awarded to the Cambridge Trust Company, Trustee under the will of James E. Miller, to be applied to scholarships in Swarthmore College. An annual income of approximately \$200 is available and 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) to be selected by Swarthmore College and approved by the Trustee.

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.

The PRESSER MUSIC SCHOLARSHIPS, given by the Presser Foundation of Philadelphia, makes available five scholarships annually, amounting to \$250 each, for those students whose special interests are in the field of music.

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 JOSEPH E. GILLINGHAM FUND.

The THOMAS L. LEEDOM SCHOLARSHIP FUND.

The SARAH E. LIPPINCOTT SCHOLARSHIP FUND.

The MARK E. REEVES SCHOLARSHIP FUND.

The HELEN SQUIER SCHOLARSHIP FUND.

The MARY SPROUL SCHOLARSHIP FUND.

The JOSEPH T. SULLIVAN SCHOLARSHIP FUND.

THE DEBORAH F. WHARTON SCHOLARSHIP FUND.

The THOMAS WOODNUTT SCHOLARSHIP FUND.

The SAMUEL WILLETS FUND yields an income of approximately \$4,300 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 are offered to graduates of designated Friends' schools.

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, Sidwell 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.

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.

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 administer-

ing 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.

Educational Resources

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

Laboratories, well equipped for undergraduate instruction and in some cases for research, exist in physics, chemistry, zoology, botany, psychology, astronomy, and in civil, mechanical and electrical engineering. The Sproul Observatory, with its 36-foot visual refracting telescope, is the center of much fundamental research in multiple star systems. The Edward Martin Biological Laboratory provides exceptional facilities for work in psychology, zoology, botany and pre-

medical studies. Recent additions to Beardsley Hall increase the facilities for laboratory instruction and research in engineering.

The SWARTHMORE COLLEGE LIBRARY, in part of the gift of Andrew Carnegie, contains reading rooms, offices and a collection of 154,576 volumes. Some 3500 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.

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

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 records of Friends' meetings belonging to Philadelphia Yearly Meeting (Race Street). More than 1,000 record books have been deposited; many of them have been reproduced on microfilm, for which a reading machine is available. The William Wade Hinshaw Index to Quaker Meeting Records indexes the material of genealogical interest in the records of 200 meetings in various parts of the United States. Notable among the other holdings are the Charles F. Jenkins Whittier

Collection (first editions and manuscripts of John Greenleaf Whittier), the Mott Manuscripts (over 400 autograph letters of Lucretia Mott, antislavery and women's rights leader), and the Hicks Manuscripts (more than 300 letters of Elias Hicks, a famous Quaker minister). The Library's collection of books and pamphlets by and about Friends numbers approximately 20,000 volumes. Ninety Quaker periodicals are currently received. There is also an extensive collection of photographs of meeting houses and pictures of representative Friends. It is hoped that Friends and others will consider the advantages of giving to this Library any books and family papers which may throw light on the history of the Society of Friends.

The SWARTHMORE COLLEGE PEACE COLLECTION, also housed in the Biddle Memorial Library, is of special interest to research students and others seeking the records of the Peace Movement. Beginning with Jane Addams' personal papers and books relating to peace, the collection contains a rich variety of the documents of early peace groups as far back as the first peace committees in England and the United States about 1815, as well as rare peace posters from many lands, and correspondence and writings of peace and arbitration leaders. Individual writings on peace date back to about 1642. The collection includes some 500 titles of magazines and bulletins devoted to peace, published in the United States and abroad during the past 120 years. There are about 140 titles of bulletins and magazines currently received in eleven languages from 23 countries. This collection is the official depository for the leading peace organizations in the United States. A more complete description of the collection will be found in the *Guide to the Swarthmore College Peace Collection, A Memorial to Jane Addams*, published by the College and available on request.

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

may be broadened by a 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 de. *Theory and Practice in International Relations*. Philadelphia, University of Pennsylvania Press, 1937.

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

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

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

The BENJAMIN WEST 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.

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 recently 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. Breakfast is served to the residents of the Mary Lyon buildings in the cafeteria on the premises.

RELIGIOUS LIFE

The religious life of the college is founded on the Quaker principle that the seat of spiritual authority lies in the Inner Light of each individual. The Society of Friends is committed to the belief that religion is best expressed in the quality of everyday living. There are accordingly no compulsory religious exercises, save in so far as the brief devotional element in Collection (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 meeting for worship 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 10:00 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

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

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

The college health program includes an annual chest x-ray which is compulsory for all students. Should the student fail to meet his x-ray appointment, he is required to have one taken at his own expense.

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

The infirmaries are open to 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.

Students are encouraged to remain in the infirmaries for the duration of an illness. A charge is made for special expensive medicines and certain immunization procedures, but ordinary medicines are furnished without cost.

Medical and surgical expenses for injuries incurred during authorized athletic competition are paid for by the college. For non-athletic injuries permission of parents is usually requested for procedures such as x-rays and extensive laboratory tests.

The college psychiatric consultants hold office hours by appointment each week. A student may have from one to three interviews, for which a fee of five dollars is charged by the college. The purpose of this service is to be of help to all types of emotional problems.

Vocational Office

The college provides vocational information and advice to assist students in their choice of a career. Conferences and field trips are planned periodically and interviews are arranged with prospective employers. Help is offered to students in finding employ-

ment. 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*, and an informal news letter, *SWARTHMORE REPORTS*. The Alumni Secretary acts as liaison for the college with all alumni and alumni groups, interpreting to them present plans and policies of the college.

Student Advisers

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

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

Members of the senior honorary societies, Book and Key and Mortar Board, help the Deans with the placement program conducted during freshman week. A group of upperclass women, under the direction of the Women's Student Government Association, serve as counselors for all freshman women, several counselors being assigned to each freshman hall. There are also proctors in each of the men's dormitory sections.

A marriage course is given each year under the direction of the Marriage Council of Philadelphia. This course may be attended by juniors and seniors, and students may seek advice from a member of the Marriage Council staff at any time. A non-credit course analyzing the development of emotional maturity is also given by the college psychiatric consultant, Dr. Leon Saul, to a limited number of students.

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

THE STUDENT COMMUNITY

Student Council

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

Committees of the Council include the Budget Committee, which regulates distribution of funds to student groups; the Community Service Committee, which administers welfare projects; and the Elections Committee, which supervises procedure in campus elections. In addition to these, there are seven joint Faculty-Student Committees, whose student membership is appointed by the Council: Admissions, Arts and Crafts, Collection, Cooper Foundation, Motion Pictures, Men's Athletics and Student Affairs.

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; Somerville, which arranges the program for Somerville Day, on which alumnae are invited to return to the College, and fosters student-alumnae relationships.

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. At no time is there any charge for college social functions.

Extra-Curricular Activities

In addition to the foregoing organizations, Swarthmore students have an opportunity to participate in a program of extra-curricular activities wide enough to meet every kind of interest. No credit is given for work in such varied fields as sculpture, play-writing, publishing the college newspaper or playing the cello in the orchestra. However, the college encourages a student to participate in whatever activity best fits his personal talents and inclinations, believing that satisfactory avocations are a necessary part of life for the well-rounded individual. It has provided instruction or advisers 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.

**THE
EDUCATIONAL PROGRAM
OF
SWARTHMORE COLLEGE**

General Statement

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

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

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

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

For this reason, all students, during the first half of their college program, 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

* For groupings of departments, see page 18.

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 semesters including class meetings, laboratory periods and individual preparation.

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

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

The program for engineering students follows a similar basic plan, with certain variations which are explained on page 85. Courses outside the technical fields are spread over all four years.

In addition to scholastic requirements for graduation, all students must meet certain standards of participation in Physical Education as set forth in the statement of that department (see pp. 128 to 130) and must attend the Collection exercises of the college (see p. 46).

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 his relationship to it.

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

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 85 to 87).

Foreign Language—through Course 4 (see below)

History 1-2 (see p. 110)—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.

For partial fulfillment of the science requirements, students are permitted to take Philosophy 47.)

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 one of the two courses which they select from among Economics 1-2, History 1-2 and Political Science 1-2, to the second year.

In the case of pre-medical students and students who plan to major in Zoology, some exemptions from the requirements listed above may be permitted, if necessary in order to make possible participation in the honors program. Such students should consult the chairman of their proposed major department about these arrangements.

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 4. 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 COURSE

The work of juniors and seniors in course includes some intensive, specialized study within a general area of interest. This comprises enough work in a single department (designated as a "major") to make an equivalent of four full courses and enough in another department

(designated as a "minor") to make an equivalent of three full courses; work taken during the first two years may be counted toward fulfillment of either the major or minor requirements. The minor may be divided between two departments, but not more than two without the approval of the Instruction Committee. In the case of a minor divided between two departments, not more than one introductory course may be submitted in support of the minor requirement.* Before graduation the student must pass a comprehensive examination in his major subject.

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

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

In addition to major and 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

* See separate departmental statements for definition of what constitutes an introductory course.

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 examination 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 divisions involved.

No examinations or grades are given from semester to semester, although 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 instructors concerned and are used as a basis for advice and guidance for the work of the senior year. 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

* For list of examiners in February and June, 1949, see page 134.

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.

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 subjects, 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, Electrical Engineering, Mathematics, Physics, Psychology, Zoology; 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 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 accepted 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 approved by the divisions involved.

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 Biology 1-2; Chemistry 1-2, 11 and 21; English Composition; Mathematics 1-2; Physics 1-2; Zoology 11 and at least one other half course; a modern foreign language, preferably German, to a point equivalent to the completion of course 4. 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 requirements 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 physician.

The last meeting before vacation and the first meeting after vacation in each course must be attended. The minimum penalty for violation of this rule is probation. 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 faculty. All students are allowed two absences from Collection each term.

GRADES

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

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; or (2) that a student's work is incomplete in respect to specific assignments or examinations. The condition may be removed by the completion of the necessary work.

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 make-up 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.

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. 56 to 59 and p. 63.)

EXTRA OR FEWER COURSES

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

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

EXAMINATIONS

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

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

SUMMER SCHOOL WORK

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

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. Upperclass 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, no undergraduate may maintain an automobile while enrolled at the college without the permission of the Dean. This rule prohibits equally the maintenance of an automobile owned by students and those owned by other persons but placed in the custody or control of students.

Day students may, with the permission of the Deans, 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.

The prohibition of automobiles is important in order to maintain the kind of academic community for which Swarthmore stands. Parents and students must realize that this regulation will be strictly enforced; students who fail to observe it may 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 degree of Bachelor of Arts and Bachelor of Science are conferred upon students who have met the following requirements for graduation:

1. The candidate must have completed eighteen 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 field or met the standards set by visiting examiners for a degree with honors.

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

6. He must have completed the physical education requirements set forth in the statements of the Physical Education Departments (see pages 128 to 130).

7. He must have attended the Collection exercises of the College in accordance with the regulations (see page 46).

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

Advanced Degrees

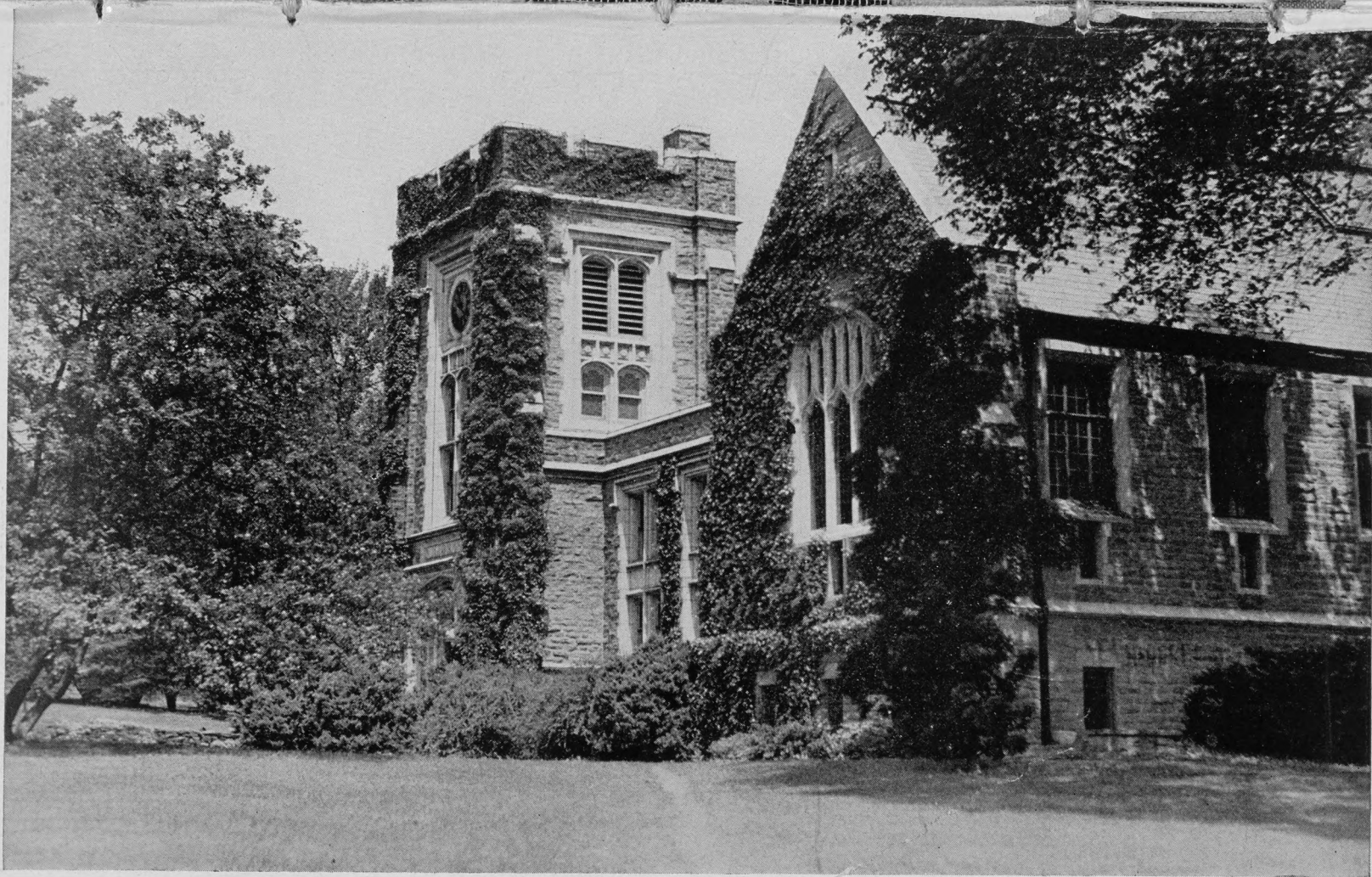
MASTER OF ARTS AND MASTER OF SCIENCE

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

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

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

The requirements for the Master's degree shall include the equivalent of a full year's work of graduate character. This work may be done in courses, seminars, reading courses, regular conferences with members of the faculty or research. The work may be done in one



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



Barnick Hall

department or in two related departments. The catalogue statements of departments which offer graduate work indicate the courses or seminars which may be taken for this purpose.

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

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

A candidate for the Master's degree shall be required to pass an examination conducted by the department or departments in which his work was done. He shall be examined by outside examiners; exceptions to this requirement shall be granted only by the division or divisions concerned. The reports of the outside examiners together with the reports of the student's resident instructors shall be presented to the division in which the work was done. Recommendations for the award of the degree shall be made to the faculty by the division.

The tuition fee for graduate students who are candidates for the Master's degree is \$300 per year, and the general fee for these students is \$15 per semester.

ADVANCED ENGINEERING DEGREES

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

1. The candidate must have been engaged in engineering work for five years since receiving his first degree.

2. He must have had charge of engineering work and must be in a position of responsibility and trust at the time of application.

3. He must make application and submit an outline of the thesis he expects to present, one full year before the advanced degree is to be conferred.

4. The thesis must be submitted for approval one calendar month before the time of granting the degree.

5. Every candidate shall pay a registration fee of \$5 and an additional fee of \$20 when the degree is conferred.

Awards and Prizes

The IVY 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 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."

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

The KATHERINE B. SICARD PRIZE of \$5, endowed by the Delta Gamma Fraternity in memory of Katherine B. Sicard, 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 prizes totalling \$45,

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

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

Fellowships

There are seven fellowships offered to graduates of Swarthmore College.

Four fellowships are awarded annually by the faculty, on recommendation of the Committee on Fellowships, to graduates of the college for the pursuit of advanced work under the direction of the faculty or with their approval. Applications for fellowships must be in the hands of the committee by April 15. Applicants for any one of these fellowships will be considered for all four.

These four fellowships are:

The CATHERWOOD FELLOWSHIP, established by the Catherwood Foundation of Philadelphia, is awarded annually to an outstanding man or woman student of the senior class who proposes to carry on graduate studies. Requirements for the Fellowship are similar to

those for Rhodes Scholarships, including "some quality of distinction in character or intellect or both." The amount of the award is \$1,000.

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.

COURSES OF INSTRUCTION

COURSE NUMBERING

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

- 1 to 9—introductory courses
- 11 to 49—other courses open to students of all classes
- 51 to 69—advanced courses limited to juniors and seniors

Botany

ASSOCIATE PROFESSOR: LUZERN G. LIVINGSTON, *Chairman*

The aim of the Department of Botany is to study plants as living organisms, with particular emphasis on the dynamic, rather than the descriptive aspects of plant science. Attention is given to the place of plants in the world of living things, of which they form an important part, and the relation of plants to their inorganic environment. The relation of plants to man's culture and environment is included, but the main emphasis is oriented toward the biology of plants, rather than applied aspects of botany.

The introductory course in the Department is a general biology course given in cooperation with the Department of Zoology. In this course, emphasis is placed on those principles and phenomena common to all organisms, with plants and animals interpreted on a comparative basis. Advanced courses provide an intensive treatment of major subdivisions of the field of plant biology aimed at the development of a requisite fundamental background for post-graduate study in plant science, either in botany per se, or in its applied aspects such as the various fields of agriculture, forestry, conservation, etc.

REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS IN COURSE AND HONORS

Students intending to major in botany are advised to consult the departmental chairman early in their college course for the purpose of planning a well integrated program. Biology 1-2 and Chemistry 1-2 must be completed in the first two years by all students contemplating a major in botany. A minor in chemistry is strongly recommended. Students contemplating an honors program are required to complete courses in chemistry through Organic Chemistry in the first two years. Courses in physics and mathematics are highly desirable for students contemplating graduate study.

Students desiring to major in biology may do so by planning an integrated program of courses in botany and zoology. Representatives of both departments should be consulted.

COURSES

- 1-2. GENERAL BIOLOGY. Mr. Enders, Mrs. Flemister, Mr. Livingston.

Full Course

An introduction to the study of living things. A consideration of the properties of protoplasm and the structure of the cell; a brief survey of living forms both plant and animal. The methods by which animals and plants maintain themselves, grow and reproduce, and a discussion of the mechanism of heredity. Some time will be devoted to the interrelationships of plants and animals in communities, and the place of man in the whole structure. Evidence for and against theories of evolution will be discussed. Two lectures and one discussion period, one three-hour laboratory per week.

11. GENETICS. Mr. Livingston.

Half Course

A study of the fundamental principles of inheritance as they apply to living organisms generally. The course includes a detailed consideration of the principles of Mendelian inheritance, an analysis of the underlying chromosomal mechanisms, the gene theory, and the relationship of the principles of genetics to evolution, to plant and animal improvement, and to man. Three lectures per week, with assigned problems and laboratory and/or library projects in lieu of formally organized laboratory work.
Prerequisite: Biology 1-2.

12. DEVELOPMENTAL PLANT ANATOMY. Mr. Livingston.

(Not offered in 1949-50.)

Half Course

The fundamentals of anatomy of seed plants approached from a developmental standpoint. The structure and behavior of meristems, problems and processes of differentiation, and a detailed analysis of cellular, tissue and organ structure in higher plants.
Two lectures and two three-hour laboratory periods per week.
Prerequisite: Biology 1-2.

13. SURVEY OF THE PLANT KINGDOM. Mr. Livingston.

(Fall) Half Course

A comparative study of the structure, reproduction, and life habits of the algae, fungi, mosses, and lower vascular plants from a phylogenetic viewpoint. Particular attention is given to current concepts of evolutionary relationship from the standpoints of both comparative morphology and paleobotanical evidence.
Two lectures and two laboratories or field trips per week.
Prerequisites: Biology 1-2.

51. PLANT PHYSIOLOGY. Mr. Livingston.

(Not offered in 1949-50.)

Half Course

An integrated study of the physiological processes of higher plants, including general cellular physiology, water relations, mineral nutrition, enzyme action, photosynthesis, metabolic processes, translocation, the physiology of growth and development, and related topics.
Two lectures, one discussion period, and one laboratory period per week.
Prerequisite: Biology 1-2, Chemistry 1-2, Organic Chemistry desirable.

52. BIOLOGY OF BACTERIA. Mr. Livingston.
(Not offered in 1949-50.)

Half Course

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

Two lectures and two laboratory periods per week.

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

53. TAXONOMY OF SEED PLANTS. Mr. Livingston.

(Spring) Half Course

A study of the classification and evolutionary relationships of seed plants, including a detailed consideration of the characteristics of the more important families of flowering plants. A study of the methods of identification and recognition of the local flora, both native and horticultural.

Two lectures and two laboratories or field trips per week.

Prerequisite: Biology 1-2.

HONORS WORK

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

PLANT PHYSIOLOGY.

An extension of the area covered in course 51, with particular emphasis on a critical study of original sources, both classical and current. The seminar discussion is accompanied by a full day of laboratory work each week.

PROBLEMS OF GROWTH AND DEVELOPMENT.

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

GENETICS.

An extension of the area covered in course 11, with particular emphasis on current research in the field of inheritance in all its aspects. The seminar discussion is accompanied by a full day of laboratory work each week.

TAXONOMY AND DISTRIBUTION OF FLOWERING PLANTS.

An extension of the area covered in course 53, integrated with a study of plant geography and distribution. Seminar discussions and field work, supplemented by laboratory work.

Chemistry

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

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

ASSISTANT PROFESSOR: EDWARD A. FEHNEL

INSTRUCTOR: EMIL J. SLOWINSKI, JR.

The aim of the Department of Chemistry is to provide a sound training in the fundamental theories and basic techniques of the science rather than to deal with specialized branches of the subject. The courses offered are designed to meet the needs of four classes of students:

1. Students, with a primary interest in the humanities or social sciences, who turn to chemistry as a scientific study of general educational value. For these students Chemistry 1 or Chemistry 1 and 2 offers training in the scientific approach to problems, experience with the laboratory method of investigation, and a presentation of the major intellectual achievements of chemistry.
2. Students who seek training in chemistry as a supplement to their training in astronomy, botany, engineering, mathematics, medicine, physics, or zoology. Courses 1, 2, 11, 12, 21 (or 22 and 55), 61-62 and the seminars in Organic Chemistry and in Physical Chemistry include those most frequently recommended for this class of students. The departmental statements contain specific recommendations.
3. Students interested in chemistry as a scientific study of general educational value, but who have no intention of pursuing chemistry as a profession. Such students may meet the college requirements for a major in chemistry by completing the following courses in chemistry as a minimum: 1, 2, 11, 12, 22, 55, 61 and 62. They should also take Mathematics 1, 2, 11, 12; Physics 1-2; and an additional advanced course in mathematics, physics, or zoology. By wisely planning his elective courses the student may obtain a broad education with emphasis on chemistry and its supporting subjects.
4. Students who expect to practice chemistry as a profession or to do graduate study in chemistry need somewhat more chemistry, mathematics and physics than listed in the previous paragraph. In addition they must complete German 4 or 5. The typical curricula outlined below provide for a well-rounded and thorough training in the fundamentals of chemistry and practice in its techniques. In addition, they satisfy the minimum requirements of the American Chemical Society for the undergraduate training of chemists.

* Absent on leave, first semester, 1949-50.

The following are typical curricula for the student in course and in honors. Some variation from either curriculum is possible, and all students intending to major in chemistry should consult with members of the staff regarding the courses best suited to their purpose.

IN COURSE

Freshman Year

Introductory Chemistry 1, 2
 Mathematics 1, 2
 German 1-2
 Introduction to Philosophy 1
 English 1
 Economics 1-2, or Political Science 1-2

Sophomore Year

Qualitative Analysis 11
 Volumetric Analysis 12
 Differential Calculus 11
 Integral Calculus 12
 German 3, 4 or 5
 Physics 1-2
 History 1-2, or Economics 1-2, or
 Political Science 1-2

Junior Year

Organic Chemistry 22
 Gravimetric Analysis 51
 Differential Equations 52
 Advanced Calculus 51
 Psychology 1
 Physics 11-12
 Elective

Senior Year

Organic Chemistry 55, 56
 Advanced Inorganic Chemistry 65
 Physical Chemistry 61-62
 Electives (3)

IN HONORS

The Freshman and Sophomore years are identical with the program above for students in course, except that Organic Chemistry 22 is substituted for Volumetric Analysis 12 in the second semester of the sophomore year.

Junior Year

Courses:

Gravimetric Analysis 51
 Volumetric Analysis 12
 Organic Chemistry 55, 56

Seminars:

Advanced Calculus

Differential Equations

Senior Year

Seminars:

Elementary Physical Chemistry
 Advanced Physical Chemistry
 Electricity and Magnetism
 Modern Physics

1. INTRODUCTORY CHEMISTRY. Mr. Keighton and Staff. *Fall Semester*

A study of some of the central concepts and fundamental principles of chemistry, showing how the basic facts of the science are collected and interpreted, how the theories or fundamental laws are arrived at, and how they are used in explaining or predicting the behavior of matter. 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 of those professionally interested in chemistry.

No previous training in chemistry is required, but ample work is provided for those who have already studied chemistry. A small group of students, who have the interest and ability, meet with some member of the staff for the discussion of more advanced topics. Students who enter college with exceptional training in chemistry are encouraged to take a placement examination during freshman orientation week. If found to be sufficiently well prepared they may omit Chemistry 1 and start with Chemistry 2 in the spring term.

One semester. Prerequisite for all other courses in chemistry.

Three lectures and recitation periods and one four hour laboratory period weekly.

Textbooks: Hildebrand and Latimer, *Principles of Chemistry and Reference Book of Inorganic Chemistry*; Bray and Latimer, *A Course in General Chemistry*.

2. INTRODUCTORY CHEMISTRY. Mr. Creighton. *Spring Semester*

This course is a continuation of Chemistry 1, but with a shift of emphasis towards the needs of those students who expect to major in the sciences or in engineering. Chemistry 1 and 2 together constitute a survey of the field. One semester. Prerequisite: Chemistry 1.

Three lectures and recitation periods and one four hour laboratory period weekly.

Textbooks: Same as Chemistry 1.

11. QUALITATIVE ANALYSIS. Mr. Foster. *Each Semester*

Modern theory of solutions of electrolytes and its application to inorganic qualitative analysis.

One semester. Prerequisite: Chemistry 2 with a minimum grade of C.

Two lectures, one conference period and four hours of laboratory weekly.

Textbook: Fales and Kenny, *Inorganic Qualitative Analysis*.

12. VOLUMETRIC ANALYSIS. Mr. Foster. *Spring Semester*

The theory and practice of inorganic volumetric analysis, including examples of physico-chemical methods. Acid-base, oxidation-reduction, and precipitation analyses are covered thoroughly in class, with examples in the laboratory. One semester. Prerequisite: Chemistry 11, with a minimum grade of C.

One lecture, one optional conference period and eight hours of laboratory weekly.

Textbook: Kolthoff and Sandell, *Textbook of Quantitative Inorganic Analysis*.

21. ORGANIC CHEMISTRY. Mr. Cox. *Fall Semester*

This course is designed to meet the needs of students who do not elect chemistry as their major interest. It is prerequisite for those minor students who will take the seminar in organic chemistry, but is not prerequisite for organic chemistry 22 or 56. The course covers classification nomenclature and reactions of organic compounds of both the aliphatic and aromatic series. Structural relationships and chemical behavior of representative mem-

bers of the various classes of compounds are stressed. No attempt is made to pursue the more complicated syntheses nor to deal at length with current modern theories.

One semester. Prerequisite: Chemistry 2, with a minimum grade of C.

Three lectures, four hours of laboratory and one optional conference per week.

22. ORGANIC CHEMISTRY. Mr. Cox or Mr. Fehnel *Spring Semester*
An introduction to the principles of organic chemistry, with special emphasis on the nomenclature, structure, synthesis and reactions of aliphatic compounds. This course is not intended to be a terminal course, but is designed to be taken in conjunction with Chemistry 55 by all chemistry majors and by other students who desire a more thorough training in the theory and practice of organic chemistry than is provided by Chemistry 21.
One semester. Prerequisite: Chemistry 2 with a minimum grade of C.
Three lectures and one laboratory period per week.
51. GRAVIMETRIC ANALYSIS. Mr. Foster. *Fall Semester*
The theory and practice of inorganic gravimetric analysis, including some special methods, such as colorimetry and polarography, elementary gas analysis, and, if time allows, organic combustion methods.
One semester. Prerequisite: Chemistry 12.
One lecture and eight hours of laboratory weekly.
Textbook: Kolthoff and Sandell, *Textbook of Quantitative Inorganic Analysis*.
55. ORGANIC CHEMISTRY. Mr. Fehnel. *Fall Semester*
A continuation of Chemistry 22, with special emphasis on the chemistry of aromatic compounds. Laboratory experiments are selected to illustrate the more important synthetic methods for the various classes of aromatic compounds and to develop skill in the use of fundamental organic laboratory techniques.
One semester. Prerequisite: Chemistry 22 with a minimum grade of C.
Three lectures and two laboratory periods per week.
56. ADVANCED ORGANIC CHEMISTRY. Mr. Fehnel. *Spring Semester*
Selected topics in organic chemistry, including resonance theory, reaction mechanisms, molecular rearrangements, free radicals and other topics of current interest. Use of the literature of organic chemistry is discussed and library assignments provide opportunities for the student to become familiar with the more important journals and handbooks. One of the two weekly laboratory periods is devoted to qualitative organic analysis and the other to advanced preparations and techniques.
One semester. Prerequisite: Chemistry 55 with a minimum grade of C.
Three lectures and two laboratory periods per week.
- 61-62. PHYSICAL CHEMISTRY. Mr. Keighton and Mr. Slowinski.
The principles of theoretical chemistry are studied and a number of numerical exercises are worked; the gaseous, liquid and solid states, solutions, colloids, elementary thermodynamics, chemical equilibria, electrochemistry, the kinetics of chemical reactions. In the laboratory the student uses a variety of physical-chemistry apparatus.

Two semesters, credit given only for the completion of both semesters.
Prerequisites: Chemistry 2 with a minimum grade of C, Mathematics 12, Physics 1.

Three lectures and one laboratory period weekly.

Textbook: Prutton and Maron, *Fundamental Principles of Physical Chemistry*.

65. ADVANCED INORGANIC CHEMISTRY. Mr. Fehnel. *Fall Semester*

The periodic classification of elements is studied from the point of view of correlation of structure and properties. Consideration is given to such topics as atomic and molecular structure, coordination complexes, metal carbonyls, intermetallic and interstitial compounds, modern concepts of acids and bases, chemistry of the transition metals and rare earths and other phases of inorganic chemistry.

One semester. Prerequisite: Chemistry 61 either previously or concurrently. Three hours of conference and lectures per week with additional four hours per week devoted to selected readings on modern developments in inorganic chemistry.

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. 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 honors examination in chemistry.

ELEMENTARY PHYSICAL CHEMISTRY. Mr. Keighton and Mr. Slowinski.

Fall and Spring Semesters

The gaseous, liquid, and solid states, solutions, colloids, elementary thermodynamics, chemical equilibria, electrochemistry, the kinetics of chemical reactions.

Prerequisites: Chemistry 2, Mathematics 12, Physics 1.

One four-hour seminar and one eight-hour laboratory period weekly for one semester.

ADVANCED PHYSICAL CHEMISTRY. Mr. Keighton and Mr. Slowinski.

Spring Semester

Thermodynamics, the Debye-Hückel theory of strong electrolytes, the structure of matter, chemical kinetics including photochemistry and acid-base catalysis.

Prerequisite: Elementary Physical Chemistry Seminar.

One four-hour seminar and one eight-hour laboratory period weekly.

ORGANIC CHEMISTRY. Mr. Cox.

Spring Semester

This seminar is for minor students who wish to fit this subject into their honors program. The material given has much of the content covered in courses 22 and 56.

Prerequisite: Chemistry 21.

Weekly seminars and laboratory.

Classics

PROFESSORS: SUSAN P. COBBS
L. R. SHERO, *Chairman*

ASSISTANT PROFESSOR: HELEN F. NORTH

The courses offered by the Department of Classics fall into two groups.

One group consists of courses in the actual languages for students who wish to begin or to continue the firsthand study of Greek or Latin literature. They are designed to meet the needs both of those who plan to teach or to go on to postgraduate study in the classical field and of those whose interests are not primarily classical and who are doing work in this field to reinforce their study of modern literature or of language in general or to broaden and deepen their educational experience. The study of Greek is of value to all serious students of literature, philosophy, or the Christian religion, while a knowledge of Latin is an indispensable tool for students of the romance languages and mediaeval history.

The other group consists of courses (numbered from 31 on) which presuppose no knowledge of the Greek and Latin languages and are open to all students. These courses deal with the history of the Greeks and Romans and with various aspects of their culture which have been of special significance for the modern world.

REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS AND MINORS

Greek or Latin may be offered as major or minor subjects in course or in honors work. Major or minor students in course are normally required to complete during the first two years either Intermediate Greek (course 11-12) or Introduction to Latin Literature (course 5-6). Both of these courses are prerequisite for honors seminars for a major student and one of them for honors seminars for a minor student. The course in Ethics and a course in the history of either Greece or Rome are also recommended for major students either in course or in honors work.

Major students in honors work may substitute for one of the four seminars normally required in this department either the seminar in Plato given by the Department of Philosophy or a thesis. Students in Latin may substitute a seminar in Greek for one of their seminars in Latin or vice versa.

Greek

1-2. ELEMENTARY GREEK. Miss Cobbs.

The essentials of Greek grammar are covered and easy selections from Greek literature are read.

11-12. INTERMEDIATE GREEK. Mr. Shero.

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

13-14. GREEK READING. Miss North.

The reading of some of the masterpieces of poetry and of prose, including selections from lyric poetry and from Herodotus and a play of Aechylus or Sophocles, is supplemented by a survey of the history of Greek literature. Credit is given for each semester. The course will be offered only when required.

15-16. ADVANCED GREEK READING. Mr. Shero.

The works read are determined by the interests and needs of the members of the class but will usually include portions of Thucydides, some speeches of the Attic orators, and a comedy of Aristophanes. Credit is given for each semester. The course will be offered only when required.

Latin

1-2. ELEMENTARY LATIN. Mr. Shero.

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

3-4. INTERMEDIATE LATIN. Miss North.

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

5-6. INTRODUCTION TO LATIN LITERATURE. Mr. Shero and Miss North.

The course aims to give some conception of the scope and characteristic qualities of Latin literature. The reading includes philosophical essays by Cicero in the first semester and the *Odes* of Horace in the second. Credit is given for each semester. It is open to students who have had four years of preparatory Latin or who have completed Intermediate Latin.

11. CATULLUS AND ELEGY. Mr. Shero.

The work of the semester is devoted to the poems of Catullus and the elegiac poets.

12. MEDIAEVAL LATIN. Miss North.

The reading done in this course consists of prose and verse selected chiefly from the writings of mediaeval Latin authors, with particular emphasis on history, philosophy, satire, and poetry. Some attention is given, early in the course, to Christian authors, such as Minucius Felix, St. Jerome, and St. Augustine, in order to clarify the transition from ancient to mediaeval modes of thought and expression.

Ancient History and Civilization

31. HISTORY OF GREECE. Mr. Shero.

The course is devoted to the study of the political and social history of the Greek states to the time of the Hellenistic kingdoms. This is preceded by a brief survey of the Oriental civilizations by which the Greeks were influenced. Special attention is given to the 6th and 5th centuries B.C. Considerable reading is done in the primary sources. The course is given in alternate years and will be offered in 1949-1950.

32. GREEK CIVILIZATION. Mr. Shero.

Special stress is laid on those aspects of Greek culture which have had special significance for the modern world, and a detailed study is made of some of the masterpieces of Greek art and of Greek literature (in translation). The course is given in alternate years and will be offered in 1950-1951.

34. HISTORY OF ROME. Mr. Shero.

The course is devoted to the study of the political and social history of Rome to the time of Constantine. Special attention is given to the last century of the Republic and the first century of the Empire. Considerable reading is done in the primary sources.

35. CLASSICAL ARCHAEOLOGY. Mr. Shero.

The methods of archaeological investigation in general and the contributions of archaeology to our knowledge of Greek and Roman life and art are studied. A visit is paid to the University of Pennsylvania Museum. The course will be offered only when required.

36. GREEK LITERATURE IN TRANSLATION. Miss North.

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

HONORS SEMINARS

LATIN LANGUAGE. Miss North.

This seminar serves as an introduction to classical philology, stressing the study of the Latin language in its development from Indo-European to the Vulgar Latin period. It also includes practice in reading and writing Latin, and an introduction to epigraphy and palaeography. The seminar is given in the first semester and will be offered in 1949-1950.

LATIN HISTORIANS. Mr. Shero.

This seminar combines a survey of Latin historical writing to the end of the Silver Age with intensive study of selected books of Livy and Tacitus. The seminar is given in the second semester and will be offered in 1949-1950.

LATIN EPIC. Miss North.

This seminar traces the development of Roman epic poetry, with particular emphasis on the *De Rerum Natura* of Lucretius and the *Aeneid* of Virgil. Some attention is also given to early Roman epic, as represented by the *Annales* of Ennius, and to the period of its decline, typified by Lucan's *Pharsalia*. The seminar is given in the first semester and will be offered in 1950-1951.

LATIN COMEDY AND SATIRE. Mr. Shero.

Representative comedies of Plautus and Terence are read, and a study of the *Satires* and *Epistles* of Horace and the *Satires* of Juvenal is supplemented by a general survey of the development of Roman satire. The seminar is given in the second semester and will be offered in 1950-1951.

In addition, seminars in Greek literature and in particular periods of ancient history will be offered when required.

Economics

PROFESSORS: HERBERT F. FRASER

PATRICK MURPHY MALIN

CLAIR WILCOX, *Chairman*

ASSOCIATE PROFESSOR: FRANK C. PIERSON*

ASSISTANT PROFESSOR: WILLIS D. WEATHERFORD

INSTRUCTOR: JOHN A. FRECHTLING

LECTURERS: ARLEIGH P. HESS, JR.

GORDON KEITH

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

Course 1-2 is prerequisite to all other work in the department except courses 3 and 4. Students intending to major in economics are also advised to take courses 3 and 4 and Political Science 1-2. Majors in course are required to take course 51 in the junior year and course 62 in the senior year. Majors in honors are required to take the seminars in Monetary and Fiscal Policy and Economic Theory. Courses and seminars should be taken, insofar as possible, in the order in which they are listed.

1-2. INTRODUCTION TO ECONOMICS. All members of department.

This course is designed both to afford the general student a comprehensive survey of the field and to provide students doing further work in the department with a foundation upon which to build. It explains the organization and operation of free, planned, and mixed economies and analyzes the major problems involved in the allocations of resources, the distribution of income, the maintenance of industrial stability, and the provision of social security, and in international economic relationships. Texts used are Samuelson, *Economics* and Bowman and Bach, *Economic Analysis and Public Policy*.

3. ACCOUNTING. Mr. Hess.

First Semester

Analysis of the problems of business organization and finance, banking, taxation and public regulation requires familiarity with the methods of corporate accountancy. It is the purpose of this course to equip the student with the rudiments of accounting that he will need to employ in his advanced courses and seminars in economics.

* Absent on leave, 1949-50.

4. STATISTICS. Mr. Hess. *Second Semester*
 A large part of the literature of the social sciences presents generalizations based upon the results of statistical investigations. The validity of such generalizations is often dubious. It is the purpose of this course, by providing the student with an elementary knowledge of statistical methods, to enable him to appraise the studies that he will encounter in his later work.
51. MONEY AND BANKING. Mr. Malin. *First Semester*
 The organization and operation of the commercial banking system in the United States. Central banking and the Federal Reserve system. Monetary policy and economic stability.
52. PUBLIC FINANCE. Mr. Fraser. *Second Semester*
 The revenues and expenditures of Federal, state, and local governments. The principles of taxation and borrowing. Budgetary control and debt management. Fiscal policy and economic stability.
- 53, 54. ECONOMICS OF BUSINESS. Mr. Fraser.
 The economic problems which confront the business executive. *First semester:* corporate organization and finance, investment banking and the securities exchanges. *Second semester:* marketing, risk, speculation, insurance and the commodities exchanges.
55. LABOR PROBLEMS. Mr. Pierson. (Mr. Weatherford in 1949-50).
First Semester
 The structure and functions of labor unions. Employer approaches to labor relations. Analysis of wage policies. Governmental control of labor relations.
56. SOCIAL ECONOMICS. Mr. Pierson. (Mr. Weatherford in 1949-50).
Second Semester
 An examination of the extent, consequences, and causes of poverty, insecurity, and inequality. An appraisal of economic reforms; social insurance, medical care, housing, the social use of the taxing power, the "welfare state."
- 57, 58. PUBLIC CONTROL OF BUSINESS. Mr. Wilcox.
First semester: competition and monopoly in American industry, enforcement and interpretation of the anti-trust laws, American agricultural policy. *Second semester:* regulation of production and prices in municipal utilities, transportation, communications, petroleum, bituminous coal, and urban markets for fluid milk; control of prices in war-time; public ownership and operation of industry.
- 59, 60. INTERNATIONAL ECONOMICS. Messrs. Fraser, Malin and Wilcox.
First semester: the theory and practice of international trade, the balance of payments, foreign exchange, national commercial policies, international investment. *Second semester:* population, resources, and technology; world economic development; problems of post-war reconstruction; relations between free and controlled economies.
61. ECONOMIC THEORY. Mr. Frechtling. *First Semester*
 National income. The determination of prices. Fluctuations in economic activity. Determinants of the level of income and employment.

62. SENIOR MAJORS SEMINAR. All members of department. *Second Semester*
Individual readings and reports on subjects not otherwise covered in the student's program. Common readings in contemporary literature appraising the operation of free and controlled economies. Discussion of current issues of public policy.

HONORS WORK

FINANCE. Messrs. Fraser and Malin.

Private finance: commercial banking, corporation finance, investment banking, the securities and commodities exchanges, insurance, public regulation of financial practices. Public finance: the expenditures and revenues of federal, state, and local governments; the principles of taxation and borrowing.

MONETARY AND FISCAL POLICY. Mr. Pierson. (Mr. Keith in 1949-50.)

Income and employment. The business cycle. The theories of Lord Keynes. The monetary policies of central banks. The fiscal policies of governments. The stabilization of economic activity.

ECONOMIC THEORY. Mr. Weatherford.

The determination of prices. The distribution of income. Non-monetary aspects of income analysis. Readings, among others, in the works of Ricardo, Mill, Marshall, Cassels, Wicksell, Chamberlin, Robinson, Hicks, Viner, Schumpeter and Haberler.

PUBLIC CONTROL OF BUSINESS. Mr. Wilcox.

The anti-trust laws, the patent system, price discrimination, delivered price systems, resale price maintenance. The control of prices and production in agriculture, bituminous coal, petroleum and urban markets for fluid milk. Public regulation of municipal utilities, transportation and communications. Price control in wartime. The public ownership and operation of industry.

INTERNATIONAL ECONOMICS. Messrs. Wilcox and Frechtling.

The theory of international trade. Monetary problems, cyclical fluctuations, and international monetary cooperation. Restrictionism and discrimination, cartels, commodity problems, shipping, aviation and telecommunications. Relations between free and controlled economies. Post-war reconstruction, economic development and international investment. International economic organization.

SOCIAL ECONOMICS. Messrs. Malin, Wilcox and Pierson. (Mr. Weatherford in 1949-50.)

Poverty, inequality and insecurity. Labor legislation, organization, collective bargaining, wage-policy and the public control of labor relations. Public assistance, social insurance, medical care, housing, free income and the social use of the taxing power. Regional planning and comparative economic systems.

THESIS

A thesis may be substituted for a course or a seminar under exceptional circumstances and by special arrangement.

Division of Engineering

Department of Civil Engineering

PROFESSOR: SAMUEL T. CARPENTER, *Chairman*

ASSISTANT PROFESSORS: ROY F. LINSENMEYER
MERTON J. WILLIS

INSTRUCTOR: CHARLES W. NEWLIN

RESEARCH ASSOCIATE: S. I. LIU

RESEARCH CONSULTANT: CAPTAIN WENDELL P. ROOF

Department of Electrical Engineering

PROFESSOR: HOWARD M. JENKINS, *Chairman*

ASSOCIATE PROFESSOR: JOHN D. MCCRUMM

ASSISTANT PROFESSOR: C. JUSTUS GARRAHAN

Department of Mechanical Engineering

ASSOCIATE PROFESSOR: WILLIAM E. REASER, *Chairman*

ASSISTANT PROFESSORS: BERNARD MORRILL
WILLIAM E. WOOD

INSTRUCTOR: THOMAS E. SWEENEY, JR.

LECTURER: GEORGE T. HAMMERSCHAIMB

The engineering profession of today is exacting and requires a broad, thorough education in the natural and social sciences. It requires people who are resourceful, precise, responsible, and emotionally mature. Engineering advances for new needs have been made possible by new knowledge, new instruments, and the coordinated efforts of a great number of people. Each advance has reaffirmed the necessity of learning the fundamentals of science and the importance of cooperative endeavor. The educational plan of the Division has been prepared with these purposes in mind: to indoctrinate the student in professional disciplines while providing the foundation of a liberal education. The engineer must be so disciplined that he is not only technically proficient, but has the background and attitude which will enable him to accept his position as a professional man. Our pre-professional programs educate the student in the professional disciplines of the engineer, such as critical analysis, fact-finding, humanistic studies, and the communication of ideas clearly and convincingly, in the written and spoken word.

The engineering profession is in transition from solely narrow applications of technology to a position of importance in science, planning, management,

industrial research, and public service. With this in mind, the three Engineering Departments intend that each student shall (1) master the fundamental concepts of Engineering; (2) extend this mastery in the field of Civil, Electrical or Mechanical Engineering; (3) obtain a sufficient amount of general education to enable him to understand how his engineering activities fit into the great purposes of society. The engineering student must understand why he is doing what he has chosen to do. Once he has some understanding of the general function of engineering, he can safely be allowed some specialization.

A student who intends to major in Engineering follows a common course of study for the first two years. At the end of the sophomore year, the student may enter his major field of Civil, Electrical, or Mechanical Engineering. The last two years are largely spent in his major field. The three curricula of the Engineering Departments lead to the degree of Bachelor of Science; these curricula are accredited by the Engineers' Council for Professional Development.

The vocational aspects of engineering are minimized, and those aspects are emphasized which tend to show the student how he can be useful in our modern society. 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 third year. 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.

Each department has its own requirements, which are in addition to those courses of the general education required of all Swarthmore students. To this end, the program outlined below becomes, in effect, a uniform curriculum for the first two years. Note particularly: (1)* students intending to major in Engineering shall have finished calculus by the end of the third semester; (2) electives are available in each semester of the freshman and sophomore years (indeed, in all four years); these should be taken in the Social Science or Humanities Divisions.

At the end of the sophomore year an examination is given to each student of Engineering to support his application for his major.

* High school students intending to enter Engineering should take algebra, advanced algebra, plane and solid geometry, and trigonometry in secondary school so as to qualify to enter analytic geometry in their first term.

OUTLINE OF THE CURRICULA IN THE DEPARTMENTS OF CIVIL,
ELECTRICAL, AND MECHANICAL ENGINEERING FOR
THE FIRST TWO YEARS

First Semester

Second Semester

Freshman Year

English Literature
Chemistry
Analytic Geometry
Engineering Drawing
Surveying I
Social Science Elective

English Composition
Chemistry
Differential Calculus
Descriptive Geometry
Surveying II
Social Science Elective

Sophomore Year

Physics
Integral Calculus
Statics
Materials & Shop Processes
Non-technical Elective

Physics
Thermodynamics I
Dynamics
Electric & Magnetic Circuits
Non-technical Elective

GENERAL COURSES

GE1 ENGINEERING DRAWING. Mr. Morrill, Mr. Sweeney.

Instruction in the use of drafting equipment; study of fundamental principles of engineering drawing; practice through rendering of detailed elements and machine assemblies; lettering and sketching. Required for freshman engineers. Open to all students.

Two three-hour periods per week.

GE2 DESCRIPTIVE GEOMETRY. Mr. Reaser, Mr. Sweeney.

An extension of the basic conception of orthographic projection as applied to the location and definition in space of three-dimensional structures; analysis of the geometric relation of distances, angles, intersections for lines and planes; development of surfaces; emphasis upon practical applications of descriptive geometry in the various fields of engineering. Required for freshman engineers. Open to all students who have had GE1 or equivalent. Two three-hour periods per week.

GE11 MATERIALS AND SHOP PROCESSES. Staff.

Study of elementary metallurgy of ferrous and non-ferrous materials; investigation in the laboratory of various engineering materials as they are affected by stress, temperature, and heat treatment; analysis of purposes and practice in use of machine tools with emphasis on their performance with the variety of materials used in manufacturing processes.

Three class periods per week; two three-hour laboratories each week.

GE51 INDUSTRIAL MANAGEMENT. Mr. Reaser.

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

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

GE57 ENGINEERING ECONOMY. Mr. Carpenter.

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. Open to all students.

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

Civil Engineering

PROFESSOR: SAMUEL T. CARPENTER, *Chairman*

**ASSISTANT PROFESSORS: ROY F. LINSENMEYER
MERTON J. WILLIS**

INSTRUCTOR: CHARLES W. NEWLIN

RESEARCH ASSOCIATE: S. I. LIU

RESEARCH CONSULTANT: CAPTAIN WENDELL P. ROOF

Civil Engineering is the oldest recognized branch of the Engineering profession, and the work of the present-day Civil Engineer is in construction, design of bridges, buildings and dams, sanitary engineering, foundations, hydroelectric power, highways, airports, and railroads. A major in the Department of Civil Engineering studies the science of soil, water, structures, and materials.

The Civil Engineering Department realizes the importance for the Civil Engineer of an understanding of Economics, Political Science, and the Liberal Arts, and provides for appropriate electives to be taken throughout the four-year program.

Students may elect to enter the Civil Engineering honors program at the beginning of the junior year, although the establishment of an honors seminar depends upon the number of students who wish to enroll.

STANDARD PROGRAM FOR COURSE STUDENTS

| <i>First Semester</i> | <i>Junior Year</i> | <i>Second Semester</i> |
|-----------------------------------|---------------------------------|------------------------|
| EE51 D. C. Apparatus | ME54 Fluid Mechanics | |
| CE51 Mechanics of Materials & Lab | EE53 A. C. Apparatus & Circuits | |
| ME61 Applied Mechanics | CE52 Structural Theory | |
| Non-Technical Elective | Non-Technical Elective | |

Senior Year

CE53 Structural Design
CE55 Soil Mechanics
CE56 Sanitary Engineering
Elective

CE54 Adv. Structural Theory
CE57 Reinforced Concrete
CE57 Engineering Economy
Elective

CE1 SURVEYING, I. Mr. Newlin.

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. (1 recitation and 1 3-hour laboratory per week.)

CE2 SURVEYING, II. Mr. Newlin.

Taking topography, stadia work, preparation of profiles and maps from field notes, elements of photogrammetry, celestial observations.
Prerequisite: CE1 Surveying. (1 recitation and 1 3-hour laboratory per week.)

CE11 STATICS. Mr. Willis.

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. (3 recitations and 1 3-hour laboratory per week.)

CE12 DYNAMICS. Mr. Willis.

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. (3 recitations and 1 3-hour laboratory per week.)

CE51 MECHANICS OF MATERIALS AND LABORATORY. Mr. Carpenter,
Mr. Linsenmeyer, Mr. Newlin.

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: CE3 Statics. (3 recitations and 1 3-hour laboratory per week.)

CE52 STRUCTURAL THEORY. Mr. Carpenter, Mr. Linsenmeyer.

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

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

CE53 STRUCTURAL DESIGN. Mr. Carpenter.

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

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

CE54 ADVANCED STRUCTURAL THEORY. Mr. Carpenter.

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

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

CE55 SOIL MECHANICS. Mr. Linsenmeyer, Mr. Newlin.

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

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

CE56 SANITARY ENGINEERING. Mr. Willis.

This course deals with the important activities of the sanitary engineer, including the development and purification of water supplies; sewerage and sewage disposal. This course also includes subjects dealing with advanced hydraulics such as hydraulic models, conformal mapping and hydrodynamics.

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

CE57 REINFORCED CONCRETE. Mr. Newlin.

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

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

CE69 CIVIL ENGINEERING THESIS. Staff.

The time allotted to a civil engineering thesis is generally one semester. The subject matter of the thesis must be arranged six weeks before the beginning of a semester.

Electrical Engineering

PROFESSOR: HOWARD M. JENKINS, *Chairman*

ASSOCIATE PROFESSOR: JOHN D. McCRUMM

ASSISTANT PROFESSOR: C. JUSTUS GARRAHAN

Electrical Engineering deals largely with the development and application of precise notions of electricity and its allied physical sciences in the broad field of the conversion, transmission, control, and utilization of electrical energy for the purposes of transmitting power and communicating intelligence. Electrical Engineering achievements have been made possible through the coordinated efforts of many men. The profession demands critical analysis of a high order and the ability to carry out projects efficiently and with economy. The program in Electrical Engineering gives full recognition to the natural sciences basic to the profession, and includes considerable work in the Humanities and Social Sciences, since the needs of the profession are best served by engineers who are vitally aware of the society in which they work.

The educational objectives of the Department are to provide the student with a thorough understanding of the fundamental principles of the natural sciences related to Electrical Engineering, and to inculcate in the student the confidence to apply these principles to new situations. Considerable emphasis is placed on the experimental evidence underlying these fundamentals, and mathematical methods are used to facilitate the application of these principles. Since most engineering problems can be solved only by making certain simplifications, the student is encouraged to examine problems critically and to make such simplifying assumptions as are possible without destroying the significance of the results. Original thinking by students is fostered at all times. The importance of the presentation of work is also stressed, the student being required to gain some proficiency in communicating the results of his work clearly, completely, and in a well organized form.

The courses in Electrical Engineering are each a series of inquiries dealing with fundamental concepts of electrical phenomena. The common aim is to carry the student to such a point that he will understand the basic sciences involved and can apply this knowledge to the problems of his later professional practice.

STANDARD PROGRAM FOR COURSE STUDENTS

Junior Year

First Semester

EE54 A. C. Circuits
EE56 Engineering Analysis I
CE51 Mechanics of Materials
Elective

Second Semester

EE55 Electronics
EE57 Engineering Analysis II
ME54 Fluid Mechanics
Elective

Senior Year

EE52 D. C. Machinery
EE58 A. C. Machinery I
EE60 Vacuum Tube Circuits
Elective

EE61 Networks and Fields
EE59 A. C. Machinery II
Engineering Elective
Elective

EE11 ELECTRIC AND MAGNETIC CIRCUITS. Mr. Jenkins.

The experimental basis of electricity and magnetism; elementary electrostatics and magnetostatics; voltage, current power, energy. Bilateral and linear networks with constant driving voltages. Induced electromotive forces; capacitance and inductance; elementary problems in ferro-magnetism.

Three class periods per week; one laboratory every other week.

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

EE51 DIRECT CURRENT APPARATUS. Mr. Jenkins.

Theory of direct-current generators and motors; fundamentals of control for direct current machines. Topics include flux, generated voltage, armature reaction, commutation, torque, speed, voltage and speed regulation, losses, efficiency, and effects of control on motor characteristics.

Three class periods per week; one four-hour laboratory every other week.

Prerequisite: EE11 Electric and Magnetic Circuits. Primarily for non-Electrical Engineering majors.

EE52 DIRECT CURRENT MACHINERY.

Theory of direct-current generators and motors; fundamentals of control for direct-current machines; effect of control on motor characteristics; rotating amplifiers and their use in closed-cycle control systems; tandem drives. Three class periods per week; one four-hour laboratory each week.

Prerequisite: EE11 Electric and Magnetic Circuits. Primarily for Electrical Engineering majors.

EE53 ALTERNATING CURRENT CIRCUITS AND APPARATUS. 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.

Three class periods per week; one laboratory each week.

Prerequisite: EE51 Direct Current Apparatus.

EE54 ALTERNATING CURRENT CIRCUIT THEORY. Mr. Jenkins.

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.

Three class periods per week; one laboratory each week.

Prerequisite: EE11 Electric and Magnetic Circuits.

EE55 ELECTRONICS. Mr. Garrahan.

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

Three class periods per week; one laboratory each week.

Prerequisite: EE54 A. C. Circuit Theory.

EE56 ENGINEERING ANALYSIS I. Mr. McCrumm.

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

Three class periods per week; one laboratory each week.

Prerequisites: EE11 Electric and Magnetic Circuits, and Integral Calculus.

EE57 ENGINEERING ANALYSIS II. Mr. McCrumm.

Further analysis of physical systems, employing the following branches of mathematics: Gamma and Bessel functions, elliptic integrals, Fourier series and other infinite series, partial differential equations, conformal mapping, dimensional analysis, the Laplace transform.

Three class periods per week.

Prerequisite: EE56 Engineering Analysis I.

EE58 ALTERNATING CURRENT MACHINERY I. Mr. Jenkins, Mr. McCrumm.

The transformer: equivalent circuits, regulation and efficiency, parallel operation, balanced and unbalanced polyphase operation, the autotransformer, three winding transformer, etc. The induction motor: polyphase and single phase machines, equivalent circuits, graphical methods of analysis, effect of unbalanced voltages, etc.

Three class periods per week; one laboratory each week.

Prerequisites: EE54 A. C. Circuit Theory, and EE52 D. C. Machinery.

EE59 ALTERNATING CURRENT MACHINERY II. Mr. McCrumm, Mr. Jenkins.

The alternator: determination of the performance and the principle machine parameters, the two reaction theory, operation under unbalanced and transient conditions. The synchronous motor: a generalized study of the synchronous machine correlating motor and generator action, the two reaction theory of the motor, etc. Commutator type A. C. motors and synchronous converters. The basic aspects of power system stability.

Three class periods per week; one laboratory each week.

Prerequisite: EE58 A. C. Machinery I.

EE60 VACUUM TUBE CIRCUITS. Mr. Garrahan.

An introduction to the analysis and design of circuits containing vacuum tubes. The circuits studied include: voltage and power amplifiers; modulators and detectors; oscillators and pulse generators.

Three class periods per week; one laboratory each week.

Prerequisites: EE54 A. C. Circuit Theory; EE55 Electronics, and EE57 Engineering Analysis II, or equivalent.

EE61 NETWORKS AND FIELDS. Mr. Garrahan.

The first part of this course is a study of electrical networks, such as artificial lines, transmission lines with distributed parameters, and electric wave filters. The second part is an introduction to electromagnetic field theory. The topics discussed are: Maxwell's hypothesis; propagation and reflection of electromagnetic waves; antennas; wave guides and resonant cavities.

Three class periods per week; one laboratory each week.

Prerequisites: EE54 A. C. Circuit Theory, and EE57 Engineering Analysis II.

EE70 ELECTRICAL ENGINEERING THESIS. Staff.

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.

HONORS

The four following seminars are offered by the Department to prepare in part for examinations for a degree with Honors. Students who plan to take honors seminars in Electrical Engineering should note that Circuit Theory is a desirable preparation for Electronics (although not a prerequisite if a seminar in Electricity and Magnetism has been taken). Adequate training in electrical machinery, and the Circuit Theory seminar or its equivalent, are prerequisites for the seminar in Servomechanisms. Some knowledge of A. C. Circuit Theory is a prerequisite for the Machinery Seminar.

CIRCUIT THEORY.

A systematic treatment of the transient and steady-state analysis of electrical networks. The operational methods of analysis based on complex algebra and the Laplace Transform are studied. These methods are then used to investigate the performance of single and polyphase systems, the general two-terminal pair, long transmission lines, and electric wave filters. The seminar is accompanied by a full-day laboratory.

ELECTRONICS.

A study of electron ballistics and the characteristics of electron tubes and their application in amplifiers, modulators, detectors, oscillators, pulse generators, etc. Some elementary aspects of radiation and ultra-high frequency techniques may be included. The seminar is accompanied by a full-day laboratory.

SERVOMECHANISMS.

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

MACHINERY.

An intensive study of the basic aspects shared in common by transformers and rotating electrical machinery. A further study of the operating characteristics and the engineering application of electrical machines as specific direct current and alternating current devices. There is one full-day laboratory per week, in addition to the seminar.

Mechanical Engineering

ASSOCIATE PROFESSOR: WILLIAM E. REASER, *Chairman*

ASSISTANT PROFESSORS: BERNARD MORRILL
WILLIAM E. WOOD

INSTRUCTOR: THOMAS E. SWEENEY, JR. (part time)

LECTURER: GEORGE T. HAMMERSHAIMB

The curriculum in Mechanical Engineering is planned to develop an individual through scientific training for positions in manufacturing industries, with organizations engaged in power production, and in the field of transportation. Based upon the fundamental sciences of physics, chemistry, and mathematics, the program aims to provide an adequate background for the solution of mechanical problems dealing with the design, construction, and operation of the machinery of modern industry. In addition, the arrangement of studies is intended to prepare an engineer for the eventual assumption of managerial responsibilities.

Coincident with the need for a broad technical training, the Mechanical Engineer must be fully conscious of the effects of his efforts on the society of which he is a part. To promote such an awareness, provision is made for elective courses. The undergraduate is encouraged to pursue work in the Humanities as a means to this end.

STANDARD PROGRAM FOR COURSE STUDENTS

Junior Year

First Semester

ME51 Thermodynamics II
EE51 D. C. Apparatus
CE51 Mechanics of Materials & Lab
ME61 Applied Mechanics

Second Semester

ME54 Fluid Mechanics
EE53 A. C. Apparatus & Circuits
ME52 Heat Power
Elective

Senior Year

ME53 Heat Engineering
ME62 Adv. Strength of Materials
ME63 Kinematics and Design
Elective

ME64 Engineering Design
ME55 Adv. Fluids and Heat Transfer
GE51 Industrial Management
Elective

ME11 THERMODYNAMICS I. Mr. Reaser, Mr. Morrill.

Energy and first law of thermodynamics; application of general energy equation to steady-flow and non-flow processes; properties of liquids; vapors, gases, mixtures; reversible cycles; second law of thermodynamics; entropy. Three class periods per week; one three-hour laboratory each week. Prerequisite: Integral Calculus.

ME51 THERMODYNAMICS II. Mr. Reaser, Mr. Morrill.

Continuation of ME11: comprehensive analysis of steam power plant cycles; external and internal combustion engines; real gases; flow of elastic fluids through nozzles and orifices; combustion; refrigeration; compression of gases. Three class periods per week; one three-hour laboratory each week. Prerequisite: ME11 Thermodynamics.

ME52 HEAT POWER. Mr. Reaser, Mr. Hammershaimb.

A critical study of modern power plants with emphasis upon design and fabrication problems relating to fuel firing equipment, furnaces, boilers, air-preheaters, economizers; auxiliary equipment such as pumps, compressors, deaerating heaters, condensers; significance of various plant cycles in their relation to station heat balance. Class and laboratory investigations extended by field trips. Three class periods per week; one three-hour laboratory each week. Prerequisite: ME11 Thermodynamics.

ME53 HEAT ENGINEERING. Mr. Hammershaimb.

Continuation of ME52; thermodynamic and mechanical features of both spark ignition and compression ignition internal combustion engines; combustion of liquid and gaseous fuels; gas turbine processes; air conditioning and refrigeration equipment. Class and laboratory work supplemented by field trips. Three class periods per week; one three-hour laboratory each week. Prerequisites: ME51 Thermodynamics, ME52 Heat Power.

ME54 FLUID MECHANICS. Mr. Wood.

An introductory course in fluid statics; kinematics; equation of continuity; steady flow energy and momentum; dynamics of an ideal fluid; dimensional analysis and similitude; incompressible flow in closed conduits and compressibility phenomena. Three class periods per week; one three-hour laboratory each week. Prerequisites: Integral Calculus, ME11 Thermodynamics.



Trotter Hall (a Classroom Building).



Faculty Commencement Procession.

ME55 ADVANCED FLUID MECHANICS AND HEAT TRANSFER. Mr. Wood.

Theory of fluid mechanics in turbines, pumps, fans, jets, fluid couplings; fundamental principles of heat transfer by conduction, free and forced convection, radiation; parallel and counterflow heat exchangers; insulated pipes and related equipment; relation to practical engineering problems.

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

Prerequisite: ME54 Fluid Mechanics.

ME61 APPLIED MECHANICS. Mr. Wood.

The development of fundamental concepts in problems dealing with mechanical vibrations; Euler's equation; theories of failure; metallurgical problems in design; use of statistical analysis and theory of probability for solving engineering problems.

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

Prerequisite: Integral Calculus.

ME62 ADVANCED STRENGTH OF MATERIALS. Mr. Wood.

Review of stress and strain; torsion; bending; beams on elastic foundations; thick cylinders; failure of metals under stress; plastic flow; influence of stress concentration and working stresses.

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

Prerequisite: ME61 Applied Mechanics.

ME63 KINEMATICS AND DESIGN. Mr. Morrill.

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

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

Prerequisite: ME61 Applied Mechanics.

ME64 ENGINEERING DESIGN. Mr. Morrill.

Design of elements under rotational stress; various classifications of fits; vibration analysis leading to isolation and engine balancing; lubrication and bearing design; design of machine assemblies.

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

Prerequisite: ME63 Kinematics and Design.

ME65 MECHANICAL ENGINEERING THESIS. Staff.

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

English Literature

PROFESSORS: PHILIP MARSHALL HICKS, *Chairman**
EVERETT L. HUNT
TOWNSEND SCUDDER, 3RD**

ASSOCIATE PROFESSORS: GEORGE J. BECKER
ELIZABETH COX WRIGHT**

ASSISTANT PROFESSORS: BRUCE DEARING
FREDRIC S. KLEES
STEPHEN E. WHICHER

INSTRUCTORS: DAVID COWDEN
SAMUEL L. HYNES
BARBARA PEARSON LANGE (part-time)

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

REQUIREMENTS FOR MAJORS AND MINORS IN COURSE

Major: The work of the major in this department in course normally consists of at least four full courses in the department, including Modern Literature in the first year, either Chaucer or Milton in the second year, a full course or two half courses in one of the types (numbers 21-28 below) in the third year, and Shakespeare and the Senior Conference in the final year. The comprehensive examination at the close of the senior year is based on this work, but also includes questions on other courses offered by the department for those prepared in these fields. A reading list in English and American literature is given to all majors to act as a guide in the selection of courses and to independent reading in prepara-

* Absent on leave, second semester, 1949-50.

** Absent on leave, 1949-50.

tion for the Senior Conference. Majors are expected to take a semester's work in either Fine Arts or Music and are advised to take a semester's work in some foreign literature. Students expecting to do graduate work should acquire a reading knowledge in the languages required by the schools they propose to attend.

Minor: The work of the minor in course normally consists of three full courses elected with the approval of the major department, including Modern Literature.

COURSES

1. MODERN LITERATURE: Introduction to Literary Study. Staff.
An introduction to the critical study of the four principal types of literature: poetry, drama, novel, and non-fictional prose. The materials are drawn chiefly from modern American literature for the purpose of emphasizing the relationship of literature to life through the study of works produced from backgrounds familiar to the student in terms of his own experience. Required of all freshmen.
5. COMPOSITION.
Training in the writing of non-fictional prose. Designed to meet the requirements of Engineering and Pre-Medical students. Other students admitted on the basis of need for this work.
11. MILTON AND THE 17TH CENTURY. Mr. Hunt and Mrs. Wright.
Paradise Lost, selections from Milton's shorter poems, *The Old Testament*, Bunyan's *Pilgrim's Progress*, and the lyrics of John Donne are read. Study is made of narrative, epic, and lyric writing, and the relationship of the literature to the thought of the period.
12. CHAUCER. Mr. Klees and Mr. Scudder.
Reading of *Troilus and Criseyde*, *The Canterbury Tales* and some of the minor poems in the original Middle English, with greater attention to the literary than to the linguistic aspects.
- 21, 22. POETRY. Mrs. Wright and Mr. Dearing.
A survey of English poetry from its beginnings, with a study of the principles of poetic criticism and a detailed examination of the work of two or three poets. The first semester may stand alone, but new students are not admitted in the middle of the year.
- 23, 24. THE NOVEL. Mr. Hicks and Mr. Cowden.
The first semester covers the development of the English novel from Fielding to Trollope with emphasis on the chronicle form prevalent during this period. In contrast, the second semester emphasizes developments in technique and content from Meredith to the present day. Credit given for either semester, but students desiring both should take them in the regular sequence.
25. COMEDY. Mr. Klees.
Dramatic comedy in its various forms, English and American, with particular attention to the Elizabethan, Restoration, and modern periods.

26. TRAGEDY. Mr. Klees.

Dramatic tragedy from the *Agamemnon* trilogy to *Death of a Salesman*, with emphasis on Elizabethan and modern American tragedy.

27. BIOGRAPHY AND TRAVEL. Mr. Klees.

Biography from Pepys to the present, with stress on the times as well as the lives; representative travel literature from Hakluyt to Dos Passos.

28. SOCIAL CRITICISM. Mr. Becker.

The reactions of such major figures as Carlyle, Mill, Henry Adams, Bellamy and Morris to the changed conditions of life after the Industrial Revolution. An attempt is made both to analyze the social comment or protest in individual works and to explore the part that social forces play in modern literature.

31-32. AMERICAN AUTHORS. Mr. Whicher.

Interpretation and comparison of some major writings by significant American authors. Texts include Franklin, *Autobiography*; Hawthorne, *The Scarlet Letter*; Thoreau, *Walden*; Melville, *Moby Dick*; Twain, *Huckleberry Finn*; Adams, *Education*, which should be read in advance of the course. A year course, not ordinarily divisible.

33, 34. SATIRE. Mr. Dearing.

An historically oriented consideration of some of the principal satires in world literature, with emphasis upon interpretation and evaluation as literature. Fall semester: representative satires from Horace and Juvenal through Voltaire and Swift. Spring semester: representative satires from Byron and Peacock through France and Huxley.

35. REALISM. Mr. Becker.

A study of realism as a literary movement. Beginning with *Madame Bovary*, the course traces the development of realistic techniques and concepts in Zola, in the Russians, and in American writers such as Norris, Dreiser, and Farrell.

41. ELIZABETHAN LITERATURE. Mr. Klees.

Comprehensive study of the literature of the period, exclusive of the work of Shakespeare.

42. SHAKESPEARE. Mr. Klees.

A study of the major plays. Not open to majors in this department.

49. ARGUMENT. Mr. Becker.

The analysis and orderly presentation of large bodies of material in speech and writing. The work comprises a series of short analytical papers, a research paper of some magnitude (usually correlated with the work of another course) and a series of argumentative speeches. Admission only with consent of the instructor.

51-52. SHAKESPEARE. Staff.

A study of the complete works of Shakespeare, tracing the development of his craftsmanship and ideas. For majors in this department only; normally offered in seminar form in the first semester of the senior year.

54. SENIOR CONFERENCE. Staff.

Group meetings of departmental majors held in the second semester of the senior year for the purpose of reviewing, integrating, and supplementing the student's course program.

56. LITERARY CRITICISM. Mr. Hunt.

The theories and doctrines of English literary criticism and their background.

GREEK LITERATURE IN ENGLISH (Greek 36). Miss North.

Writing and Speaking: Students in need of training in Composition may be required to take tutorial work or to complete Course 5 before entering the junior year.

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

Extra-curricular student groups for practice in creative writing, acting, and debating meet with members of the departmental faculty.

HONORS WORK

Prerequisites: The course requirements for a major in honors are the same as for a major in course, Modern Literature and either Chaucer or Milton. The election of an additional course in the sophomore year is advised when the schedule permits it, and The History of England is also recommended.

For admission with a minor in this department, the requirement is one year of work, including Modern Literature.

Program: Majors in honors must take four seminars in the department, including Shakespeare and one of the types seminars from Group II. Minors in honors may enroll in any two or three of the seminars offered as may seem best suited to the purposes of their whole program.

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

Group I

SHAKESPEARE. Mr. Dearing, Mr. Hicks and Mr. Whicher. *Both Semesters*

A study of the mind and art of Shakespeare as dramatist and poet. The emphasis is on the major plays, with a more rapid reading of the remainder of his work. Students are advised to read through the whole of the plays before entering the seminar.

MILTON AND THE 17TH CENTURY. Mr. Hunt. *Fall Semester*
Milton, Donne, and the poetry of the Bible.

CHAUCER. Mr. Klees and Mr. Scudder. *Spring Semester*
A study of Chaucer's poetry and age.

Group II

- POETRY. Mrs. Wright and Mr. Dearing. *Spring Semester*
Chiefly Victorian poetry. The basic elements of poetic expression, thought, imagery, and sound are studied separately, and then brought together in the investigation of four long poems.
- DRAMA. Mr. Hicks. *Spring Semester*
Survey of the development of the drama in England and America following a preliminary study of classic drama.
- NOVEL. Mrs. Wright. *Fall Semester*
Chiefly 19th century. Principles of aesthetics applied to the novel form are developed from the study of selected novels outside the Victorian tradition.
- LITERARY CRITICISM. Mr. Hunt. *Spring Semester*
English literary criticism from Sidney to Pater, with some study of classical backgrounds and contemporary developments.

Group III

- COMPARATIVE LITERATURE. Mr. Becker. *Fall Semester*
Using the realistic movement as a starting point, this seminar considers some of the major themes and philosophic attitudes embodied in recent literature. The chief figures studied are Flaubert and Zola; Tolstoy, Dostoevsky, and Chekhov; and Mann, Joyce, and Kafka.
- SOCIAL CRITICISM. Mr. Becker. *Spring Semester*
The development of social criticism as a major constituent of American literature from Jefferson and Paine to the present.
- THE ENGLISH AUGUSTANS. Mr. Dearing. *Spring Semester*
A study of ideas and forms in the works of Dryden, Pope, Swift, and Johnson. The intent is primarily to evaluate the literary achievement of four major authors, and to relate them on the one hand to the literature of Greece and Rome, and on the other to philosophical and literary currents of the Eighteenth Century.
- AMERICAN LITERATURE. Mr. Whicher. *Fall Semester*
A study of the major writers in this field.
- PROBLEMS OF LITERARY STUDY. Mrs. Wright. *Fall Semester*
This seminar gives training in bibliography, selection of problems for critical writing, and leads to the presentation of a thesis. Students read and criticise each other's work at intervals and confer individually with the instructor. Students who wish to write theses not properly within the scope of this seminar may apply to the Chairman of the Department for permission to substitute such projects for the fourth seminar of work in the major field.
- LINGUISTIC SCIENCE. Mr. Reuning. (German.)
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 the department.

Fine Arts

ASSOCIATE PROFESSOR: ROBERT M. WALKER, *Chairman*

INSTRUCTORS: HEDLEY H. RHYS
ETHEL STILZ (part-time)

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

Since it is the objective of the Department to foster an intelligent comprehension of the visual arts rather than to train professional artists, no courses in drawing, painting and sculpture are offered for credit. However, instruction in such work is available under the extracurricular Arts and Crafts Program.

REQUIREMENTS AND RECOMMENDATIONS

Prerequisites: Majors and minors in course and honors must take the full year course Fine Arts 1-2. For other students the prerequisite for all advanced courses is one semester of Fine Arts 1-2 only (i. e., Fine Arts 1 or Fine Arts 2).

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

Majors and Minors in Course: The program of a major consists of at least eight half courses (including Fine Arts 1-2) in the Department. The courses supporting this program depend on the needs of the individual student and may be found in both the Division of the Humanities and the Division of the Social Sciences.

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

Language Requirements for Graduate Schools: Students are advised that graduate work in Fine Arts usually demands a knowledge of French or German.

COURSES

1-2. INTRODUCTION TO ART HISTORY. Mr. Rhys and Mr. Walker.

Full Course

Fine Arts 1 (first semester). Consideration is given in the first four weeks to the basic problems of the nature of the work of art, the factors of influence upon its conception, formation and development (geographic, social,

economic, etc.), the principles of value judgments, and methods of analysis. A limited number of representative examples of architecture, sculpture, and painting are studied within the historical context of the civilizations and cultural epochs which produced them: Ancient Egypt, Greece, Rome and Medieval France.

Fine Arts 2 (second semester). European and American architecture, sculpture and painting from the fifteenth century to the present day are studied from the same points of view and with the same methods as in the first semester.

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

11. DESIGN IN DRAWING AND PAINTING. Mr. Rhys.
Half Course, Second Semester
The basic elements of design and their function in drawing and painting. Types of harmony, sequence and balance such as linear, tonal and spacial. The methods of design and representation that characterize the various historical styles. Practical exercises required demand no special technical aptitude, since the purpose of the course is to develop a critical understanding of drawing and painting and not technical skill.
12. ANCIENT ART. Mr. Walker. *Half Course, First Semester*
The development of the forms of architecture, sculpture and painting as expressing the various cultural patterns of ancient civilizations: Egypt, Iran, Mesopotamia, Greece and Rome.
13. MEDIEVAL ART. Mr. Walker. *Half Course, Second Semester*
A study of the relationship between art and society in Europe and the Near East from the fourth through the fourteenth centuries. The ideas and institutions which were instrumental in shaping Christian art during its formative stages of development. Special emphasis is placed on the Romanesque and Gothic periods in France: the abbey and the cathedral.
14. ITALIAN RENAISSANCE ART. Mr. Rhys. *Half Course*
A study of certain aspects of the Renaissance in Italy as expressed in architecture, sculpture and painting. Emphasis is placed on such great masters as Donatello, Masaccio, Alberti, Leonardo da Vinci, Raphael, Michelangelo and Titian.
15. RENAISSANCE AND BAROQUE PAINTING OF WESTERN EUROPE.
Mr. Walker. *Half Course*
Developments in painting and drawing during the fifteenth, sixteenth and seventeenth centuries in France, the Netherlands, Germany and Spain through the study of individual artists such as the Van Eycks, Roger van der Weyden, Jean Fouquet, Dürer, Gruenewald, Holbein, El Greco, Rubens, Rembrandt, Vermeer, Poussin and Velasquez.
16. MODERN PAINTING. Mr. Rhys. *Half Course, First Semester*
Important stylistic developments in European painting from the French Revolution to 1939: the meanings of the various movements and their relationship to changing social and political attitudes.

17. AMERICAN ART. Mr. Rhys. *Half Course, Second Semester*
 Architecture, sculpture and painting in North America from the Colonial Period to the present day, their connection with European art and their significance as a reflection of American culture.
18. MODERN BUILDING. Mr. Walker. *Half Course, Second Semester*
 An introduction to the nature of architecture and the function of the architect through a study of developments in European and American building during the late nineteenth and twentieth centuries. The specific influence of economic, technological and social changes upon design and structure. Emphasis placed on the study of original examples in the Philadelphia area and on the work of such men as Sullivan, Wright, Lescaze, Mies van der Rohe, Gropius and Le Corbusier.
 The prerequisite of Fine Arts 1-2 is waived for students in Engineering.
19. THEORY OF DESIGN IN DECORATION. Miss Stilz. *Half Course, First Semester*
 The principles of design and color and their application to the planning and furnishing of the interior of the house. Practical exercises and the study of selected examples of European and American architecture.

HONORS SEMINARS

- ITALIAN RENAISSANCE PAINTING. Mr. Rhys.
 A study and analysis of painting in Italy from Giotto to Titian: the decisive contributions of the outstanding masters to its stylistic development and its relationship to the Renaissance movement as a whole.
- RENAISSANCE AND BAROQUE PAINTING OF WESTERN EUROPE.
 Mr. Walker.
 Developments in painting and drawing during the fifteenth, sixteenth and seventeenth centuries in France, the Netherlands, Germany and Spain through the study of individual masters such as the Van Eycks, Roger van der Weyden, Jean Fouquet, Albrecht Dürer, Gruenewald, Holbein, El Greco, Rubens, Rembrandt, Vermeer, Poussin and Velasquez.
- MODERN PAINTING. Mr. Rhys.
 Important stylistic developments in European painting from the French Revolution to 1939: the meanings of the various movements and their relationship to changing social and political attitudes.
- MASTER PRINT MAKERS. Mr. Walker.
 A consideration of certain problems in the history of the graphic arts. A study of the significance of the work of such men as Schongauer, Dürer, Rembrandt, Goya, Daumier, Munch and Rouault for the development of expression in the media of the woodcut, engraving, etching, aquatint and lithography. Students work almost exclusively with original material in the Print Room of the Philadelphia Museum and the Lessing J. Rosenwald Collection in Jenkintown.

German Language and Literature

ASSISTANT PROFESSORS: LYDIA BAER, *Chairman*
HILDE D. COHN
KARL REUNING

Through its elementary courses the German Department attempts to serve, on a college level, those students who wish to build a foundation in the language, as well as those who are forced into the study by a college or departmental requirement. Beyond the first two years, the objectives are broadly cultural, with particular stress on the integration of German language, literature, and philology into the great body of other humanistic cultures. As far as possible, German is the language of the classroom in all advanced courses and seminars.

REQUIREMENTS FOR MAJORS AND MINORS

German 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. By special arrangement, qualified students who begin German in college are enabled to choose German as a major or minor subject in their junior and senior years. Such competent students may in the sophomore year, by special reading, take Course 6-7, which is required of all majors and minors within the first two years.

Recommended as supporting subjects 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.

- 1-2. ELEMENTARY GERMAN. Members of the department. *Full Course*
For students who begin German in college. Equivalent of two years' secondary school preparation. Fundamentals of German and simpler texts such as Appelt and Funke: *Modern German Prose*.
3. INTERMEDIATE GERMAN. Members of the department. *Half Course*
Prerequisite: German 1-2 or two years' secondary school preparation. Review grammar and texts of average difficulty such as Hill: *Drei Nobelpreisträger*.
4. INTERMEDIATE GERMAN. Miss Baer and Miss Cohn. *Half Course*
Fulfills the college requirement for all students who wish to learn reading through the medium of literary and cultural material, of the type Werfel: *Jacobowsky und der Oberst*; Fleissner and Fleissner: *Die Kunst der Prosa*; Goethe: *Urfaust*; Bruns: *A Book of German Lyrics*.
Prerequisite: German 3 or equivalent.
5. SCIENTIFIC GERMAN. Miss Cohn and Mr. Reuning. *Half Course*
Fulfills the college requirement for students who are interested only 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 3 or equivalent.

- 6-7. INTRODUCTION TO GERMAN LITERATURE. Mr. Reuning. *Full Course*
 Either half or both may be taken for credit. Prerequisite for majors and minors. 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 3-4 or equivalent.
8. WRITING AND SPEAKING GERMAN. Mr. Reuning. *Half Course*
 Composition and conversation. Introduction to *Volkskunde*: the social and cultural backgrounds of modern Germany.
 Prerequisite: Course 3-4 or equivalent.
11. DIE DEUTSCHE ROMANTIK. Miss Baer. *Half Course*
 An introductory study of the romantic movement in Germany, with illustrative readings from representative authors such as Novalis, Tieck, Arnim, Brentano, Eichendorff. Lectures, discussion, papers in German.
 Prerequisite: Course 6-7 or equivalent.
12. POETISCHER REALISMUS. Miss Baer. *Half Course*
 Selected studies from the dramas of Grillparzer, Hebbel, Otto Ludwig, and from the works of the great prose writers of the second half of the nineteenth century. Conducted in German. Discussion, papers.
 Prerequisite: Course 6-7 or equivalent.
- 13-14. GOETHE. Miss Baer. *Full Course*
 A study of Goethe's life and works. The first semester is occupied with a consideration of the period up to the Italian Journey; the second semester with Goethe's maturity and old age, including Faust I and II. Conducted in German; lectures, discussion, papers. Open to all students who read and speak German fluently.
15. SCHILLER. Miss Baer. *Half Course*
 The classical age of Schiller, as reflected in his dramas and in his essays on aesthetic questions. Conducted in German; discussion and papers. Open to all students who read and speak German fluently.
16. MODERNE DEUTSCHE LITERATUR. Miss Baer. *Half Course*
 A study of four or five leading German writers of the twentieth century, including Thomas Mann, Gerhart Hauptmann, Rainer Maria Rilke. Lectures, discussion, papers.
 Prerequisite: Course 6-7 or equivalent.
- 17-18. GERMAN AUTHORS IN TRANSLATION. Members of the department. *Full Course*
 Lectures in English; discussion; frequent book reports in English by students. Open to all students.
19. CREATIVE WRITING. Mr. Reuning. *Half Course*
 An advanced course. Intensive practice in writing and speaking German. The subject matter is taken from German literature and *Kulturgeschichte*, and students are encouraged to exercise their own initiative.

HONORS WORK

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

MIDDLE HIGH GERMAN LITERATURE AND PHILOLOGY. Mr. Reuning.

Introduction into Indo-European and Germanic philology and phonetics. Outline of development of the German language. Middle High German grammar. Brief survey of Old and Middle High German literature. Reading of MHG texts in the original, especially *Nibelungenlied*, Wolfram's *Parzival*, and Walther von der Vogelweide.

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 seminar in History of the Reformation is recommended as preparation for this seminar.

DEUTSCHES BAROCK und AUFKLAERUNG. Miss Baer.

A study of German literature in the seventeenth and early eighteenth centuries. The reforms of Opitz, the lyric poetry of the period, the mysticism of Angelus Silesius and Jakob Böhme, the plays of Gryphius, and the prose of Grimmelshausen; a study of Lessing in his most important dramas and critical writing.

GOETHE. Miss Baer.

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

DIE DEUTSCHE ROMANTIK. Miss Baer.

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

POETISCHER REALISMUS. Miss Baer.

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.

DEUTSCHE LITERATUR SEIT 1900. Miss Baer.

The chief writers of "Neuromantik" and impressionism: Gerhart Hauptmann's dramas; Thomas Mann's epic prose; Rainer Maria Rilke's poetry; Hugo von Hofmannsthal's lyric prose and poetry.

LINGUISTIC SCIENCE. (In cooperation with other departments in the Division of the Humanities.) Mr. Reuning.

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

History

PROFESSORS: MARY ALBERTSON, *Chairman*
FREDERICK J. MANNING*

ASSOCIATE PROFESSOR: GEORGE P. CUTTINO

ASSISTANT PROFESSORS: PAUL H. BEIK
JAMES A. FIELD, JR.
LAURENCE D. LAFORE
FREDERICK B. TOLLES
THEODORE H. VON LAUE

INSTRUCTOR: GRACE H. LARSEN (part-time)

The department plans its offerings for majors in the other departments as well as for its own majors. Students with special interests will note that there are a few courses emphasizing, for instance, intellectual history and economic history, but in most of the courses and all of the seminars the emphasis is on the whole context of the event.

LANGUAGES

Languages which are most useful to students of history and which are required by most graduate schools are French and German. Beginning with the class entering in 1951 the language requirement for a major in history will be French or German. This requirement may be met by three years study of one of these languages before entering college, or two years at the college level either at Swarthmore or in summer school and it may be met at any time before graduation.

REQUIREMENTS FOR A MAJOR IN HISTORY

The minimum requirement for acceptance as a major in history is successful completion of course 1-2 and a C average in the first two years in all subjects. Any freshman or sophomore who wishes to keep open the possibility of a major in history should ask a member of the department for advice on courses.

COURSE WORK FOR A MAJOR

The choice of courses in history should be made in such a way as to prepare for the comprehensive examination, which includes questions in European, English, and American history. Usually the first electives taken in history by majors should be one term of American history (4 or 5) and one term of English history (3). All the other courses offered are also in the fields tested by the comprehensive examination. Course 65 (Special Topics) is designed to help major students in their preparation for this examination. All major students should elect this course. The following minors are suggested in connection with a major

* Absent on leave, 1949-50.

in history: (1) a departmental minor (three full courses or six half courses in a single department), or (2) a minor in literature (for instance, a combination of courses in English and French or French and German, chosen in consultation with the major department), or (3) a minor in American studies (for instance, a combination of certain courses in Fine Arts and American literature or Latin American literature or in Political Science and Economics, chosen in consultation with the major department).

COURSES

- 1-2. EUROPE. All members of the Department. *Full Course*
One of the basic courses in the curriculum. It is intended to be an introduction to the study, understanding, and use of history. It is a prerequisite to all other work in history except courses 21 and 30. It begins with a brief discussion of the classical backgrounds of European civilization and ends with a brief discussion of post-war Europe. Sections are small enough for discussion.
3. ENGLAND. Miss Albertson. *Half Course*
A survey of the history of the English people. For sophomores, juniors, and seniors. This course is planned for a five-course program.
4. THE UNITED STATES BEFORE 1865. Mr. Field and Mr. Tolles. *Half Course*
An advanced course on American history. Special help with the writing of long papers is given in connection with this course. For sophomores, juniors, and seniors. This course is planned for a five-course program.
5. THE UNITED STATES SINCE 1865. Mr. Field. *Half Course*
An advanced course on American history. For sophomores, juniors and seniors. This course is planned for a five-course program.
11. THE OTHER AMERICAN REPUBLICS. Mr. Lafore. *Half Course*
The emphasis is on Mexico, Brazil, and Argentina. For sophomores, juniors, and seniors. It may be taken without a prerequisite by special permission of the instructor. This is recommended for majors in Spanish as well as for majors in history and as a general elective.
12. FRANCE. Miss Albertson. *Half Course*
The history of France from Roman times to the present day. For sophomores, juniors, and seniors. It may be taken without a prerequisite by special permission of the instructor. This is recommended for majors in French as well as for majors in history and as a general elective.
14. RUSSIA. Mr. von Laue. *Half Course*
The history of modern Russia. For sophomores, juniors, and seniors. The course begins with the reign of Peter and gives half its time to the period since the Revolution.

20. HEGEL AND MARX. Mr. von Laue. *Half Course*
 The historical influence of Hegel and Marx from their own day to the present. The emphasis is on the relation between institutions and ideas. For sophomores, juniors, and seniors.
21. QUAKERISM. Mr. Tolles. *Half Course*
 The history of the Society of Friends to the present day. The characteristic religious and social ideas of the Quakers are considered in their historical setting. A large part of the reading is done in the original sources. For sophomores, juniors, and seniors. It may be taken without a prerequisite.
30. RECENT HISTORICAL TRENDS. Mr. Beik and Mr. Lafore. *Half Course*
 A course designed for students who do not intend to take more than one half course in history. It cannot be substituted for the college requirement in history (course 1-2) and is not open to majors in the social sciences and humanities.
51. THE WESTWARD MOVEMENT. Mr. Field. *Half Course*
 European colonization, the struggle for North America, westward expansion, sectional development, problems of growth and integration of newly settled regions. For juniors and seniors.
52. MODERN BRITAIN. Mr. Lafore. *Half Course*
 Social thought and institutions from 1688 to 1945. Much of the reading will be in fiction and biography. For juniors and seniors.
53. THE FRENCH REVOLUTION AND NAPOLEON. Mr. Beik. *Half Course*
 The emphasis is on the relation between institutions and ideas. For juniors and seniors.
54. MEDIEVAL EUROPE. Mr. Cuttino. *Half Course*
 The history of western Europe from the decline of the Roman Empire through the thirteenth century. For juniors and seniors.
55. THE RENAISSANCE. Miss Albertson. *Half Course*
 The history of the period of the Renaissance in Europe. For juniors and seniors.
13. GERMANY. Mr. von Laue. *Half Course*
 The history of modern Germany from the Napoleonic era to the present. For sophomores, juniors, and seniors. This is recommended for majors in German as well as for majors in history and as a general elective.

56. THE LABOR MOVEMENT. Mrs. Larsen. *Half Course*
 The social background and the economic, political, and legal problems of American labor, considered in connection with the European and English labor movements. For juniors and seniors.
57. RECENT EUROPE. Mr. Beik. *Half Course*
 The emphasis is on factors of general importance chiefly in western Europe in the late nineteenth and early twentieth centuries. For juniors and seniors.
65. SPECIAL TOPICS. All members of the Department. *Half Course*
 Individual programs are planned to prepare majors in history for the comprehensive examinations. The discussion of review problems, of papers, and of reading is conducted in groups and in individual conferences with the instructor.
66. SENIOR ESSAY. All members of the Department. *Half Course*
 An essay may be substituted for a half course by special permission of the department. It must be finished by the middle of the senior year.

HONORS WORK

The following seminars are offered by the department to juniors and seniors to prepare for the examinations for a degree with Honors. Students who plan to take honors seminars in history, whether as majors or minors, are advised to decide as early as possible whether their seminars will be in American, English, or European history so that they can meet prerequisite requirements for specific seminars. Any seminar will be given during the term for which more than four students elect it at the time of Spring registration. Seminars can not usually be arranged later than the time of registration.

HONORS SEMINARS

American History

AMERICAN COLONIAL HISTORY. Mr. Tolles.

The history of the thirteen colonies. The emphasis is on cultural, social, and institutional history.

PROBLEMS IN AMERICAN HISTORY. Mr. Field and Mr. Manning.

Selected topics in the history of the United States. Open only to students who have taken either course 4 or course 5.

THE SUPREME COURT. Mr. Manning.

For seniors. The emphasis is on common law cases and principles. The work in this seminar is not designed to anticipate or overlap the courses in constitutional law offered in law schools.

English History

MEDIEVAL ENGLAND. Miss Albertson.

The period from 1066 to 1485.

TUDOR AND STUART ENGLAND. Miss Albertson.

The period from 1485 to 1688. Open only to students who have taken course 3.

MODERN ENGLAND. Mr. Lafore.

The period from 1688 to 1914, with most of the emphasis on the nineteenth century. Open only to students who have taken course 3.

European History

MEDIEVAL EUROPE. Mr. Cuttino.

The civilization of the twelfth and thirteenth centuries.

FIFTEENTH AND SIXTEENTH CENTURY EUROPE. Miss Albertson.

The period of the Renaissance and Reformation.

EUROPE 1760 TO 1870. Mr. Beik.

The decay of the old regime and the rise of liberalism.

EUROPE 1870 TO 1939: MODERN EUROPE. Mr. Beik and Mr. Lafore.

Social and political changes which preceded the second world war.

EUROPE 1870 TO 1939: DIPLOMATIC HISTORY. Mr. Lafore.

The management of international affairs and problems.

EUROPE 1900 TO THE PRESENT: EASTERN EUROPE. Mr. von Laue.

The internal development of Russia and Russia's cultural and political position in eastern Europe.

THESIS

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

Mathematics and Astronomy

PROFESSORS: HEINRICH BRINKMANN
ARNOLD DRESDEN, *Chairman*
PETER VAN DE KAMP, *Director of Sproul Observatory***
ROSS W. MARRIOTT

ASSOCIATE PROFESSOR: JOHN H. PITMAN

ASSISTANT PROFESSORS: PHILIP W. CARRUTH
WOLFGANG WASOW*

VISITING ASSISTANT PROFESSOR: ALICE T. SCHAFER (part-time)

RESEARCH ASSOCIATES: L. BINNENDIJK
HANS ROTH

ASSISTANTS: SARAH L. LIPPINCOTT
SARA M. SMITH

Mathematics

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

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 and Senior years, two half-courses selected each year from courses 14, 15, 19, 51, 52, 53. The completion of Physics 1-2 is strongly recommended.

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

* Absent on leave, 1949-50.

** Absent on leave, September-December, 1949.

1-2. FIRST YEAR MATHEMATICS. Mr. Brinkmann, Mr. Carruth, Mr. Dresden, Mr. Marriott, Mrs. Schafer.

The material covered in these courses consists of Algebra and Trigonometry (Course 1) and Analytical Geometry (Course 2). The subjects studied are required for any further work in mathematics; they will also serve to give the student who intends to take no other courses in mathematics an introduction to mathematical principles and methods. Students taking Course 1 must also take Course 2 in order to receive credit for the course. However, properly qualified students may take Course 2 without first taking Course 1; such students will receive credit for Course 2 separately. Course 1 is given during the first semester; Course 2 is offered in each semester. The texts used are: Albert, *College Algebra*; Curtiss and Moulton, *Essentials of Trigonometry*; Smith, Salkover and Justice, *Analytic Geometry*.

3. INVITATION TO MATHEMATICS. Mr. Dresden. (Omitted in 1949-1950)

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*.

Prerequisite: A good high school course in mathematics.

11-12. DIFFERENTIAL AND INTEGRAL CALCULUS. Mr. Brinkmann, Mr.

Carruth, Mr. Marriott, Mrs. Schafer.

These courses introduce the student to the principles and applications of the calculus. They form a necessary basis for any further work in mathematics and are essential for an understanding of the fundamentals of physics and other sciences, as well as engineering. These courses constitute a full course and cannot be taken separately; both are usually offered in each semester. The text used is Sherwood and Taylor, *Calculus*.

Prerequisite: Courses 1-2.

14. THEORY OF EQUATIONS

Second Semester

This course begins with a study of complex numbers and continues with a study of polynomials and algebraic equations, based on the notion of a field and its algebraic extensions. The numerical calculation of roots of numerical equations is also considered briefly. The text used is Weisner, *Theory of Equations*.

Prerequisites: Courses 1-2, 11-12.

15. SOLID ANALYTIC GEOMETRY. (Omitted in 1949-1950)

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*.

Prerequisites: Courses 1-2, 11-12.

19. PROJECTIVE GEOMETRY. Mr. Brinkmann. *First Semester*

The principles of plane projective geometry are studied in this course, by analytic as well as synthetic methods. The projective properties of the conic sections are derived and the relation of elementary metric geometry to projective geometry is considered.

Prerequisites: Courses 1-2, 11-12.

51. ADVANCED CALCULUS. Mr. Dresden. *First Semester*

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

Prerequisites: Courses 1-2, 11-12.

52. DIFFERENTIAL EQUATIONS. Mr. Dresden. *Second Semester*

A study of ordinary differential equations, with applications to problems from geometry, physics and other sciences. Certain classical linear differential equations are also studied in some detail.

Prerequisites: Courses 1-2, 11-12, 51.

53. HIGHER ANALYSIS. *Second Semester*

A number of different subjects will be studied in this course, both because of their intrinsic importance and in order to give the student practice in the processes of analysis. Some of the topics to be considered are: Fourier Series, with applications to physical problems; Orthogonal polynomials; Gamma Function; Elliptic Integrals.

Prerequisites: Courses 1-2, 11-12, 51, 52 (may be taken at the same time).

60. READING COURSE IN MATHEMATICS.

This course is to provide an opportunity for students to do special work in fields not covered by the undergraduate courses, listed above. The work consists in the preparation of papers requiring extensive and detailed examination of the literature of a problem.

HONORS SEMINARS IN MATHEMATICS

ADVANCED CALCULUS.

The subject matter of this seminar includes the differential calculus of functions of several variables, the elements of vector analysis, multiple integrals, line and surface integrals, improper integrals, infinite series, uniform convergence of infinite processes. The treatment of these various subjects is sufficiently detailed to give the student an introduction to the rigorous processes of analysis.

DIFFERENTIAL EQUATIONS.

This seminar begins with a formal treatment of ordinary differential equations and their applications to various types of problems. This is followed by a study of existence theorems for ordinary differential equations, certain classical linear differential equations, Fourier series and a brief introduction to boundary value problems of certain partial differential equations of the second order.

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. In addition, the modern development of this subject provides a valuable application of the concepts and techniques acquired in the study of advanced calculus. The topics treated include: the axiomatic approach, the use of Stieltjes integrals, correlation and regression, some special distribution, sampling theory and a short introduction to the theory of statistical estimation.

MODERN ALGEBRA.

This seminar deals with the theoretical properties of such formal systems as groups, rings, fields and vector spaces. While these concepts will be illustrated by many concrete examples, the emphasis will be on the abstract nature of the subject; the student will thus be introduced to an important aspect of modern mathematics. Among the specific topics to be studied are the algebra of matrices, of classes and of ideals.

THEORY OF FUNCTIONS OF A COMPLEX VARIABLE.

A brief study of the geometry of complex numbers is followed by a detailed treatment of the Cauchy theory of analytical functions of a complex variable. Various applications are given and some special classes of functions, such as elliptic functions, are studied. Analytic continuation and the theory of Weierstrass are briefly considered.

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.

DIFFERENTIAL GEOMETRY.

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

THEORY OF NUMBERS.

Among the subjects studied in this seminar are: Elementary properties of integers, the congruence relation, quadratic residues, certain quadratic forms, certain classical Diophantine equations, simple examples of fields of algebraic numbers.

Astronomy

Astronomy deals with the nature of the universe about us and the methods employed to discover the laws underlying the observed phenomena.

The elementary courses present the problems in broad outlines and trace the growth of our knowledge of the facts and the development of more comprehensive theories.

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

The principal instrument of the Sproul Observatory is the twenty-four-inch visual refractor of thirty-six-foot focal length, used almost exclusively for photography. 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.

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' 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.

1-2. DESCRIPTIVE ASTRONOMY. Mr. van de Kamp.

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

8. INTRODUCTION TO ASTRONOMY. Mr. Pitman.

This course is designed to give the student an acquaintance with some of the problems in astronomy, the methods of investigation, and results obtained. Emphasis is placed on the overlapping of astronomy and the other sciences, and its role in art, history and literature. Those planning to take additional work in astronomy should enroll in Astronomy 1-2. Three class periods each week. Text: Baker, *Introduction to Astronomy*, and current periodicals.

13. PRACTICAL ASTRONOMY.

Theory and use of the transit instrument for the determination of time, latitude and longitude. Reduction of star positions. Solution of observation equations by the method of least squares.

(Two class sessions and one laboratory period each week.)
Prerequisites: Mathematics 1-2 and Astronomy 1-2 or 8.

14. LABORATORY ASTRONOMY.

Theory and practice of micrometric measures of double stars, comets and asteroids. Photography of selected objects. Determination of positions from photographic plates.

(Two class sessions and one laboratory period each week.)

Prerequisites: Mathematics 1-2 and Astronomy 1-2 or 8.

19. DOUBLE STARS. Mr. van de Kamp.

The two body problem. Visual, spectroscopic and eclipsing binaries. The masses of binary components and of unseen companions.

Prerequisite: Mathematics 11-12.

31. UNDERGRADUATE READING COURSE IN ASTRONOMY.

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

51. ORBIT COMPUTATION. Mr. Pitman.

The principles and methods of orbital analysis for planets, asteroids, comets and double stars.

Students who intend to pursue astronomy as a major subject in course should have Astronomy 1-2 during the freshman or sophomore year; advanced courses in astronomy selected from the list given above combined with work in mathematics constitute the further requirement.

For students who select astronomy as their minor, Astronomy 1-2 and one advanced course normally constitute the minimum requirement.

HONORS SEMINARS IN ASTRONOMY

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

SPHERICAL ASTRONOMY.

Outline of spherical trigonometry. The astronomical triangle. Determination of time and latitude. Reduction of astronomical positions. Precession, aberration, proper motion, parallax.

ORBIT COMPUTATION.

The principles and methods of orbital analysis for planets, asteroids, comets and double stars.

CELESTIAL MECHANICS.

The problems of two, three and n bodies. Perturbations.

DOUBLE STARS.

The two body problem. Theory and observational technique of visual, spectroscopic and eclipsing binaries. Special attention is given to the photographic study of both resolved and unresolved astrometric binaries. The masses of binary components and of unseen companions.

PHOTOGRAPHIC ASTROMETRY.

The long-focus refractor. Photographic technique, measurement and reduction of photographic plates. Choice of reference stars. Attainable accuracy. Application to the problems of parallax, proper motion, mass-ratio, and perturbations. Resolved and unresolved astrometric binaries; orbital analyses.

STATISTICAL ASTRONOMY.

Fundamental data. Stellar motions and parallaxes. Distribution of stars and globular clusters. The dimming of star light. Pattern of stellar motions. The galactic system.

GRADUATE WORK

In conformity with the general regulations for work leading to the master's degree (see p. 64), this department offers the possibility for graduate work.

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

Candidates for the master's degree must have a good reading knowledge of French and German.

Music

PROFESSOR: ALFRED J. SWAN, *Chairman*

ASSISTANT PROFESSOR. IRMA WOLPÉ (part-time)

INSTRUCTOR: THOMAS DUNN

The study of music is concerned with a gradual and growing understanding of the language of the great composers. This may be approached from without: through a study of the general style of the epoch in which the composer lived, its ideas, its art, its manner of life; through a historical tracing of the forms used by the composer; through listening to his music accompanied by certain directives of the teacher. Yet the better and surer approach is from within: through a study of the musical laws underlying the composition and a gradual application of these laws (counterpoint, harmony, etc.) to thematic material either invented by the student himself, or set before him by the teacher; through acquiring the ability to perform his own work or the models of the masters (chiefly at the piano).

A reasonable amount of inherent musical talent is presupposed for the second, surer method of studying music. There are not a few students in the college, however, who, considering themselves lacking in this talent, would prefer the former, more outward way. The ensuing music courses are devised to satisfy both types of student.

REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS

If, in the course of his first two years in college, the student has shown an exceptional aptitude for either composition, or musicology (an interest in all music history plus an absorbing interest in one phase, preferably the Middle Ages or the Renaissance), or both, he may elect to major in music. It is also desirable that he show a certain gift, or at least skill, in handling the piano.

1-2. FOUNDATIONS OF MUSIC. Mr. Swan.

Full Course

First Semester: The study of the old scales (modes) leading to melodic writing in two and three parts. Models from the works of Josquin des Pres and Palestrina. Towards the end of the term the student will usually have produced exercises in free counterpoint (three-part motets for voices).

Second Semester: Brief fugal exposition for piano or strings, preludes, fughettas, and dance forms. It is during the second semester that a public demonstration of student compositions usually takes place.

The course includes a weekly class session of two hours and individual appointments with each of the students for the revision and correction of the work submitted.

Collateral texts: Jeppesen, *Counterpoint*, *The Palestrina Style and the Dissonance*; Morris, *Contrapuntal technique of the 16th Century*; Medtner, *The Muse and the Fashion*.

3-4. HISTORY OF MUSIC. Mr. Dunn.

Full Course

A survey course of music history for non-composers. Study of the successive styles in music, especially those of Bach and the Viennese Classics. Initiation into score reading.

21-22. PIANO LITERATURE. Mrs. Wolpé.

Full Course

The acquisition of the art of piano playing through the study of Cramer, Bach's Inventions and French Suites, Mozart and Beethoven Sonatas. Students of composition may be beginners; others must show at least four years of previous study.

The course includes a weekly class session of two hours in which the successive styles in piano music are demonstrated, and individual appointments with each of the students—lessons in piano playing, one hour per week.

31-32. ADVANCED MUSICAL COMPOSITION. Mr. Swan

Full Course

A continuation of Music 1-2 for students who are able to attempt composition on a larger scale (sonatina, sonata, string trio and quartet, small orchestra).

41-42. A seminar on mediaeval music, or some later phase, may be offered from time to time for course and honor students.

HONORS WORK

To be admitted to honors a student must have completed both semesters of Music 1-2 and 21-22. A student may do his principal work in Composition, or in Music History (Musicology), or in both. The seminars (four for majors and two for minors) culminate in the production of a string quartet movement or some other chamber ensemble in sonata form. The completed work is played by professionals at the time of the honors examination.

Philosophy and Religion

PROFESSORS: WOLFGANG KÖHLER,* *Research Professor of Philosophy and Psychology*

PAUL SCHRECKER

ASSOCIATE PROFESSORS: RICHARD B. BRANDT,* *Chairman*
JOHN M. MOORE (part-time)

ASSISTANT PROFESSORS: MONROE C. BEARDSLEY
RODERICK FIRTH

INSTRUCTORS: WILLIAM HORDERN
SIDNEY MORGENBESSER

The study of philosophy consists in examining the beliefs to which one is committed by accepting scientific knowledge and common-sense views of the world; clarifying basic concepts; determining the circumstances under which statements may properly be said to be true in all fields of human inquiry and concern, including ethical and aesthetic discourse; and drawing the outlines of an account of human experience coherent with the evidence of the sciences. On account of the role of philosophy in the history of human thought, and on account of the relation of philosophical ideas to problems in other fields, philosophy may be studied as instrumental to the understanding of wider areas of history or thought.

Religion is studied primarily as a system of ideas, both ethical and theological: systematically, through a consideration of representative forms of contemporary religious thought; and historically, through an examination of the great religions and the development of religion, particularly of the Judaeo-Christian tradition.

REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS AND MINORS

Applications to major in the department will normally be approved until the student has completed Course 1, and one other course from those numbered 11 to 30 if his principal interest is philosophy. Students who wish to major in the field of religion should consult the department about their programs; normally Course 1 and at least one course in the field of religion will be a minimum prerequisite to admission as a major. Students whose principal interest is philosophy should obtain permission if they plan to offer courses in religion, in excess of one, as fulfillment of their major or minor course requirements in philosophy; similarly, students whose principal interest is religion should obtain permission if they plan to offer courses in philosophy, in excess of one, as fulfillment of their major or minor course requirements in religion. As supporting material for a major program in philosophy, the department recommends a year's work in psychology, and some work in physics.

* Absent on leave, second semester, 1949-50.

1. INTRODUCTION TO PHILOSOPHY. All instructors.

Half Course, Both Semesters

Several of the most important problems of philosophy, and alternative answers to them, are discussed. The nature and criteria of knowledge are emphasized, and implications of this issue for traditional problems are analyzed. Stress is laid on the writing of philosophical essays. This course should be taken to satisfy the college requirement for the freshman year.

Note: This course serves as a sufficient prerequisite for any other course offered by the department. Other courses may be taken in any order that is convenient. Members of the department will offer advice on request concerning an order of courses to suit individual needs. Students planning to do honors work should not take courses dealing with material to be covered in honors seminars.

11. ETHICS. Mr. Brandt and Mr. Firth.

Half Course, Both Semesters

A systematic study of the principal ethical theories, historical and contemporary, absolutistic and relativistic, with the object of developing an understanding of the nature and scope of rational criticism in ethics and of the principles and problems involved in the analysis of ethical issues. Psychological, anthropological, metaphysical and religious issues are examined where they are relevant.

12. LOGIC. Mr. Morgenbesser.

Half Course, First Semester

An analysis of the structure of logical systems, both classical and contemporary. Reference will be made to the philosophical problems resulting from such systems, and to the employment of logical tools for clarification of the sciences, especially mathematics.

13. SELECTED MODERN PHILOSOPHERS. Mr. Firth.

Half Course, Second Semester

A systematic study of the work of two or three modern 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.

14. ANCIENT PHILOSOPHY. Mr. Morgenbesser. *Half Course, First Semester*

A study primarily of Plato and Aristotle, but including also dramatists and other Greek thinkers. Greek thought will be considered in its relation to the economic and political context.

15. PHILOSOPHY OF SCIENCE. Mr. Morgenbesser.

Half Course, Second Semester

A consideration of scientific knowledge, its scope and limitations; of problems resulting from theory construction and the validation of scientific assertions; of probability and induction. Brief attention is given to the place of science in the wider cultural setting.

16. CONTEMPORARY PROBLEMS. Mr. Brandt. *Half Course, First Semester*

A systematic study of some problems in epistemology and metaphysics, such as the theory of meaning, universals, the nature and criteria of truth, the justification of memory beliefs and inductive generalization, theories of perception, and the nature of the self and its relation to material nature. Parts of the work of Russell, Broad, Price, Lewis and Dewey are emphasized.

17. AESTHETICS. Mr. Beardsley. *Half Course, First Semester*
 A study of some problems that arise in describing and evaluating works of art. The course includes: (1) clarifying such basic terms of criticism as "form," "style," and "meaning"; (2) examining the principles and underlying assumptions of criticism; and (3) analyzing the nature of aesthetic value, especially the claim that works of art are "good," "beautiful," and "true."
18. SOCIAL PHILOSOPHY. Mr. Morgenbesser. *Half Course, Second Semester*
 An analysis of theories of social institutions and change; the theory of rights, both of individuals and minority groups. A study of alternative political ideals, including Marxism, socialism and democracy.
19. SEVENTEENTH CENTURY PHILOSOPHY. Mr. Schrecker. *Half Course*
 (Not offered in 1949-50.)
 The evolution of philosophical problems and ideas from Descartes to Leibniz, with special reference to the scientific, religious, political and social background. Particular attention is paid to matters relevant to present day discussion.
20. PHILOSOPHY OF RELIGION. Mr. Moore. *Half Course, Second Semester*
 The nature of religion; the psychology and interpretation of religious experience; the problem of religious knowledge; the validity and difficulties of Christian theology and ethics.
32. RELIGIOUS AND ETHICAL IDEAS OF THE BIBLE. Mr. Moore.
Half Course, First Semester
 Important parts of the Old and New Testament are examined, in order to trace the growth of Hebrew and Christian religions and the development of the ideas of the Judaeo-Christian tradition, both ethical and theological.
33. EARLY CHRISTIAN THOUGHT. Mr. Hordern. *Half Course, First Semester*
 The rise and development of Christian thinking from the time of the New Testament to the Reformation; the influence of Judaism and Greek philosophy; the formation of the creeds, Scholasticism, the rise of Humanism, and Protestant beginnings.
34. MODERN CHRISTIAN THOUGHT. Mr. Hordern.
Half Course, Second Semester
 The development of Christian thought from the Reformation to the twentieth century, with emphasis upon the relationship between Christian and secular thinking; the main ideas of the Reformation, church and sect in the Reformation, Roman Catholic development, Protestant orthodoxy, Protestant liberalism.
35. HISTORY OF RELIGIONS. Mr. Hordern. *Half Course, First Semester*
 An historical and comparative study of the world's great religions, with the exception of Judaism and Christianity: primitive religions, Hinduism, Buddhism, Confucianism, Mohammedanism. Stress will be placed upon the ethical and philosophical teachings of these religions and their rôle in the interaction of modern cultures.

36. PROBLEMS OF CHRISTIANITY TODAY. Mr. Hordern. *Half Course, Second Semester*
 A study of Humanism, Naturalism, Liberalism, the Social Gospel, Barthianism, Neo-Orthodoxy, as the major answers to modern issues. Emphasis will be on the relevance of these answers to contemporary philosophical and scientific thinking.
37. RELIGIONS OF AMERICA. Mr. Hordern. *Half Course, Second Semester*
 A study of some of the more important American religious groups with regard to their history, teaching and present status. Visits will be made to representative churches and synagogues.
46. REFLECTIVE THINKING. Mr. Beardsley. *Half Course, Second Semester*
 A beginning course in applied logic. Its principles are drawn from formal logic, scientific method and "semantics". These are combined with the materials of rhetoric, to develop the student's ability to read critically and write clearly. The emphasis is on practical application of these principles.
47. HISTORY OF SCIENCE. Mr. Schrecker. *Half Course, Both Semesters*
 The historical development of scientific methods as applied to three main problems: the conception of the universe, the structure of matter, and the evolution of life. Selected readings in the classics of science. This course can be taken only for the fulfillment of the science requirements; it will not be counted as a course for completion of major or minor requirements in Philosophy or Religion.
- PSYCHOLOGY 60. SYSTEMATIC PSYCHOLOGY. Mr. Köhler. *Half Course*
 A study of recurrent problems of psychology, in historical perspective and in the light of various systematic views. Open to qualified students of philosophy.
 Prerequisites: Psychology 1 and 2. (May be counted toward a major or minor in philosophy.)
- HISTORY 21. QUAKERISM. Mr. Tolles. *Half Course, Second Semester*
 The history of the Society of Friends to the present day. The characteristic religious and social ideas of the Quakers are considered in their historical setting. A large part of the reading is done in the original sources. (For sophomores, juniors and seniors. May be taken without prerequisite. This course may be counted toward a major or minor in the field of Religion.)

HONORS WORK

For admission to honors work in philosophy, the requirement is at least two semester courses, one of which must be the *Introduction to Philosophy* (course 1), unless with special permission. Students should normally present as their second course one selected from courses numbered 11 to 30.

Seminars: Students who wish to study religion in seminars should consult the department about what seminars may be planned, beginning with the fall of 1950. The following seminars in philosophy prepare for examinations for a degree with Honors:

MORAL PHILOSOPHY. Mr. Firth.

A seminar in ethics, systematic and historical. The general issue of relativism and absolutism is analyzed; the principal ethical theories are studied; and considerable attention is also given to related psychological and metaphysical problems. Recommended for students of psychology and the social sciences.

PLATO. Mr. Schrecker.

Reading and interpretation of all the major and some of the minor dialogues of Plato in an effort to understand his contributions to metaphysics, the theory of knowledge, ethics and politics, and to appreciate his importance for Western thought. Attention will be paid to the pre-Socratic elements of his philosophy, to his scientific and social background, and to the germs of future developments contained in his work.

HISTORY OF MODERN PHILOSOPHY. Mr. Beardsley.

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

CLASSIC PROBLEMS IN PHILOSOPHY. Mr. Köhler and Mr. Brandt.

A systematic study of some basic problems such as the theory of meaning, universals and particulars, the nature and criteria of truth, the justification of memory knowledge and induction, theories of perception and the nature of the self and its relation to material nature. The reading is in the works of contemporary writers such as Broad, Russell and Lewis.

PHILOSOPHY OF SCIENCE. Mr. Morgenbesser.

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.

AESTHETICS. Mr. Beardsley.

A systematic examination of the philosophy of art and the methodological foundations of criticism. Recommended for students of literature, music and the fine arts.

SOCIAL PHILOSOPHY. Mr. Brandt and Mr. Morgenbesser.

An examination of theories of culture and of sociocultural change, including those of Hegel, Marx and contemporary writers. An analysis of the logic of the social sciences, of methodological problems and of related theories, such as historical relativism. Recommended for students of the social sciences and psychology.

THESIS

A thesis may be submitted by majors in the department in place of one of the seminars, upon application by the student and at the discretion of the Department.

Physical Education for Men

DIRECTOR OF ATHLETICS AND PHYSICAL EDUCATION FOR MEN AND

ASSOCIATE PROFESSOR: WILLIS J. STETSON

ASSOCIATE PROFESSOR: ROBERT H. DUNN

ASSISTANT PROFESSORS: LEWIS H. ELVERSON

EDWIN J. FAULKNER

ASSISTANTS: ROBERT BACH

ALBERT M. BARRON

AVERY F. BLAKE

SAMUEL ECKERD

JAMES MCADOO

JAMES MILLER

HOWARD D. SIPLER

PAUL STOFKO

COLLEGE PHYSICIAN: DR. MORRIS A. BOWIE

The course in Men's Physical Education is designed to acquaint each participant with both team and individual sports. The value of team play is developed while emphasis is also placed on the so-called "carry over" sports which one can enjoy after graduation. Each individual, while benefiting from the physical exercise, also becomes better acquainted with the fundamentals, rules, etc., of the various sports and so is better able to enjoy these activities as a spectator.

The intercollegiate athletic program is a comprehensive one with varsity schedules in eleven different sports. In many of these activities there are contests arranged for junior varsity and freshman teams, thus providing ample opportunity for large numbers of men to engage in intercollegiate competition.

FACULTY REQUIREMENTS

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

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

FALL ACTIVITIES

*Cross Country
*Football

*Soccer
Speed Ball

Swimming
Tennis

Touch Football

WINTER ACTIVITIES

Badminton
*Basketball
Boxing

Handball
Lacrosse
*Swimming

Tennis
Track
Volley Ball

*Wrestling

SPRING ACTIVITIES

*Baseball
*Golf

*Lacrosse
Softball

*Tennis
*Track

* Indicates intercollegiate competition.

Physical Education for Women

ASSOCIATE PROFESSOR: VIRGINIA RATH, *Chairman*

ASSISTANT PROFESSORS: IRENE MOLL
MAY E. PARRY

ASSISTANTS: JANET SCANTLEBURY (part-time)
JANE VACHÉ (part-time)

COLLEGE PHYSICIAN: DR. MORRIS A. BOWIE

The aim of this Department is to contribute to the education of all women students through the medium of physical activity. We believe this contribution can best be achieved through participation in a broad program of recreational, rhythmic and developmental activities. 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 inter-collegiate 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, Miss Moll, 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.
7. BASKETBALL. Miss Moll. *Winter*
Class and Varsity.
9. BADMINTON. Miss Rath, Miss Parry, Miss Moll, Mr. Faulkner. *Winter and Spring*
Class and Varsity.
10. SOFT BALL. Miss Moll. *Spring*
Class and Varsity.
11. LA CROSSE. Miss Vaché. *Spring*
Class and Varsity.

RHYTHMIC ACTIVITIES

12. DANCING. Miss Scantlebury. *Fall, Winter and Spring*
Class and Club.
13. FOLK AND SQUARE DANCING. Miss Moll. *Fall, Winter and Spring*

DEVELOPMENTAL AND HEALTH ACTIVITIES

14. TUMBLING. Miss Rath. *Winter*
15. BODY MECHANICS. Miss Rath. *Winter*
Required of all first-year students whose posture indicates a need for it.
16. CONDITIONING EXERCISES. Miss Rath. *Winter*

SERVICE ACTIVITIES

17. RECREATIONAL LEADERSHIP. Miss Moll. *Winter*
Theory and practice teaching in recreational activities of all kinds.
18. 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, *Chairman*
MILAN W. GARRETT

ASSISTANT PROFESSOR: DENNISON BANCROFT

The physics department, through its introductory course in general physics, endeavors to give an integrated account of basic physics. In this course, as well as in the advanced work of the department, emphasis is placed on quantitative, analytical reasoning, as distinct from the mere acquisition of facts and skills. The introductory course makes no pretense of covering all material of interest to physicists, but rather comprises a selection of topics which form a coherent group.

Advanced work in the department involves a more intensive study of topics covered at the introductory level, and of many phases of modern physics which require a considerable background in mathematics and electricity. In all courses and seminars particular importance is attached to laboratory work, in as much as physics is primarily an experimental science.

REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS

Students who intend to major in physics normally take Course 1-2 in the freshman year and Course 11-12 in the sophomore year. In addition they should complete Course 12 in mathematics and Course 2 in chemistry by the end of the sophomore year. In view of graduate school requirements, and of the extensive literature of physics in German, it is strongly recommended that the student fulfill his language requirement in German.

The work of the last two years normally involves an honors program, and includes three seminars in physics and three seminars in mathematics. Other seminars in the program are usually chosen from electrical engineering, chemistry, or philosophy. Such a program is a particularly satisfactory way of preparing for graduate or other professional work in physics or in mathematics. However, it constitutes in itself an effective educational program, since the aim throughout is to achieve an understanding of fundamental ideas and concepts, as distinct from the mastery of information, skills and techniques in a limited segment of science.

COURSE STATEMENT

1-2. GENERAL PHYSICS. Staff.

An introductory course in basic 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. Separate credit given for each semester's work.

11-12. MECHANICS, HEAT AND SOUND. Mr. Elmore and Mr. Bancroft.

The material for this course is drawn from the fields of mechanics, hydrodynamics, acoustics, kinetic theory and thermodynamics. Since extensive 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.

HONORS WORK

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.

ELECTRICITY AND MAGNETISM. Mr. Garrett.

First Semester

Based primarily on Page and Adams' *Principles of Electricity* and Harnwell's *Principles of Electricity and Electromagnetism*. It covers static and dynamic electricity, magnetism and electromagnetism, with some electronics. The emphasis throughout is on fundamental analysis rather than application. The laboratory includes measurements in direct and alternating currents and in magnetism, together with some fundamental experiments in electronics. Mathematics seminars in advanced calculus and differential equations are normally prerequisite.

MODERN PHYSICS. Mr. Elmore.

Second Semester

A seminar devoted to both the experimental and the theoretical aspects of modern atomic physics. The topics include radiation, special relativity, quantum theory, the wave nature of particles, atomic structure, X-rays, isotopes, 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 and magnetism.

THEORETICAL PHYSICS. Mr. Elmore.

Not Offered Regularly

A study of selected topics, mostly drawn from classical physics. Little duplication occurs of theoretical material covered in the other seminars offered by the department. Based primarily on Page's *Introduction to Theoretical Physics*. Not accompanied by laboratory.

Prerequisites: Course 11-12 and mathematics seminars in advanced calculus and differential equations.

Political Science

PROFESSOR: J. ROLAND PENNOCK, *Chairman*

ASSOCIATE PROFESSORS: LESLIE LIPSON*
BRYCE WOOD

ASSISTANT PROFESSORS: HERBERT SONTHOFF
PAUL N. YLVISAKER

LECTURER: PHILIP E. JACOB

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

REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS

Students who intend to major in political science should take Course 1-2 in the freshman year and Course 11 in the sophomore year. Majors are also required to take Economics 1-2. Courses in Statistics (Economics 11) and in American History are recommended. Political Theory, either in seminar or in course, is required of all majors.

1-2. 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. 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.

11. AMERICAN STATE AND LOCAL GOVERNMENT. Mr. Ylvisaker.
Half Course, Second Semester

The nature of federalism, as exemplified by the United States and contrasted systems. Intergovernmental relations within a federal system. Analysis of state and local governments; their constitutions and charters; the electoral process and political parties; the legislative, executive, and judicial branches; finance and functions of governmental administration.

12. INTERNATIONAL RELATIONS AND ORGANIZATION. Mr. Wood.
Half Course, First Semester

An introduction to the principles and problems of international relations and foreign policy, including: historical concepts of international society; develop-

ment 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.

13. AMERICAN FOREIGN POLICY. Mr. Wood.
Half Course, Second Semester, Alternate Years
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.
14. LATIN AMERICAN RELATIONS. (Not offered in 1949-50.)
Half Course, Second Semester, Alternate Years
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.
15. COMPARATIVE GOVERNMENT. Mr. Sonthoff. *Half Course*
A critical study of the major political systems and of their significance in the problem of constitutional order.
16. DEMOCRACY AND DICTATORSHIP. Mr. Pennock.
Half Course, Second Semester
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.
51. PUBLIC ADMINISTRATION. Mr. Ylvisaker. *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.
52. AMERICAN CONSTITUTIONAL LAW. Mr. Ylvisaker. *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.
Sophomores may be admitted by special arrangement.
53. MODERN PARTY POLITICS. (Not offered in 1949-50.)
The rise of political parties; their role in the modern state; and reasons for their existence. The connection between parties and group interests. Types of parties. Programs, organizations, and leadership.
Open to juniors and seniors only.

54. HISTORY OF POLITICAL THEORY. Mr. Pennock.
Half Course, First Semester

The development of thought on the nature of the state and of individual rights and duties, based largely on readings of the chief political philosophers. 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.

HONORS WORK

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

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.

POLITICS AND LEGISLATION. Mr. Sonthoff.

A study of the political process: purposes of the state; the relation of the general welfare to special interests; public opinion; voters and electoral systems; parties and politicians; the functions and organization of the legislature.

PROBLEMS IN GOVERNMENT AND ADMINISTRATION. Mr. Ylvisaker.

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.

INTERNATIONAL RELATIONS AND ORGANIZATION. Mr. Wood.
First Semester

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.

AMERICAN FOREIGN POLICY. Mr. Wood. *Second Semester*

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

PUBLIC LAW AND JURISPRUDENCE. Mr. Pennock. *Second Semester*

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

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

PROFESSORS: WOLFGANG KÖHLER, *Research Professor of Philosophy,
and Psychology*

SOLOMON E. ASCH

ASSOCIATE PROFESSORS: RICHARD S. CRUTCHFIELD, * *Chairman*
WILLIAM C. H. PRENTICE, *Acting Chairman*
HANS WALLACH*

ASSISTANT PROFESSORS: CAROL F. CREEDON
HENRY GLEITMAN
BENBOW F. RITCHIE

INSTRUCTOR: PETER MADISON

The work of the Department of Psychology is concerned with the scientific study of human behavior and experience. This involves study of the basic processes of perception, learning, thinking and motivation, and the consideration of these processes in relation to psychological development of the individual, personality, and the social relations of the individual to other persons and to groups. For those students planning for graduate and professional work in psychology the courses and seminars of the department are designed to provide a sound basis of understanding of psychological principles and a grasp of research method. For other students the intention is to provide an orientation with respect to the nature of psychological inquiry and the foundations of the psychological approach to various problems encountered in study of the humanities, the social sciences and the life sciences.

REQUIREMENTS AND RECOMMENDATIONS

Courses 1 and 2 are prerequisite to all further courses and seminars in psychology. Course majors are required to take Courses 51, 52, and 53. Course 63 is recommended.

Honors majors are advised to take during their freshmen and sophomore years introductory work in zoology and/or physics, and, if possible, work beyond the introductory course in philosophy. A reading knowledge of German is useful but not required.

Courses in education—3, 12, 13—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, 3, 11, 12 and 13.

* Absent on leave, 1949-50.

Psychology

1. INTRODUCTION TO PSYCHOLOGY. Mr. Crutchfield, Mr. Prentice.
Each Semester

An introduction to the study of psychology, including a consideration of the nature of psychological inquiry and a brief review of the available facts and theories relevant to a scientific understanding of human behavior and experience. Technical aspects are subordinated to questions concerning motivation, personality and adjustment, although the emphasis throughout is theoretical rather than practical. Reading covers a standard textbook of psychology. Three lectures and one conference section per week.

2. PSYCHOLOGICAL METHODS. Mr. Gleitman, Mr. Ritchie. *Each Semester*

The main objective of this course is to develop in the student a critical and experimental attitude towards psychological problems. The content of the course includes: (1) a survey of the types of experimental designs, the methods of measurement, and the kinds of apparatus employed in different psychological studies, (2) an introduction to the concepts of descriptive statistics and sampling error theory, (3) an analysis of the historical background of selected contemporary theoretical problems, and (4) practice in the design of original experiments by the students with the aim of training them to sharpen psychological concepts by casting them into experimental form.

Prerequisite: Course 1.

51. COGNITIVE PROCESSES. Mr. Asch, Mr. Wallach. *First Semester*

Selected problems in perception, learning, and thinking are studied with the object of clarifying how we perceive the world, how we discover its properties and acquire mastery of them. The following topics are studied: The structured character of perceptual processes. The role of experience in perception. Formation of associations; memory and processes in the trace field. Cognitive processes in emotions. The process of discovery; conditions of productive thinking. The problem of transfer of training. Applications to teaching. Cognitive processes in the social field.

Prerequisites: Courses 1 and 2.

52. MOTIVATION. Mrs. Creedon, Mr. Madison, Mr. Ritchie. *First Semester*

Emphasis is upon the role of dynamic factors (drives, needs, values) in the determination of behavior. Consideration is given to the measurement of motives, the relationship between biological and psychological tension-systems, conflict, frustration, success and failure, reward and punishment. Evaluation of the theories of motivation of McDougall, Tolman, Lewin, Allport, Murray and Freud. Term paper or design of an original experiment is required.

Prerequisites: Courses 1 and 2.

53. EXPERIMENTAL PSYCHOLOGY. Mr. Gleitman, Mr. Prentice, Mr. Wallach.
Each Semester

A course in experimental thinking: how to conceive, design, and carry out original experiments on psychological problems. Instructor and students begin with a problem or problem-area and develop experimental attacks by group discussion. The actual experiments so designed are carried out by the students with supervision and are interpreted and evaluated by the group. Students present formal reports on each experiment. Class work, laboratories, and reports take ten to twelve hours per week.

Prerequisites: Courses 1, 2 and 51.

54. ANIMAL EXPERIMENTATION. Mr. Ritchie. *Second Semester*

A detailed analysis of selected contemporary experimental problems, leading to original experimental investigations carried out by the students with animal subjects. Meets as a weekly seminar during first half of term, and involves 6 hours of laboratory work per week during the remainder of the term.

Prerequisites: Courses 1 and 2.

55. CHILD PSYCHOLOGY. Mrs. Crendon. *Second Semester*

The development of the child from birth through adolescence, studied in terms of basic psychological principles. Important theories and practices of child-rearing are evaluated in the light of experimental and cross-cultural data. Topics include the significance of infantile and childhood experience on subsequent personality development, parent-child relationships, sibling rivalry, and the "behavior problems" which typically occur during the socialization process. One of the following is required: (1) acting as an assistant in a child-care center for approximately 20 hours, (2) an intensive study of a single child, (3) individual or group experimental or observational research, (4) a term paper.

Prerequisites: Courses 1 and 2.

56. SOCIAL PSYCHOLOGY. Mr. Asch, Mrs. Crendon. *Second Semester*

A study of some basic processes and products of interaction between persons, between persons and groups and between groups. The following topics are covered: The formation of the social field of the individual. Perception of persons as psychological entities. Perception of groups. Formation of the self; social relations of the self. Psychological forces supporting group-belonging. Functional consequences of group membership. The psychological investigation of group processes. Group requirements and group standards. Formation and change of attitudes.

Prerequisites: Courses 1 and 2.

57. PSYCHOLOGICAL TESTS AND MEASUREMENTS. Mrs. Crendon.
First Semester

Theory and measurement of intelligence and personality; a critical evaluation of psychological tests and testing methods. Administration of individual

and group tests of intelligence to preschool and older children, normal adults, mentally retarded individuals and aged persons. Scoring techniques and interpretation of test results with major emphasis on the Stanford-Binet and Wechsler-Bellevue scales. Assumptions underlying the design of paper and pencil tests of personality, tests of special abilities and vocational interests are examined. Texts: Terman & Merrill: *Measuring Intelligence*, Wechsler: *Measurement of Adult Intelligence*.

Prerequisites: Courses 1 and 2.

58. PSYCHOPATHOLOGY. Mr. Madison. *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 52.

59. PERSONALITY DYNAMICS AND DIAGNOSIS. *Second Semester*

A systematic approach to personality, including a survey and critique of such major theoretical positions as those of Freud, Jung, Adler, Horney, Fromm, McDougall and Murray. A consideration of the methods employed in the assessment of personality such as life history methods, the interview, standardized personality tests, association tests, projective techniques and situational tests.

Prerequisites: Courses 1, 2, 52, 57 and 58.

60. SYSTEMATIC PSYCHOLOGY. Mr. Köhler. *First Semester*

A study of recurrent problems of psychology, in historical perspective and in light of various systematic views. Restricted to psychology majors and qualified students of philosophy.

Prerequisites: Courses 1 and 2.

61-62. ADVANCED PSYCHOLOGICAL RESEARCH. The staff. *Each Semester*

Individual research on a selected original problem under the direction of a member of the department. Open only to psychology majors. Credit will be given for one semester; a second semester may be taken for credit at the discretion of the department.

Prerequisites: Courses 1, 2, 51 and 53.

63. PSYCHOLOGICAL TUTORIAL. The staff. *Second Semester*

Weekly seminar meeting of psychology course majors held in the second term of the senior year for the purposes of reviewing, integrating, and supplementing the student's course work in psychology. Open only to senior majors.

Education

3. INTRODUCTION TO EDUCATION. *First Semester*
A survey of the aims, organization and procedures of education, with some attempt to orient the study in the context of the philosophy and history of education; the opportunities and requirements in education as a profession. No prerequisites.
11. EDUCATIONAL PSYCHOLOGY. *Second Semester*
The application of psychological principles concerned with the processes of thinking, learning and motivation to the problems of education. Prerequisites: Courses 1, 2 and 3.
12. PRINCIPLES OF SECONDARY EDUCATION. (Not offered in 1949-50.)
First Semester
A study of the principles of secondary education, with emphasis upon aims and organization. Visits to nearby schools are made. Prerequisites: Courses 1, 2, 3 and 11.
13. TECHNIQUES OF SECONDARY EDUCATION. (Not offered in 1949-50.)
Second Semester
A review and critical analysis of the methods used in secondary education. Prerequisites: Courses 1, 2, 3, 11 and 12.

HONORS SEMINARS

PERCEPTION. Mr. Köhler, Mr. Prentice, Mr. Wallach.

Reading and discussion combined with independent experimental projects. The student is expected to know the basic facts about human perceptual mechanisms, particularly visual ones, by the time he has completed this seminar. Specific topics covered are: color vision, grouping and form, depth and distance, size, movement, influences of learning and of needs or attitudes, general theory of perception. When time permits, some attention is given to parallel problems in other senses.

LEARNING AND THINKING. Mr. Asch, Mr. Gleitman, Mr. Köhler,
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.

MOTIVATION. Mrs. Creedon, Mr. Crutchfield, Mr. Köhler, Mr. Madison,
Mr. Prentice, Mr. Ritchie, Mr. Wallach.

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

INDIVIDUAL IN SOCIETY. Mr. Asch, Mr. Crutchfield.

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

PERSONALITY. Mr. Asch, Mr. Madison.

A systematic approach to personality, including a survey and critique of such major theoretical positions as those of Freud, Jung, Adler, Horney, Fromm, McDougall and Murray. An examination of clinical and experimental evidence concerning personality, for example, experimental data on ego-involvement, clinical evidence of repression. A consideration of the methods employed in the assessment of personality such as life history methods, the interview, standardized personality tests, association tests, projective techniques, and situational tests.

LANGUAGE. (Not offered in 1949-50.)

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.

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.

THESIS. All members of the department.

May be presented as a substitute for one seminar, provided the student is doing major work in psychology with four seminars, and provided some member of the department is available to undertake the direction of the thesis.

MASTER'S DEGREE

A limited number of students may be accepted for graduate study toward the Master's degree in psychology. Students receiving the Bachelor's degree from Swarthmore are not normally eligible for this work.

The program of work for the Master's degree requires the completion of four seminars, or their equivalents. One of the seminars must be a research seminar leading to a Thesis. The work of the seminars is judged by external examiners. The requirements for the Master's degree can normally be completed in one year.

Romance Languages

PROFESSORS: HAROLD MARCH
EDITH PHILIPS, *Chairman*

ASSOCIATE PROFESSORS: JAMES D. SORBER
LEON WENCELIUS

ASSISTANT PROFESSOR: NEWELL BUSH

INSTRUCTOR: JOSÉ MIGUEL GONZÁLEZ

The Romance language department aims to give its majors a fairly comprehensive view of the literature and culture of the countries represented by these languages. In the elementary courses the emphasis is naturally on the language itself. In the advanced courses the emphasis is on the literature and progress in the language is a secondary aim.

French

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

French may be offered as a major or a 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:

- French 5-6 Introduction to Literature.
- French 11 Advanced Composition and Diction.

Recommended supporting subjects:

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

Majors are expected to speak French 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.

COURSES

1-2. ELEMENTARY FRENCH.

For students who begin French in College. Equivalent to two years' French in high school. The initial approach is oral but a foundation is laid for a reading knowledge. No credit is given for French 1 alone. Both courses offered each semester.

3-4. INTERMEDIATE FRENCH.

For students who have had French 1-2 or its equivalent (2 years' French in high school.) Students who have had three years in high school usually enter French 4. Grammar is reviewed. Reading is from contemporary literature in French editions without notes or vocabulary. Students are urged to use a French dictionary (Larousse) as well as French-English dictionaries

Every effort is made to help the student to increase his vocabulary and to discuss what he has read in the French language. (Both courses are offered each semester.)

5-6. INTRODUCTION TO LITERATURE.

In Course 5 the transition is made from regarding reading as an aid to language learning to the consideration of literary values. The material is selected from classics of the nineteenth century, but it is not a systematic survey course.

In Course 6 the treatment is more historical with selected readings in Larousse editions from Rabelais to Rousseau. (Both courses are offered each semester.)

11. ADVANCED COMPOSITION AND DICTION.

For those who intend to major in French or who wish an advanced course in which the emphasis is not primarily literary. An effort is made to correct faulty pronunciation and to improve self-expression in the language, both oral and written.

12. LE ROMAN AVANT 1800.

Starting with some examples to show the origins of the French novel in the romances of the middle ages, selected novels are read which show the development of the novel as an art form before the nineteenth century.

13. ROMAN MODERNE.

Representative novelists from Balzac to the present.

14. PROSE DE LA RENAISSANCE.

Readings from Rabelais, Calvin, Montaigne.

15. LA PENSÉE DU 17^e SIÈCLE.

Descartes, Pascal, La Rochefoucauld and other prose writers of the seventeenth century, their importance in the formation of French "classicism".

16. LES "PHILOSOPHES".

Montesquieu, Voltaire, Diderot and Rousseau; their contribution to the development of the ideas on art, literature and society which characterize the French eighteenth century.

17. THÉÂTRE CLASSIQUE.

The plays of Corneille, Racine and Molière and the growth of the classic ideal in French literature.

18. THÉÂTRE MODERNE.

The development of the French theater from the breaking down of the dominance of the classical ideal in the eighteenth century. Plays of Marivaux and Beaumarchais. Theories of Diderot. Characteristic examples of the theater of the nineteenth and twentieth centuries.

19. POÉSIE DE VILLON À LA FONTAINE.

Villon, Ronsard and the Renaissance poets. The influence of French classicism on lyric poetry.

20. POÉSIE MODERNE.
Baudelaire, the Symbolists, modern tendencies.
21. PROUST, GIDE AND VALÉRY.
The dominant writers of the early twentieth century. Novels and essays which illustrate their importance in contemporary literature.
22. SAINT-EXUPÉRY, MALRAUX, SARTRE, CAMUS.
Neo-humanism and contemporary tendencies.
51. SPECIAL TOPICS. (For senior majors.)
Readings selected to fit the needs of individual seniors and to supplement their selection of courses. Not designed to prepare for any specific type of comprehensive examination but to give an opportunity in the senior year for the student to see his courses in perspective and to see possible relationships with work in other fields.

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

HONORS SEMINARS

LA RENAISSANCE EN FRANCE.

Rabelais, Calvin, Montaigne, Ronsard et la Pléiade.

LE THÉÂTRE CLASSIQUE.

Corneille, Racine, Molière.

LES "PHILOSOPHES"

Montesquieu, Voltaire, Diderot, Rousseau.

BALZAC, STENDHAL, FLAUBERT.

PROUST, GIDE, VALÉRY.

POÉSIE MODERNE.

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

MOUVEMENT DES IDÉES.

Ideological background of modern literature with particular but not exclusive attention to the French.

ECRIVAINS POLITIQUES.

Political writers from Rousseau to Maurras and Blum who have been important for the influence of their ideas and the quality of their literary style.

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

Italian

Since few students enter with previous preparation in Italian, there is no system for placement. Any student who wishes advanced standing can arrange his status in conference with the instructor.

COURSES

1-2. ELEMENTARY ITALIAN.

A course aimed to give the student ability to read ordinary Italian with ease, and to write and speak simple Italian.

3. INTERMEDIATE ITALIAN.

First Semester

Grammar review and composition. Reading from modern literature.

4. INTERMEDIATE ITALIAN.

Readings from Dante's *Inferno*.

5-6. INTRODUCTION TO MODERN ITALIAN LITERATURE.

Representative texts of modern Italian writers.

Footnote:

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

There are no honors seminars in Italian.

Not more than one Italian course is usually offered in any given year and plans for the study of Italian should be carefully made in consultation with the department.

Spanish

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

Spanish may be offered as a major or a 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:

Spanish 5-6 Introduction to Literature.

Recommended supporting subjects:

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

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

COURSES

1-2. ELEMENTARY SPANISH.

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

3-4. INTERMEDIATE SPANISH.

For students who have had Spanish 1-2 or its equivalent (two years' in high school). Students who have had three years usually enter Spanish 4. Grammar is reviewed. Reading is from Spanish and South American literature with emphasis on increasing the student's vocabulary and his ability to discuss his reading in oral and written Spanish.

5-6. INTRODUCTION TO SPANISH LITERATURE.

Representative texts of modern Spanish and Latin American writers. Conducted in Spanish with frequent written work in Spanish.

11. ADVANCED COMPOSITION AND DICTION.

For majors and others who wish an advanced course in which the emphasis is not primarily literary. An effort is made to correct faulty pronunciation and to improve self expression in the language both oral and written.

12. LA NOVELA ESPAÑOLA DEL SIGLO XIX.

Outstanding novelists from Fernán Caballero to Blasco Ibañez.

13. EL PERÍODO ROMÁNTICO.

Plays, poems and novels of major Spanish writers of the first half of the nineteenth century.

14. LA NOVELA HISPANONAMERICANA.

Representative novelists from Mármol in Argentina to Revueltas in Mexico.

15-16. LAS OBRAS DE CERVANTES.

Novelas ejemplares. The *Quixote*. (A year course giving a thorough study of Cervantes. The first semester may stand alone.)

17. LA POESÍA HISPANOAMERICANA.

Some precursors of Modernism; Modernism; contemporaries.

18. SPECIAL TOPICS FOR SENIOR MAJORS.

Readings selected to fit the needs of seniors and to supplement their selection of courses. Not designed to prepare for any specific type of comprehensive examination, but to give an opportunity in the senior year for the student to see his courses in perspective and to see possible relationships to work in other fields.

SEMINARS

LA NOVELA HISPANOAMERICANA.

LA NOVELA ESPAÑOLA DEL SIGLO XIX.

LAS OBRAS DE CERVANTES.

EL PERÍODO ROMÁNTICO.

Footnote: While the titles of seminars in Spanish correspond to the titles of courses, honors students read more extensively both in the texts and critical work. The work of a seminar corresponds to that of two courses.

Russian Studies

The Russian Studies program, inaugurated in the fall of the 1949 at Bryn Mawr, Haverford and Swarthmore Colleges, has been made possible by a grant of \$105,000 from the Carnegie Corporation of New York. As a part of this program, Swarthmore will offer courses in the Russian language and in Russian history in 1949-50. In addition, it is hoped that at least one course exclusively devoted to the political and economic institutions of the U. S. S. R. will be offered in 1950-51.

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

RUSSIAN LANGUAGE

- 1-2 ELEMENTARY RUSSIAN. Miss Lamkert. *Full Course*
This course deals with the fundamentals of the Russian language, both written and spoken. Grammar, simple Russian prose and oral practice.
3. INTERMEDIATE RUSSIAN. Miss Lamkert. *Half Course*
Grammar review and composition. Reading in texts of average difficulty.
4. INTERMEDIATE RUSSIAN. Miss Lamkert. *Half Course*
A continuation of course 3. Literary and cultural material is included in the readings.

HISTORY

14. RUSSIA. Mr. von Laue. *Half Course*
The history of modern Russia. For sophomores, juniors and seniors. The course begins with the reign of Peter and gives half its time to the period since the Revolution. It may be taken only after History 1-2.

Zoology

PROFESSOR: ROBERT K. ENDERS, *Chairman*

ASSOCIATE PROFESSORS: WALTER J. SCOTT
NEAL A. WEBER

ASSISTANT PROFESSORS: LAUNCE J. FLEMISTER
JAE L. LITTBRELL
NORMAN A. MEINKOTH

INSTRUCTOR: SARAH C. FLEMISTER

Through its elementary course the Department of Zoology introduces the student to the fundamental properties of protoplasm and the systematic classification of animals with particular emphasis on the structural features as related to habitat and mode of life.

Following this broad review of the animal kingdom, the material is taken up in two different ways: first, specific aspects of the broad subjects are treated in a comparative manner as in Anatomy and Physiology; second, broader aspects of a specific subject are treated as in Entomology, Parasitology and Embryology.

The structural and functional consideration is extended to include problems of interdependence of animals in the structure and function of an animal society and the influence of physical, chemical and biological factors in the survival of that society.

REQUIREMENTS FOR MAJORS AND MINORS

Students in course with a major in Zoology should complete during four years the following: two courses in chemistry, one course in physics, one course in mathematics and two courses in a modern language (German preferred, although two courses in French will be acceptable), and four courses in Zoology. Genetics or advanced botany may be substituted for one advanced zoology course.

The student should complete in the first two years the required chemistry, physics, mathematics, language, and three half courses in Biology and Zoology.

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

Students in course with a minor in Zoology must complete six half courses in Biology and Zoology.

1-2. GENERAL BIOLOGY. Mr. Enders, Mrs. Flemister, Mr. Livingston.

Full Course

An introduction to the study of living things. A consideration of the properties of protoplasm and the structure of the cell; a brief survey of living forms both plant and animal. The methods by which animals and plants maintain themselves, grow and reproduce, and a discussion of the mechanism of heredity. Some time will be devoted to the interrelationships of plants and animals in communities, and the place of man in the whole structure. Evidence for and against theories of evolution will be discussed. Two lectures and one discussion period, one three-hour laboratory per week.

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

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

12. 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: 1-2 General Biology.

51. HISTOLOGY. Miss Littrell. *Half Course*

This course consists of a detailed study of the microscopic structure of vertebrate tissues, together with the functions of such tissues. In the laboratory the student examines both prepared and living material, and becomes familiar with the principles of microtechniques. Three lectures and two laboratory periods per week.
Prerequisites: 1-2 General Biology.

52. EMBRYOLOGY. Miss Littrell. *Half Course*

A study of development of vertebrate anatomy. The lectures are concerned with an investigation of the events which precede development, an analysis of the development processes, and a brief survey of the contributions of the field of experimental embryology. Laboratory periods are devoted to the embryology of the frog, chick and pig. Three lectures and two laboratory periods per week.
Prerequisites: 1-2 General Biology.

53. ENTOMOLOGY. Mr. Weber. *Half Course*

The study of insects and their relatives, their morphological and physiological adaptations and their effect on man. Each student will prepare a study collection from field trips.

54. BIOLOGY OF PARASITISM. Mr. Meinkoth. *Half Course*

A consideration of parasitology with reference to evolution and adaptation to the parasitic habit. Surveys are made of parasites in native animals. Classification, life cycles and epidemiology are reviewed.
Prerequisites: 11 Comparative Vertebrate Anatomy and junior standing.

55. FIELD ZOOLOGY. Mr. Weber. *Half Course*

Emphasis is on the living animals as they occur in nature, their systematics, relationships to the environment, habits and distribution. Most of the work will be done on field trips.

56. **INVERTEBRATE ZOOLOGY.** Mr. Meinkoth. *Half Course*
 A course designed to acquaint the student with the fundamental morphology, classification, phylogeny and special problems of the invertebrate phyla. Three lectures and two laboratories per week. Occasional field trips.
 Prerequisite: 11 Comparative Vertebrate Anatomy.
57. **COMPARATIVE PHYSIOLOGY.** Mr. Flemister. *Half Course*
 A course of lectures and laboratory experiments treating functional processes from the standpoint of adaptation of the animal to its environment. These processes in representative animals are compared in order to follow their elaboration from the more general to the more specialized. Two lectures, one conference and two laboratory periods per week.
 Prerequisites: Comparative Anatomy and Organic Chemistry. Offered in Fall term.
58. **PHYSIOLOGICAL ECOLOGY.** Mr. Flemister. *Half Course*
 A course of lectures, discussions and laboratory experiments concerning the physiological adaptations of representative animals to environmental stress. Requirements and availability of optimum conditions of temperature, oxygen, foodstuffs and the maintenance of ionic independence are critically appraised. More than half of the laboratory work is done in the field. Two lectures, one conference and two laboratory periods per week.
 Prerequisite: 57 Comparative Physiology. Offered Spring term of even years.
59. **NEURO-ANATOMY.** Mr. Scott. *Half Course*
 This course is planned to give an account of the structure and something of the functioning of the central nervous system of man. In the discussions special attention is given where possible to consideration of the comparative features of the evolution of the central nervous system. One laboratory period and one three-hour conference per week.
 Prerequisites: Comparative Anatomy and Physiology.
61. **BIOLOGY OF THE VERTEBRATES.** Mr. Enders. *Half Course*
 A course designed to integrate the student's 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.
- 63-64. **SPECIAL TOPICS.** Staff. *Full or Half Course*
 For advanced students. Open to those who, on account of fitness, have arranged a program of special work in the department.

HONORS WORK

A student with a major in zoology and a minor in chemistry, or a minor in chemistry and physics must complete in the first two years the following: three half courses in zoology (including 1-2), two courses in chemistry, one course in mathematics (11 and 12 required for advanced chemistry and physics) and two courses in German (preferred) or French. Honors students majoring in zoology normally take four seminars in zoology, with the remaining seminars usually in botany, chemistry, physics, mathematics and psychology.

Prerequisites for students in the honors curriculum with a minor in zoology consists of three half courses in biology and zoology (including 1-2). In addition, seminars in physiology require one course in physics and chemistry through organic chemistry.

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

BIOLOGY OF PARASITISM. Mr. Meinkoth.

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

CYTOLOGY. Miss Littrell.

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

EMBRYOLOGY. Mr. Enders or Miss Littrell.

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

PHYSIOLOGY (for Zoology Majors). Mr. Flemister.

An intensive consideration of the physical and chemical phenomena underlying the function of animals. A comparative approach is maintained in order to consider the progression from more general to the more specialized adjustments, acclimatizations and adaptations of animals to physical, chemical and biological stresses in the environment. The terminal portion of the laboratory program is devoted to the pursuit of original, independent work by the student. Prerequisites for this seminar are courses in Comparative Anatomy and Organic Chemistry. One afternoon of discussion and one full day in the laboratory per week. Offered in the Fall term.

PHYSIOLOGY (for non-Zoology Majors). Mr. Flemister.

A general consideration of the functional processes in animals with emphasis placed on mammals and other vertebrates. The aspects of adaptation of the animal to environmental stress are treated in such a way as to serve the individual student's area of concentration. A portion of the laboratory program is devoted to original, independent investigation on a specific problem of interest to the student. In preparation an introductory course in Zoology is desirable. One afternoon of discussion and one full day in the laboratory per week. Offered in the Spring term of alternate years.

SPECIAL TOPICS. The Staff.

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

REFERENCE SECTION

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

Visiting Honors Examiners — May 1949

- BOTANY:** DR. PHILIP R. WHITE, *Institute for Cancer Research.*
- CHEMISTRY:** PROFESSOR ERNST BERLINER, *Bryn Mawr College;*
PROFESSOR EDWARD HAENISCH, *Villanova College.*
- ECONOMICS:** PROFESSOR EMILE DESPRES, *Williams College;* PROFESSOR FRITZ MACHLUP, *Johns Hopkins University;* DR. ROBERT B. WARREN, *The Institute for Advanced Study.*
- ENGINEERING:** PROFESSOR WALTER JOHNSON, *Princeton University;*
PROFESSOR ROY F. LINSENMEYER, *Swarthmore College;* PROFESSOR WILLIAM E. WOOD, *Swarthmore College.*
- ENGLISH:** PROFESSOR WALLACE A. BACON, *Northwestern University;*
PROFESSOR CARLOS BAKER, *Princeton University;* PROFESSOR ROBERT E. SPILLER, *University of Pennsylvania.*
- FINE ARTS:** PROFESSOR HELMUT VON ERFFA, *Rutgers University.*
- HISTORY:** PROFESSOR J. B. BREBNER, *Columbia University;* PROFESSOR JOHN L. LA MONTE, *University of Pennsylvania;* PROFESSOR ELTING E. MORISON, *Massachusetts Institute of Technology;* PROFESSOR HENRY L. ROBERTS, *Columbia University;* PROFESSOR FRED V. CAHILL, JR., *Yale University.*
- MATHEMATICS & ASTRONOMY:** PROFESSOR HANS RADEMACHER, *University of Pennsylvania;* PROFESSOR JAN SCHILT, *Rutherford Observatory, Columbia University;* PROFESSOR A. W. TUCKER, *Princeton University.*
- PHILOSOPHY:** PROFESSOR MAURICE MANDELBAUM, *Dartmouth College;* PROFESSOR ERNEST NAGEL, *Columbia University;* PROFESSOR LEDGER WOOD, *Princeton University.*
- PHYSICS:** PROFESSOR FRANZO H. CRAWFORD, *Williams College;* PROFESSOR WILLIAM F. STEPHENS, *University of Pennsylvania.*
- POLITICAL SCIENCE:** PROFESSOR FRED V. CAHILL, JR., *Yale University;* DEAN JOHN H. FERGUSON, *The New School for Social Research;* DR. G. BERNARD NOBLE, *Department of State.*
- PSYCHOLOGY:** PROFESSOR TAMARA DEMBO, *The New School for Social Research;* DR. EUGENIA HANFMANN, *Harvard University;* PROFESSOR ROBERT W. LEEPER, *University of Oregon;* DR. HELEN BLOCK LEWIS, *The New School for Social Research;* PROFESSOR FILLMORE SANFORD, *Haverford College;* PROFESSOR HEINZ WERNER, *Clark University.*

ROMANCE LANGUAGES: PROFESSOR CARLOS CLAVERIA, *University of Pennsylvania*; PROFESSOR WILBUR M. FROHOCK, *Columbia University*.

ZOOLOGY: PROFESSOR DAVID W. BISHOP, *University of Massachusetts*; PROFESSOR GEORGE L. GRAHAM, *School of Veterinary Medicine, University of Pennsylvania*; PROFESSOR FREDERICK H. MCCUTCHEON, *School of Veterinary Medicine, University of Pennsylvania*.

Degrees Conferred

January 30, 1949

BACHELOR OF ARTS

In the Division of the Humanities

| | |
|--|---------------------------------------|
| *ROBERT GILBERT HANEY (History) | MARGARET LOUISE MACLAREN (Psychology) |
| ROBERT WARREN HILLEGASS (English) | JEAN MICHENER NICHOLSON (English) |
| THOMAS VICTOR HODGES, JR. (Psychology) | EDWARD BURNS SHAW, JR. (English) |
| NORMAN LLOYD HOULBERG (Spanish) | PAUL VICTOR WILSON (Philosophy) |

In the Division of the Social Sciences

| | |
|---|---|
| GEORGE ALLEN BARNWELL (Political Science) | *DONALD GLUCK OYLER (Political Science) |
| CHARLES BRADFIELD BODINE (History) | RICHARD KLEIN SCHOEPPERLE (Economics) |
| PHILIP MORGAN DRURY (Economics) | ROBERT JULES ROSSHEIM (Economics) |
| DONALD JAY GORDON (Political Science) | DOUGLAS ROBERT SPITZ (History) |
| WILLIAM JAMES HIRSCH (Economics) | *ANDREW WARREN WEIL (Political Science) |
| ANN WINSOR KILLOUGH (Economics) | *LAWRENCE ASH YEARSLEY (Economics) |

* As of June 6, 1948.

In the Division of Mathematics and the Natural Sciences

JOSEPH CARLYLE D'ANNUNZIO
(Psychology)
GEORGE DUDLEY, JR. (Mathematics)

CHARLOTTE LOUISE GARCEAU
(Mathematics & Astronomy)
*GEORGE RICHARDSON LEDERER
(Mathematics)

BACHELOR OF SCIENCE

In the Division of Engineering

GERALD ERNEST ACHTERMANN
(Mechanical Engineering)
MURRAY GRIEVE ALBERTSON
(Civil Engineering)
NORMAN WILLIAM BAKER (Civil
Engineering)
ROBERT BURKE BENHAM (Mechanical
Engineering)
JOHN BRIERLEY BLOSE (Electrical
Engineering)
EDWARD ALLEN BURROUGHS, JR.
(Civil Engineering)
ROBERT T. COLYER (Mechanical
Engineering)
WALTER COSINUKE (Mechanical
Engineering)
ROBERT FRANK FREMONT, JR.
(Mechanical Engineering)

REX INGLIS GARY, JR. (Electrical
Engineering)
CHARLES JOHN HESNER (Electrical
Engineering)
ARTHUR LINCOLN KAPLAN (Electrical
Engineering)
ARNOLD IRVING KRELL (Electrical
Engineering)
WILLIAM MCKAY MOORE (Electrical
Engineering)
CHARLES LEWIS STARBUCK (Mechanical
Engineering)
HENRY EDWARD TEMPLE (Mechanical
Engineering)
DAVID RUTTER WORK (Mechanical
Engineering)

* As of June 6, 1948.

Degrees Conferred

June 6, 1949

BACHELOR OF ARTS

In the Division of Humanities

- ROBERT MARTIN AMUSSEN (English)
- JEAN MARION ASHMEAD (*High Honors*—French)
- JAMES KENDALL BLAKE (English)
- EDMUND ADDISON BOWLES (Music)
- ROBERT BRENTANO (*Highest Honors*—History)
- JOANN BROADHURST (History)
- DORIS JEANETTE CAMPBELL (English)
- WALTER LEO CAREL (*Honors*—Psychology)
- JANE MORFOOT CHAPMAN (English)
- JOHN HOLT CLANEY (English)
- ALICE BROADUS CLIFFORD (Psychology)
- HARRIET R. COHEN (*Honors*—Psychology)
- FORREST STARR COMPTON (English)
- CHARLES MAXMILLIAN CONVER (History)
- LLOYD RUTHERFORD CRAIGHILL, JR. (Philosophy)
- NANCY CLAIRE CROFT (English)
- JANET CRUM (Psychology)
- JOAN LYNNE DAVIS (*High Honors*—Spanish)
- WALTER S. R. DICKINSON, JR. (*High Honors*—English)
- SELMA JANE EBLE (Psychology)
- MARY BUNTING FALLIN (Psychology)
- MARY JEAN FINCH (History)
- RUTH FRIEDENTHAL (Psychology)
- DAVID C. GRIER (*High Honors*—English)
- SARA MARGARET GWYNN (English)
- RACHEL DIANA THIES HARE (Psychology)
- CHARLES ALLAN HERNDON, JR. (English)
- ALICE HEYROTH (History)
- LESTER CALLOWAY HUNT, JR. (History)
- ATHALIA CRAWFORD JAMISON (English)
- JOHN STEWART JOHNSON (*Honors*—English)
- EVA FRIEDA KOCH (*High Honors*—Romance Languages)
- ELIZABETH ALBRIGHT KSCHINKA (English)
- ELEANOR MAIE LACY (*Honors*—Psychology)
- BARBARA EDITH LEA (English)
- JOAN LEVINO (Fine Arts)
- JOHN HALSEY LIRIO (French)
- SUSAN MEHRER LURIE (*High Honors*—Psychology)
- DOROTHY LOUISE MCCLOSKEY (History)

- GENE ELTON McCORMICK (*Honors—English*)
 ORVILLE GEORGE McMILLAN (English)
 WILLIAM H. MATCHETT (*Highest Honors—English*)
 SARA-PAGE MERRITT (Psychology)
 ELLEN HOPE MEYER (*Honors—English*)
 BARBARA HOLLY MULLER (Latin)
 JAMES AKIN NAISMITH (English)
 BARBARA ANN NELSON (German)
 PAMELA MADELEINE NORRIS (English)
 MARALYN ROSE ORBISON (English)
 THOMAS FRANZ ALFRED PLAUT (*High Honors—Psychology*)
 JOHN MARSHALL PRATT (English)
 DAVID COLEMAN REDDING (English)
 LAURA GWENDOLYN REPPERT (English)
 GORDON HINSEY ROWE, JR. (*Honors—Philosophy*)
- MARIE GABRIELLE STAUB (*High Honors—English*)
 ANN STEWART (English)
 GEORGE AUSTIN TEST (English)
 GEORGE FRANKLIN TOWNES (German)
 CATHERINE TRUMAN UNDERHILL (Spanish)
 LAWRENCE WEISKRANTZ (*Highest Honors—Psychology*)
 MARGARET SPENCER WHITE (French)
 RUTH MARIE WILCOX (Psychology)
 JOAN UPPINGTON WILLIAMS (Psychology)
 ANDREA WOLF (History)
 JULIA MAY WOLF (English)
 KATHRYN LORETTA WOLFE (English)
 JUDITH CHARMIAN WOLFSON (Psychology)
 SARAH CADWALLADER WOOD (French)

In the Division of the Social Sciences

- ELIZABETH ANN ALDERFER (Psychology)
 ROBERT NELSON ALFANDRE (History)
 ROLF OTTO AMANN (Economics)
 WILLIAM DAUGHETY AMIS (Psychology)
 DAVID EVERETT ARMINGTON (*High Honors—Political Science*)
 WINSTON SHERMAN BAILEY (Economics)
 STEPHEN FRANCIS BARKER (*Highest Honors—Philosophy*)
- DAVID CROMWELL BEARDSLEE (*Highest Honors—Psychology*)
 BARBARA ANNE BEEBE (*High Honors—Economics*)
 ROGER BIRDSSELL, JR. (*Honors—History*)
 ROBERT CHARLES BLEKE (Psychology)
 THEODORE RALPH BROMWELL (*Honors—History*)
 MILES JANNEY BROWN (Economics)
 PRISCILLA BUCK (Economics)

- EDWIN MONROE BUSH, JR. (Economics)
- DAVID MARK CHALMERS (*High Honors—History*)
- JOHN HORNER CHAPMAN (Economics)
- GEORGE LI-SENG CHEN (*Honors—History*)
- ROBERT A. CHRISTIE (*Honors—History*)
- EDWARD MANSFIELD CLARK (Economics)
- ANN THACHER CLARKE (*High Honors—Philosophy*)
- WILLIAM ANDERSON CLARKE, JR. (Economics)
- SAMUEL HAMILTON DAY, JR. (*High Honors—Political Science*)
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- JAMES MORGAN DOLLIVER (*High Honors—Political Science*)
- CORINNE JENNIFER EDWARDS (History)
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- LOIS LAEL KELLY (Political Science)
- JOHN IRVING KENNEDY (*High Honors—Philosophy*)
- JOYCE BALDWIN KIDDER (*Highest Honors—History*)
- MORTON COWLING KIMBALL (History)
- RICHARD WILLIAM KIRSCHNER (*High Honors—Political Science*)
- JOHN LADD (*High Honors—Political Science*)
- BETTY Jo LARSH (Psychology)
- GEORGE WILLIAM LLOYD (Economics)
- RICHARD PANCOAST LONGAKER (Political Science)
- THOMAS BAYARD McCABE, JR. (Economics)
- ROBERT LESLIE MCCOY, JR. (*Honors—Economics*)
- WILLIAM JAMES McMILLAN (*Highest Honors—History*)
- FRANK ARNOLD MILLER (*Honors—History*)
- BLAIR ALEXANDER MOFFETT (Political Science)
- JAMES ARTHUR MUMPER (Political Science)

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|--|---|
| EDWIN GEORGE NICHOLSON (History) | WARREN CLARKE SKIPP (History) |
| MARY CUSHING NILES (<i>High Honors</i> —Political Science) | WILLIAM JOHN SPANGLER (History) |
| ROBERT HENRY PARKS (Economics) | RICHARD ARTHUR SPIERLING (History) |
| EDWARD BETTS PERKINS (Economics) | GAVIN P. SPOFFORD (Economics) |
| DAVID S. POLLEN (Political Science) | CHALMERS CLARK STROUP, JR. (History) |
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| RUTH LOUISE PRETZAT (Economics) | PAUL BARTON TRECOTT (<i>Highest Honors</i> —History) |
| FREMONT GOEFFERT REDFIELD (Economics) | LISBETH ROSA WERTHEIMER (<i>High Honors</i> —Psychology) |
| ALAN LEE REINSTEIN (<i>High Honors</i> —Political Science) | WILLIAM HENRY WILL (Political Science) |
| EDWARD RIVLIN (Political Science) | THEODORE PAUL WRIGHT, JR. (<i>High Honors</i> —Political Science) |
| KAY IRIS ROPP (History) | HERSCH LIEB ZITT (History) |
| WILLIAM MARKHAM SELDEN (Political Science) | |

In the Division of Mathematics and the Natural Sciences

| | |
|--|---|
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| WALTER EDWIN AHRENS (Zoology) | ARDEN F. CORDRAY (Mathematics) |
| JANET LOWE ANDERSON (Zoology) | EDWIN WALTER DENNISON (Mathematics) |
| DANIEL NEWSON BESHERS (<i>Honors</i> —Mathematics) | DANIEL PAUL DETWILER (Physics) |
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| JOHN WELLS BRACE (Mathematics) | JOANNE ELLEN DONOVAN (Zoology) |
| KATHERINE BURT (Mathematics) | JACQUES ROBERT JOUSSOT DUBIEN (Chemistry) |
| CHARLES MEIGS BUSH (Zoology) | ERNST EPSTEIN (Chemistry) |
| GEORGE WILLIAM CAROW (Mathematics) | HANS E. JOHN FEIGL (Biology) |
| | RICHARD STUART GREEN (<i>High Honors</i> —Zoology) |

- JEANNETTE LOUISE HAAS
(Mathematics)
- ERIC GUSTAV HEINEMANN (*High Honors—Psychology*)
- RICHARD HENRY HOFFMAN
(Mathematics)
- ALFRED CURTIS HUNTING
(*Honors—Physics*)
- WILMER ATKINSON JENKINS, II
(*High Honors—Chemistry*)
- GLORIA LANE (Zoology)
- WALTER HESS LESER (*High Honors—Mathematics*)
- CARL ANSELL LEVINSON (*High Honors—Physics*)
- WILLIAM LEWIS LICHTEN
(*High Honors—Physics*)
- ANNE DILLARD McLAREN
(Chemistry)
- PAUL CHRISTOPH MANGELSDORF,
JR. (*High Honors—Mathematics*)
- MARJORIE LOUISE MERWIN
(Mathematics)
- JOHN LOGAN NEED (*High Honors—Physics*)
- ROBERT ZANE NORMAN (*Honors—Mathematics*)
- DEAN PEABODY (*High Honors—Psychology*)
- JORDAN BERNARD RABIN (*Honors—Mathematics*)
- LOUIS NATHAN RASHIN (*High Honors—Philosophy*)
- WALTER WOODWARD SANVILLE
(*Honors—Physics*)
- KATHLEEN MORRIS SCOTT
(Zoology)
- JOEL LAWRENCE SINER (*Honors—Zoology*)
- RUTH REBECCA STRUIK (*High Honors—Mathematics*)
- JOYCE CONOVER SUTHERLAND
(Zoology)
- CHARLES EARL TAYLOR, JR.
(Zoology)
- ROBERT HUGH TAYLOR, JR.
(Mathematics)
- MARGARET ANN THOMSON
(Zoology)
- SAMUEL JUDAH TODES
(Psychology)
- GERTRUDE ELIZABETH UREY
(*High Honors—Mathematics*)
- HEINZ VALTIN (Zoology)
- KAI-CHUNG MAURICE WAN
(Zoology)
- LEE GRANT WENTLING, JR.
(Mathematics)
- BETTY LEE WHITE
(Mathematics)
- DOUWE BUSEY YNTEMA (Physics)

BACHELOR OF SCIENCE

In the Division of Engineering

- ROBERT OTIS BROWN (Mechanical Engineering)
- WILLIAM LINDSAY CORNOG, JR.
(Civil Engineering)
- HERBERT SHALOM DORDICK
(Electrical Engineering)
- JOHN WYMAN FISKE (Electrical Engineering)
- BUCKLEY R. GARRETT (Civil Engineering)
- JANE MASSON GROSS (Electrical Engineering)

HOWARD SOTHORON GILLIAMS
(Civil Engineering)
WILLIAM HUNTER, JR.
(Mechanical Engineering)
WILLIAM BATES JAMESON (Civil
Engineering)
CLEM MYRON KASHMAR
(Electrical Engineering)
PHILIP NESSEN KNISKERN
(Electrical Engineering)
ROY FREDERICK KNUDSEN
(Electrical Engineering)
JOHN BRAMPTON KOELLE
(Electrical Engineering)
FREDERICK WILLIAM LEHMAN
(Mechanical Engineering)
FRANK JOHN LUDEMANN
(Electrical Engineering)
STEPHEN MUCHA (Mechanical
Engineering)
CARL GERHARD MUELLER
(Mechanical Engineering)
ALBERT THOMAS MURRI
(Mechanical Engineering)

THOMAS GILBERT NICHOLS
(Electrical Engineering)
CHRISTIAN HARALD PEDERSEN
(Mechanical Engineering)
HOWARD Y. PENNELL
(Electrical Engineering)
THOMAS ROBINSON SAUNDERS
(Mechanical Engineering)
DAVID PURDY SCHOFIELD (Civil
Engineering)
WILLIAM CHARLES SCHWEIKLE
(Mechanical Engineering)
JACKSON TAYLOR (Civil
Engineering)
LARS O. ULFSPARRE (Electrical
Engineering)
THOMAS PETER VILUSHIS
(Electrical Engineering)
RICHARD WARE WALKLING
(Electrical Engineering)
DAVID K. WITHEFORD (Civil
Engineering)
LEO GEORGE WOERNER, JR. (*Hon-
ors*—Electrical Engineering)

MASTER OF ARTS

SHIRLEY HECKHEIMER HEINEMANN ALEXANDER WEISZ (Psychology)
(Psychology)

Geographical Distribution of Students

1949-1950

| | | | |
|-------------------------------|-----|-------------------------------|----|
| Pennsylvania | 293 | Germany | 7 |
| New York | 209 | Brazil | 4 |
| New Jersey | 88 | China | 3 |
| Massachusetts | 49 | England | 4 |
| Illinois | 40 | Netherlands | 3 |
| Maryland | 35 | Australia | 2 |
| Ohio | 22 | Hawaii | 2 |
| Connecticut | 20 | Japan | 2 |
| District of Columbia | 15 | Venezuela | 2 |
| California | 16 | Colombia | 1 |
| Indiana | 11 | France | 1 |
| Michigan | 9 | Greece | 1 |
| Virginia | 9 | Italy | 1 |
| Florida | 8 | Kenya | 1 |
| West Virginia | 8 | Lebanon | 1 |
| Wisconsin | 8 | Netherlands West Indies | 1 |
| Missouri | 7 | Norway | 1 |
| Delaware | 6 | Palestine | 1 |
| Minnesota | 6 | Puerto Rico | 1 |
| Colorado | 6 | Roumania | 1 |
| North Carolina | 5 | Syria | 1 |
| New Hampshire | 4 | Wales | 1 |
| Iowa | 4 | | |
| Washington | 4 | Total of others | 42 |
| Kentucky | 3 | | |
| Nebraska | 3 | | |
| South Dakota | 3 | | |
| Alabama | 3 | | |
| Georgia | 2 | | |
| Louisiana | 2 | | |
| Maine | 2 | | |
| Rhode Island | 2 | | |
| Tennessee | 2 | | |
| Vermont | 2 | | |
| South Carolina | 2 | | |
| Montana | 1 | | |
| Oregon | 1 | | |
| New Mexico | 1 | | |
| Oklahoma | 1 | | |
| Total of U. S. students | 911 | | |
| Grand Total | 953 | | |

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1939-1949

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Beardsley Hall
Benjamin West House
Biddle Memorial Library
Bond Memorial
Chemistry, Hall of
Faculty Residences
Field House
Hall Gymnasium
Hicks Hall
Isaac H. Clothier Memorial
Library Building
Martin (Edward) Biological
Laboratory
Meeting House
Palmer Hall
Pittenger Hall
Parrish Hall
Roberts Hall
Scott (Arthur Hoyt) Outdoor
Auditorium
Somerville Hall (Gymnasium for
Women)
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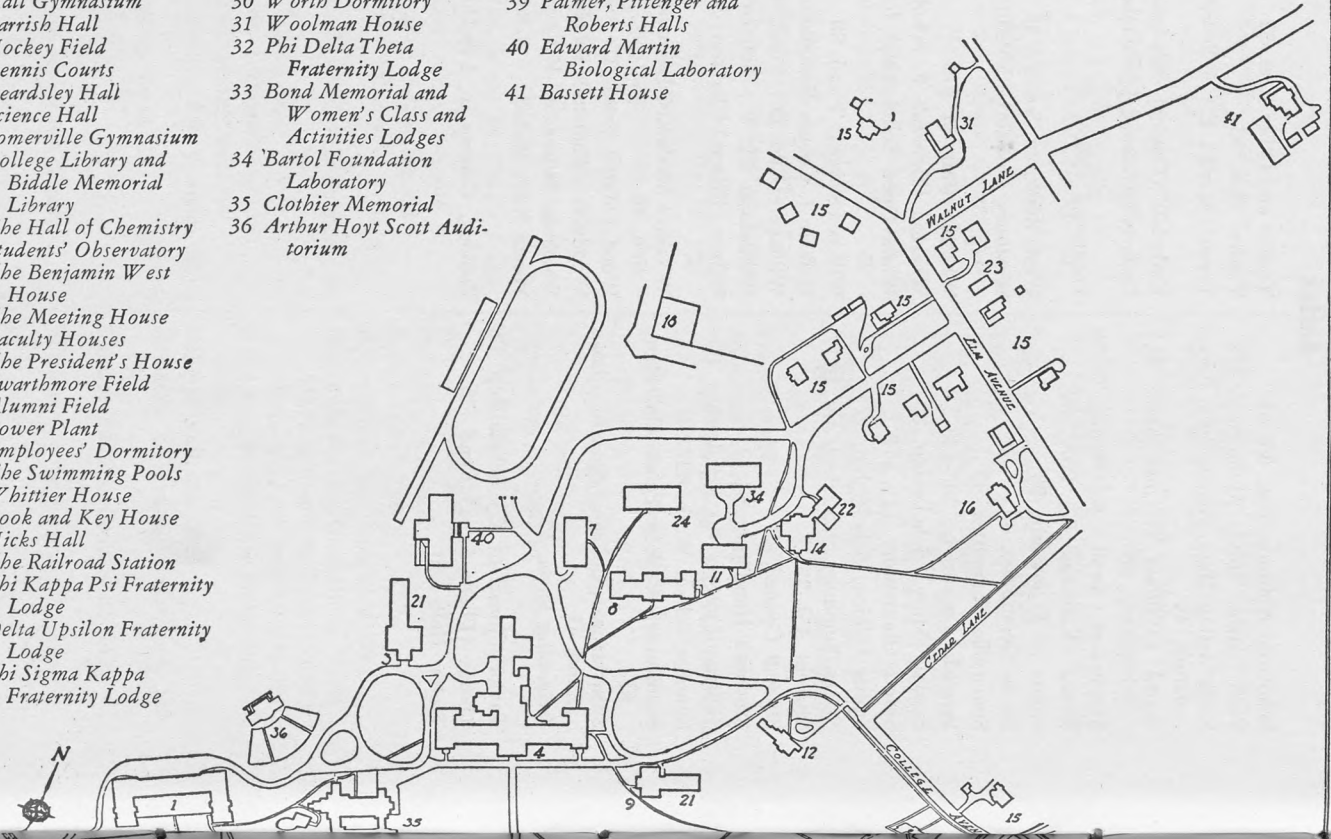
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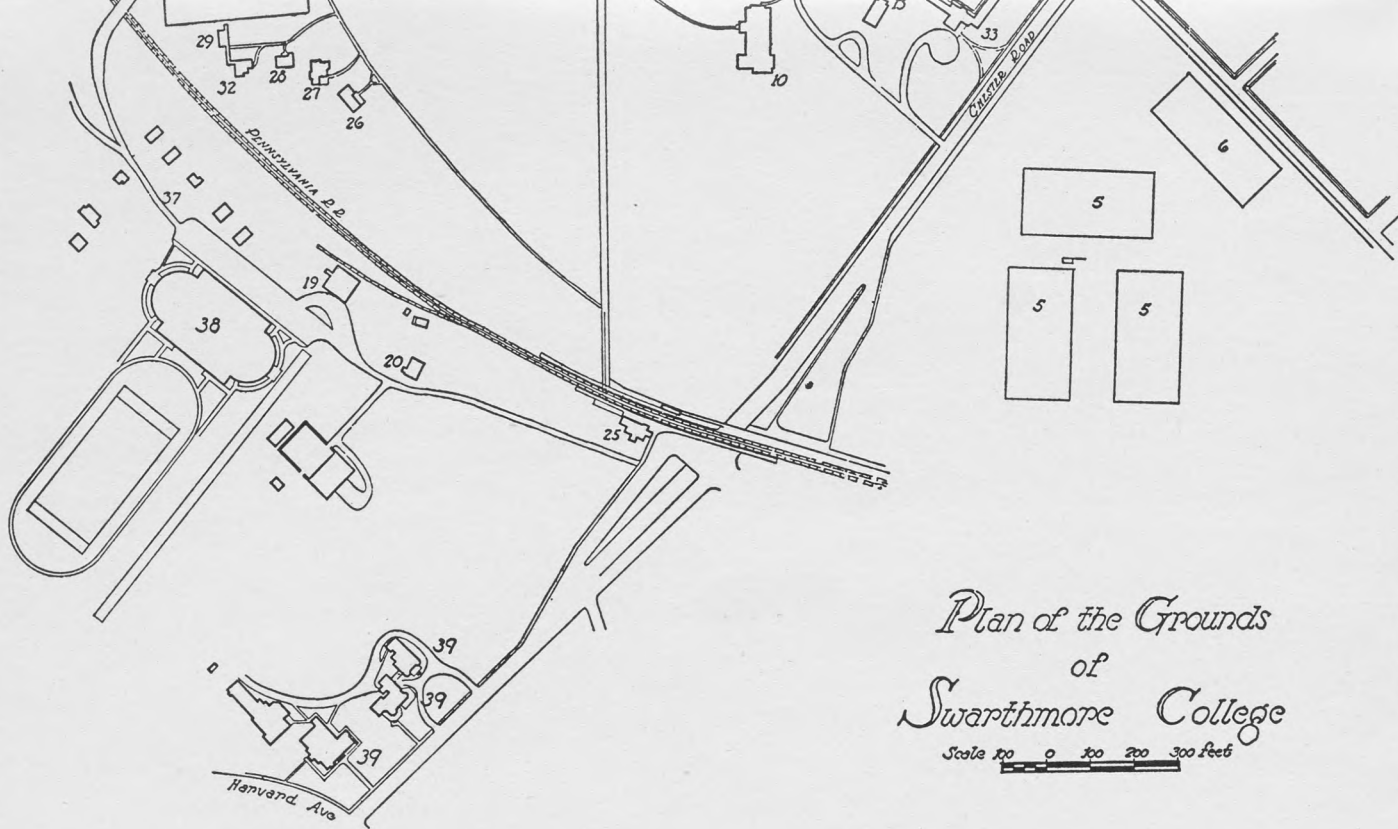
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*Plan of the Grounds
of
Swarthmore College*

Scale 100 0 100 200 300 feet