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SWARTHMORE COLLEGE BULLETIN

CATALOGUE
1951-1952



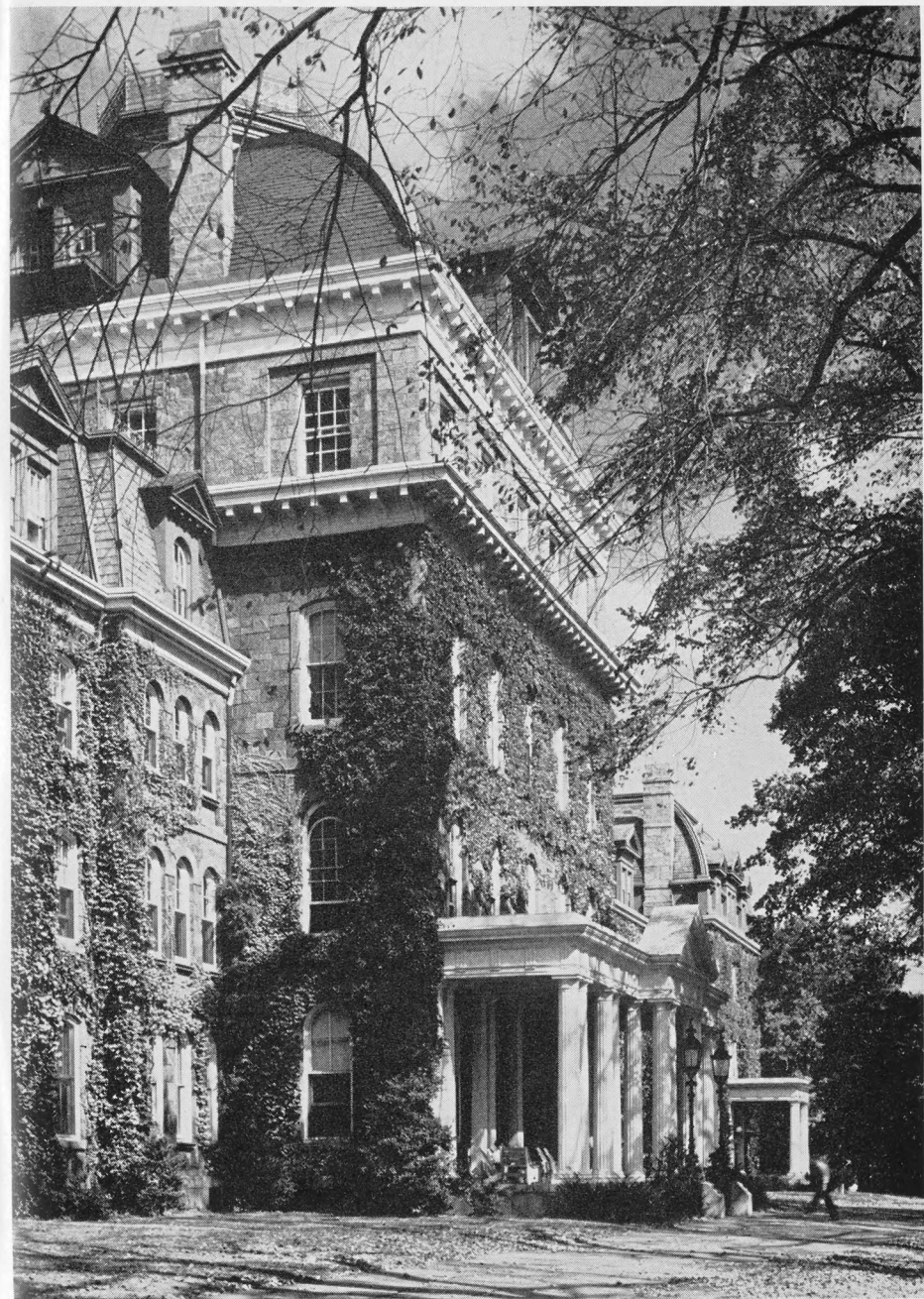
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SWARTHMORE COLLEGE
BULLETIN

CATALOGUE
1951-1952

SWARTHMORE, PENNSYLVANIA

Volume XLIX Number 1 Ninth Month, 1951

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Table of Contents

	PAGE
CALENDAR	4
PERSONNEL	7
The Corporation and The Board of Managers	8
Alumni Association Officers and Alumni Council	10
The Faculty	11
Divisions and Departments	17
Standing Committees	18
Administrative Officers and Assistants	19
Honorary Curators of the Biddle Memorial Library	21
INTRODUCTION TO SWARTHMORE COLLEGE	23
Admission	28
Expenses	31
Student Aid and Scholarships	33
Educational Resources	40
College Life	44
Student Community	47
THE EDUCATIONAL PROGRAM	49
Program for Freshmen and Sophomores	51
Program for Juniors and Seniors	53
Honors Work	54
Pre-Medical Program	57
Faculty Regulations	57
Requirements for Graduation	60
Advanced Degrees	60
Awards and Prizes	62
Fellowships	63
COURSES OF INSTRUCTION	65
Biology	66
Chemistry	72
Classics	77
Economics	81
Engineering	84
English Literature	95
Fine Arts	100
History	103
International Relations	107
Mathematics and Astronomy	108
Modern Languages and Literature	114
Music	122
Philosophy and Religion	124
Physical Education for Men	128
Physical Education for Women	129
Physics	131
Political Science	133
Psychology and Education	137
Russian Studies	142
REFERENCE SECTION	143
Visiting Examiners	144
Degrees Conferred	145
Distribution of Students	149
Recent Publications About Swarthmore College	150
Index	151
PLAN OF COLLEGE GROUNDS	156

1951

OCTOBER	NOVEMBER	DECEMBER
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College Calendar

1951

Fall Semester

Ninth Month 20-23	Freshman placement days
Ninth Month 24	Registration, 1: 00 p. m.
Ninth Month 25	Classes and honors seminars begin
Tenth Month 2	Meeting of the Board of Managers
Eleventh Month 6	Executive Committee of the Board of Managers
Eleventh Month 22	Thanksgiving Day (holiday)
Twelfth Month 4	Annual Meeting of the Board of Managers
Twelfth Month 19	Christmas recess begins, 6: 00 p. m.

1952

First Month 3	Christmas recess ends, 8: 00 a. m.
First Month 8	Executive Committee of the Board of Managers
First Month 17	Classes end
First Month 18	Registration, 1: 30 p. m.
First Month 18, 19	Review period for course students
First Month 19	Honors seminars end
First Month 21	Mid-year examinations begin
First Month 23	Honors seminars begin for spring semester
First Month 31	Mid-year examinations end

Spring Semester

Second Month 4	Classes begin
Second Month 5	Executive Committee of the Board of Managers
Third Month 4	Meeting of the Board of Managers
Third Month 22	Spring recess begins, 11: 00 a. m.
Third Month 31	Spring recess ends, 8: 00 a. m.
Fourth Month 1	Executive Committee of the Board of Managers
Fifth Month 6	Executive Committee of the Board of Managers
Fifth Month 6	Honors seminars end
Fifth Month 16	Honors written examinations begin
Fifth Month 17	Classes end for seniors
Fifth Month 22	Classes end
Fifth Month 23	Enrollment in classes for winter semester, 1: 30 p. m.
Fifth Month 23-24	Review period for course students Senior comprehensive examinations
Fifth Month 26	Final examinations begin
Fifth Month 27	Honors written examinations end
Fifth Month 29-31	Honors oral examinations
Sixth Month 5	Final examinations end
Sixth Month 6	Meeting of the Board of Managers
Sixth Month 7	Alumni Day
Sixth Month 8	Baccalaureate Day
Sixth Month 9	Commencement Day

College Calendar

1952

Fall Semester

- Ninth Month 18-21 Freshman placement days
- Ninth Month 22 Registration, 1: 00 p. m.
- Ninth Month 23 Classes and honors seminars begin
- Tenth Month 7 Meeting of the Board of Managers
- Eleventh Month 6 Executive Committee of the Board of Managers
- Eleventh Month 27 Thanksgiving Day (holiday)
- Twelfth Month 2 Annual Meeting of the Board of Managers
- Twelfth Month 20 Christmas recess begins, 12: 00 noon

1953

- First Month 5 Christmas recess ends, 8: 00 a. m.
- First Month 6 Executive Committee of the Board of Managers
- First Month 15 Classes end
- First Month 16 Registration, 1: 30 p. m.
- First Month 16-17 Review period for course students
- First Month 17 Honors seminars end
- First Month 19 Mid-year examinations begin
- First Month 21 Honors seminars begin for spring semester
- First Month 29 Mid-year examinations end

Spring Semester

- Second Month 2 Classes begin
- Second Month 3 Executive Committee of the Board of Managers
- Third Month 3 Meeting of the Board of Managers
- Third Month 21 Spring recess begins, 12: 00 noon
- Third Month 30 Spring recess ends, 8: 00 a. m.
- Fourth Month 7 Executive Committee of the Board of Managers
- Fifth Month 5 Executive Committee of the Board of Managers
Honors seminars end
- Fifth Month 15 Honors written examinations begin
- Fifth Month 16 Classes end for second-semester seniors
- Fifth Month 21 Classes end
- Fifth Month 22 Enrollment in classes for winter semester, 1: 30 p. m.
- Fifth Month 22-23 Review period for course students
Senior written comprehensives
- Fifth Month 25 Final examinations begin
Honors written examinations end
- Fifth Month 28-30 Honors oral examinations
- Sixth Month 3 Final examinations end
- Sixth Month 5 Meeting of the Board of Managers
- Sixth Month 6 Alumni Day
- Sixth Month 7 Baccalaureate Day
- Sixth Month 8 Commencement Day

PERSONNEL
OF
SWARTHMORE COLLEGE

The Corporation

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801 Market St., Philadelphia 5, Pa.
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1617 Land Title Building, Philadelphia 10, Pa.
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Term Expires Twelfth Month, 1951

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*WILLIAM H. WARD, 630 Strath Haven Avenue, Swarthmore, Pa.

* Nominated by the Alumni Association.

Term Expires Twelfth Month, 1954

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HADASSAH MOORE LEEDS

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* Nominated by the Alumni Association.

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- 1954 GEORGE C. CORSON '10, Butler Pike, Plymouth Meeting, Pa.
EDWARD L. NOYES '31, 490 Riverview Road, Swarthmore, Pa.
BARCLAY WHITE, JR. '43, 314 Vassar Avenue, Swarthmore, Pa.
- 1952 ESTHER RIDPATH DELAPLAINE '44, 1020 S. Harvard Avenue, Swarthmore, Pa.
JULIA YOUNG MURRAY '17, 105 Princeton Avenue, Swarthmore, Pa.
- 1953 ANNA ROBERTS BROSIUS '23, Russell Road, Berwyn, Pa.
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1952 VIRGINIA MELICK TURNER '27, Acorn Hill, Oakwood Lane, Greenwich, Conn.
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** Absent on leave, Spring Semester.

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ASSOCIATE PROFESSORS

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** Absent on leave, Spring Semester.
† Absent on leave.
‡ Absent on leave, part-time.

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THE HISTORY OF THE

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CHAPTER I

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CHAPTER II

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CHAPTER III

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CHAPTER IV

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CHAPTER V

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CHAPTER VI

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INTRODUCTION TO SWARTHMORE COLLEGE

Introduction to Swarthmore College

Swarthmore College, founded in 1864 by members of the Religious Society of Friends, is a small co-educational college situated 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.

The college campus contains about 250 acres of rolling wooded land in the borough of Swarthmore in Delaware County, Pennsylvania. The borough of Swarthmore is a small residential suburb within half an hour's commuting distance of Philadelphia on the West Chester branch of the Pennsylvania Railroad. Situated near the intersection of U. S. Route 1 (Baltimore Pike) and Pennsylvania State Highway 320, Swarthmore is easily accessible by car.* Because of its location, Swarthmore College students are able to combine the advantages of a semi-rural setting with the opportunities offered by Philadelphia. Especially valuable is the cooperation possible with three other nearby institutions, Bryn Mawr and Haverford Colleges and the University of Pennsylvania.

OBJECTIVES AND PURPOSES

The purpose of Swarthmore College is to make its students more valuable human beings and more useful members of society. It shares this purpose with other educational institutions, for American education is a direct outgrowth of our democratic principles. Democracy is based on the infinite worth of each individual. It can operate successfully only when men are willing to seek together a common good. It depends upon knowledge and understanding of the complex problems of modern society. The debt of our educational system to democracy is equalled only by the debt of democracy to education.

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

THE RELIGIOUS TRADITION

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

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

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.

During recent months a special joint committee of the Board of Managers, the faculty, and the students has been working on ways to apply and to make effective the Quaker concerns of the college in the present world situation. One result of its labors thus far is the provision for a field of concentration in International Relations, outlined on page 107 below.

THE COMMUNITY LIFE

Swarthmore is a small college by deliberate policy. Its enrollment in normal years is about 850 students, of whom about 400 are women and 450 are men. It is semi-rural in location, residential and co-educational in character. These features create an ideal environment for personal growth. Co-education provides the most natural environment for both men and women, who in their common work and play come to value each other for their true worth. Almost all of the students live in the college dormitories and eat together in the dining rooms. A large number of faculty houses are within campus boundaries, making it possible for students to have valuable social contacts with their professors outside the classroom. The residential character is the basis for a community life in which the ideals of the college influence every member. Growth in emotional maturity, necessary both for personal satisfaction and for effective action, is an integral part of the total educational program.

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

critical intolerance as they struggle to live successfully together. They learn the meaning of responsibility as they become responsible for their activities.

THE EDUCATIONAL PROGRAM

Swarthmore's educational program is based on the philosophy that self-discovery and self-development are more valuable than the simple 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 of many areas of human experience, the college requires that freshmen and sophomores take a wide variety of courses. This plan allows them to test their ability in subjects they have already studied and to explore new fields. By the end of their sophomore year, students are expected to make two decisions: first, what their field of concentration will be for the last two years; and second, whether they prefer to take "honors work" or to continue their study in regular courses.

Honors work, more fully described on pages 54 to 56, 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 meet with their instructors in small weekly seminar groups for discussion and evaluation of their work. Since an honors student pursues only one major and one related minor subject during a semester, this system facilitates greater concentration and greater independence than is possible under the usual academic routine. The development of the "honors" or seminar method was begun under President Aydelotte in 1922, and because of its success, it has been widely imitated in other institutions.

ACADEMIC COMPETENCE

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

Education is largely an individual matter, for no two students are exactly alike. Some need detailed help, while others profit from considerable freedom. The program of honors study, in which Swarthmore pioneered, is designed to give recognition to this fact. It is the most distinctive feature of our educational program. For many students it provides an enriching and exciting intellectual experience. It has as its main ingredients freedom from class work, maximum latitude for the development of individual

responsibility, concentrated work in broad fields of study, and close association with faculty members in small seminars. The honors program and the course program are parallel systems of instruction for students during their last two years. Both are designed to evoke the maximum effort and development from each student, the choice of method being determined by individual need and capacity.

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

Admission

Inquiries concerning admission and applications should be addressed to the Deans of the College: from men, to Dean Everett L. Hunt; from women, to Dean Susan P. Cobbs.

GENERAL STATEMENT

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

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

Selection is important and difficult. No simple formula will be effective. The task is to 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.

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 Test and in three Achievement Tests of the College Entrance Examination Board. In some cases, special tests may be given by the college.
4. Personal interview with one of the Deans or an appointed representative.
5. Reading and experience, both in school and out.

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

PREPARATION

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 literature, 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.

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 1951-52 these tests will be given in various centers throughout this country and abroad on December 1, January 12, March 15, May 17 and August 13. Applicants are normally expected to take the required tests in March of their Senior year. Scholarship candidates are urged to take the Scholastic Aptitude Test in December or January, and other applicants may do so 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, Alberta, British Columbia, Mexico, Australia, and all Pacific Islands including Formosa and Japan, should address their inquiries and send their applications to the College Entrance Examination Board, Box 9896, Los Feliz Station, Los Angeles 27, California. Application should be made to the Board at least a month before the date on which the test will be taken.

No additional tests are required of candidates for scholarships. 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. Information concerning scholarships will be found on pages 33 to 39.

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

ADVANCED STANDING

For favorable consideration, applicants for advanced standing must have had a good scholastic record in the institution from which they wish to transfer, and must present full credentials for both college and preparatory work and a letter of honorable dismissal. They must take the College Ability Test given by the College Entrance Examination Board on the dates mentioned in the preceding section.

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.

Expenses

Charges per academic year of two semesters:

Board, room, and tuition	\$1300*
General fee	100
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>
Total charges	\$1400

While a general charge for board, room and tuition is made, this may be divided into \$650 for tuition and \$650 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 at the time of graduating or leaving college.

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

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

THE TUITION PLAN

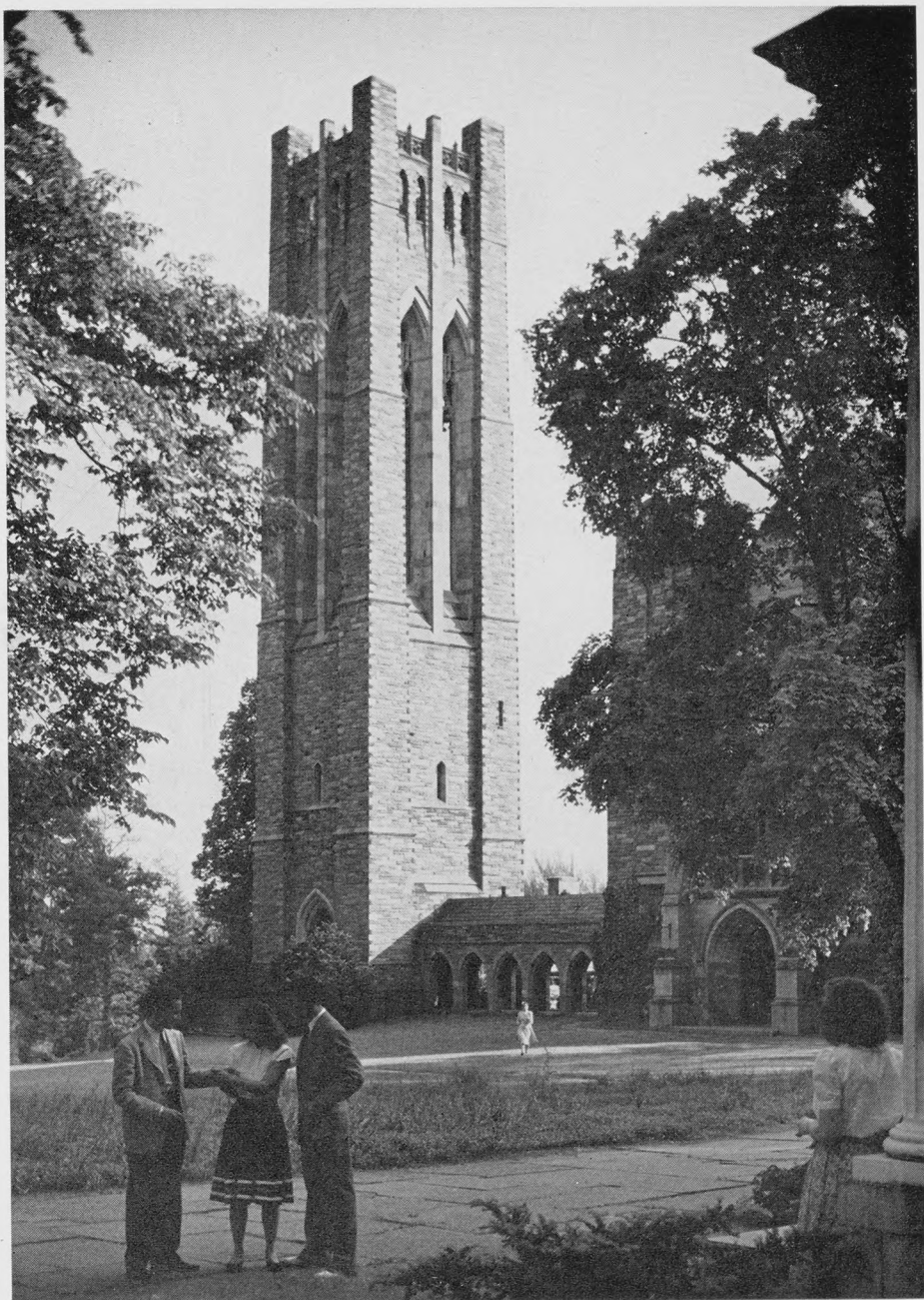
Many of the parents of students may wish to pay all tuition, fees, and residence charges on a monthly basis. It is now possible to arrange this

* 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.

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.

ACCIDENT AND SICKNESS INSURANCE

The college makes available both accident and accident and sickness insurance to students through John C. Paige & Company of Boston, Massachusetts. The accident coverage alone, which is strongly recommended for all students, is required of all students who participate in intercollegiate athletic activities. This coverage costs \$6.00 per year (12 months) for women and \$12.00 for men. A combined accident and sickness policy is also available at an annual cost of \$18.00 for women and \$22.00 for men. Application forms are mailed to each student during the summer.



Clothier Memorial



The College Library

Student Aid and Scholarships

The college furnishes scholarships and financial assistance to a substantial number of students from its general funds and from special endowments. About fifty scholarships are awarded to freshmen each year. During the current academic year the college has budgeted more than \$90,000 for scholarships. About one-quarter of that sum is provided by the endowed scholarships listed below. The income from many of these endowments is assigned each year to entering freshmen in accordance with the will of the donor and in his name. Where satisfactory records have been maintained these awards are normally renewed annually from the general funds of the College. Seniors who have had substantial aid may in some cases be asked to finance themselves in part from a College loan fund. All awards are based upon the college record, the financial need of the family as revealed in confidential statements to the Scholarship Committee, and the efforts of the student in earning his own expenses. All applications for scholarships are handled by the Committee on Admissions and Scholarships and should be addressed to the Deans.

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 EMPLOYMENT affords opportunity to earn money by regular work at current wage rates in one of the college offices, shops, laboratories or libraries. A student may hold a college job in addition to a scholarship or a grant-in-aid. The distribution of jobs among those authorized to hold them is made by the Student Employment office. Residents of the borough of Swarthmore often send requests for services to the college, which co-operates in making these opportunities known to students. Last year over four hundred students secured work through this office. Many students earn from eight to ten dollars a week and still maintain an excellent scholastic standing.

SCHOLARSHIPS FOR MEN

The GEORGE F. BAKER SCHOLARSHIPS. The George F. Baker Scholarships, awarded for the first time in 1950, have been given to the college as part of a national scholarship program. They are the gift of the George F. Baker Foundation and will be awarded to four freshmen men each year. 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, was offered for the first time in 1950. This scholarship is in honor of a former distinguished Professor of Engineering and, therefore, students who plan to major in engineering will be given preference. 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 a maximum of \$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 a maximum value of \$650.

The **T. H. DUDLEY PERKINS MEMORIAL SCHOLARSHIP** is awarded annually to a young man selected by a committee of the faculty appointed by the President of the college for the purpose. The award having a maximum 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 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 has a maximum value of \$500.

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

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

SCHOLARSHIPS OPEN TO MEN AND WOMEN

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

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

The PHEBE ANNA THORNE FUND provides an income of approximately \$2250 for scholarships for students needing pecuniary assistance whose previous work has demonstrated their earnestness and their ability. This gift includes a clause of preference to those students who are members of the New York Monthly Meeting of Friends. These scholarships are awarded by the college under the regulations fixed by the board.

The WESTBURY QUARTERLY MEETING, N. Y., SCHOLARSHIP, amounting to \$250, 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 one or more scholarships annually, amounting to \$250 each, for those students whose special interests are in the field of music.

The income from each of the following funds 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: 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 scholarships 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 administering committee. The loans are repayable not later than five years after graduation, with interest at the rate of four percent.

THE JOHN A. MILLER LOAN FUND was established by the Class of 1912 at their twenty-fifth reunion. Both principal and income are to be used to provide a loan fund for students in the three upper classes. Individual students may borrow up to \$200 in any one year, such loans to be repayable within five years with interest at four percent.

THE PAUL M. PEARSON LOAN FUND was established by a number of Dr. Pearson's friends as a memorial for perpetuating his life and spirit. Both principal and income may be used for loans to students, repayable not later than five years after graduation, with interest at the rate of four percent.

THE SWARTHMORE COLLEGE STUDENT LOAN FUND was established by Mr. Clarence J. Gamble, who, feeling such a fund to be of unusual benefit to worthy students, gave a sum to the college on condition that the Board should set aside an equal amount to be added to the fund. Both principal and income may be used for loans to students, repayable not later than five years after graduation with interest at the rate of four percent.

THE ELLIS D. WILLIAMS FUND. By the will of Ellis D. Williams, a legacy of \$25,000 was left to the college, the income from which is to be used for loans to students, repayable not later than five years after graduation, with interest at the rate of four percent.

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 the gift of Andrew Carnegie, contains reading rooms, offices and a collection of 161,445 volumes. Some 4500 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 storeroom for 150,000 volumes was erected in 1935. The library is definitely a collection of books and journals for undergraduate use. The demands of honors work, however, make necessary the provision of large quantities of source material not usually found in collections maintained for undergraduates. It is a point of library policy to try to supply, either by purchase or through inter-library loan, the books needed by students or members of the faculty for their individual research.

In addition, the library contains certain special collections—the British Americana collection, the Wells' Wordsworth and Thompson collections, and a collection of the issuances of 406 private presses. The latest special addition is the John William Graham Collection of Literature on Psychic Science.

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 305 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 750 titles of magazines and bulletins devoted to peace, published in the United States and abroad during the past 120 years. There are about 160 titles of bulletins and magazines currently received in eleven languages from 25 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 eight volumes:

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

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

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

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

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

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

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

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

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 horticultural and botanical collection of trees, shrubs and herbaceous plants through the provisions of the Arthur Hoyt Scott Horticultural Foundation, established in 1929 by Mrs. Arthur Hoyt Scott and Owen and Margaret Moon as a memorial to Arthur Hoyt Scott of the Class of 1895. The plant collections are designed both to afford examples of the better kinds of trees, shrubs and herbaceous plants which are hardy in the climate of Eastern Pennsylvania and suitable for planting by the average gardener, and to beautify the campus. There are exceptionally fine

displays of Japanese cherries, flowering crab apples and tree peonies, and a great variety of lilacs, rhododendrons, azaleas, daffodils, iris, herbaceous peonies, hemerocallis and chrysanthemums. Many donors have contributed generously to the collections. (For full information see *Bulletin of Swarthmore College*, Vol. xxxvii, No. 5.)

The BRONSON M. CUTTING MEMORIAL COLLECTION OF RECORDED MUSIC was established at Swarthmore College in 1936 by a gift of approximately four thousand phonograph records, a radio-phonograph, books 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 on or near 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, Woolman House and two buildings on the former Mary Lyon School property.

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

Dining Rooms

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

RELIGIOUS LIFE

The religious life of the college is founded on the Quaker principle that the seat of spiritual authority lies in the Inner Light of each individual. The Society of Friends is committed to the belief that religion is best expressed in the quality of everyday living. There are accordingly no compulsory religious exercises, save in so far as the brief devotional element in Collection may be so considered. Students are encouraged to attend the churches of their choice. Episcopal, Presbyterian, Methodist, and Christian Science churches are located in the borough of Swarthmore; Catholic and other churches 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 with faculty cooperation 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.

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

The college physician gives physical examinations to all students at the beginning of each year. There is close cooperation with the 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.

Each student is allowed ten days care in the infirmaries per term without charge unless the services of a special nurse are required. After ten days, a charge of \$2.00 per day is made. Students suffering from a communicable disease or from illness which makes it necessary for them to remain in bed, must stay in the infirmary for the period of their illness. A charge is made for special or expensive medicines and certain immunization procedures, but ordinary medicines are furnished without cost.

The medical and infirmary facilities of the college are available to students injured in athletic activities or otherwise, but the college cannot assume additional financial responsibility for medical and surgical expenses arising from accidents. Accident insurance coverage is, therefore, required for all

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

The college psychiatric consultants hold office hours by appointment each week. 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 employment. In addition, summer work is planned to give students job experience in various fields.

Alumni Office

The Alumni Office keeps records of the addresses of all living graduates and alumni of the college. It also publishes periodically the Swarthmore alumni magazine, *THE GARNET LETTER*. The Alumni Office 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. The Curriculum Committee co-operates with a similar committee of the faculty in the discussion of matters relating to the academic program of the college. In addition to these, there are several joint Faculty-Student Committees, whose student membership is appointed by the Council: Collection, Cooper Foundation, 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 semesters of resident study, which are normally completed in four years, lead to a Bachelor's degree.

The selection of a program will depend upon the student's interests and vocational plans. Programs in engineering, pre-medical courses, and chemistry, for example, are the necessary preparation for professional work in these fields. Students planning a career in law, business, or 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 the general college requirements, to choose their major and minor subjects, and to prepare for advanced work in these subjects by taking certain prerequisites. Five full courses or their equivalent in half courses constitute the normal program for each of the first two years. Each course represents from eight to twelve hours of work a week including class meetings, laboratory periods and individual preparation.

The program for upper class students affords a choice between two 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

* For groupings of departments, see page 17.

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 84. Courses outside the technical fields are spread over all four years.

In addition to scholastic requirements for graduation, all students must meet certain standards of participation in Physical Education as set forth in the statement of those departments (see pp. 128 to 130) and must attend the Collection exercises of the college (see p. 44).

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

Program for Freshmen and Sophomores

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

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

All students must include in their program:

1. One year course in the natural sciences to be selected from Physics 1-2, Chemistry 1-2, Astronomy 1-2, Biology 1-2. By special provisions, students may meet this requirement in 1951-52 by a course consisting of one semester of mathematics (Mathematics 7) and one semester of astronomy (Astronomy 8).
2. One year course in the social sciences, either Economics 1-2 or Political Science 1-2.

3. Two semester courses in the humanities. Students majoring in the Divisions of Engineering and of Mathematics and the Natural Sciences shall select these courses from among philosophy, literature (English or foreign), fine arts, music and religion. Students majoring in the Divisions of the Humanities and the Social Sciences shall select from the same subjects, but must include a semester course in literature (English or foreign) and may include any course in philosophy except Philosophy 1, which partially meets the requirement described below.
4. In addition, one year or two semester courses in departments outside the division in which the major work is to be done. Students majoring in the Humanities or the Social Sciences shall fulfill this requirement by Philosophy 1 and Psychology 1. Students majoring in the Division of Mathematics and the Natural Sciences may offer psychology in partial or complete fulfillment of this requirement, as well as any introductory course listed in the catalogue in the Divisions of the Humanities and the Social Sciences.

In addition to these general requirements, there are the following special requirements:

5. All students majoring in the Humanities and the Social Sciences shall take History 1-2.
6. All students except those majoring in engineering must include in their program sufficient work in a modern or classical language to complete course 4 or its equivalent. This may be met in whole or in part by secondary school preparation as measured by the appropriate achievement test of the College Entrance Examination Board.

Not more than one year in any one department will be counted toward the fulfillment of requirements 1-5. Students entering college with special preparation in any one of these subjects may apply for exemption.

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. 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. Work taken during the first two years may be counted toward fulfillment of the major requirements but not more than six full courses or twelve half courses may be taken in the major field. Before graduation the student must pass a comprehensive examination in his major subject.

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

A student's course adviser during his junior and senior years is the chairman of his major department (or a member of the department desig-

nated by the chairman) whose approval he must secure for his choice of courses each semester.

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

The completion of eighteen full courses, 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 Academic Requirements, provided that his record in the previous year has been satisfactory.

HONORS WORK

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 from three to four hours. In these meetings it is customary for students to present frequent papers, although the methods of stimulating discussion vary greatly. In scientific subjects additional time is spent in the laboratory. A student in the honors program ordinarily 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 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 Literature, 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.

* For list of examiners in June 1951, see page 144.

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 honors should consult the chairmen of his prospective major and minor departments during the second semester of his sophomore year and work out a program for his junior and senior years. This proposed program must be filed in the office of the Registrar who will forward it to the division or divisions concerned. The acceptance of the candidate 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 is responsible for drawing up the original plan of work, for supervising the candidate's 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 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.

Students who plan to meet medical school requirements will ordinarily 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 departments 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.

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 that the student has been permitted to withdraw from the course by the Committee on Academic Requirements. *X* designates a condition, and *Inc.* means that a student's work is incomplete in respect to specific assignments or examinations. These marks may be removed as indicated below.

The mark "conditioned" indicates 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. "Incompletes" must normally be made up in the term immediately following that in which they were incurred. 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 an incomplete until the second term following. This permission must be given in writing and filed in the Office of the Registrar. Any not made up within a year from the time it 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.

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 the middle of the semester.

EXAMINATIONS

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

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

SUMMER SCHOOL WORK

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

RESIDENCE

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

Students may occupy college rooms between terms only by special arrangement with the Deans and the payment of the required fee. 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 supporting 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 44).
8. He must have paid all outstanding bills and returned all equipment and library books.

Advanced Degrees

MASTER OF ARTS AND MASTER OF SCIENCE

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

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

The candidate's record and a detailed program setting forth the aim of the work to be pursued shall be submitted, with a recommendation from the department or departments concerned, to the Committee on the Master's Degree. If accepted by the 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 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, provided that, where this procedure is not practicable, exceptions may be made by the Committee on the Master's Degree. The department or departments concerned, on the basis of the reports of the outside examiners, together with the reports of the student's resident instructors, shall make recommendations to the faculty for the award of the degree.

The tuition fee for graduate students who are candidates for the Master's degree is \$650 per year, and the general fee for these students is \$25 per semester.

ADVANCED ENGINEERING DEGREES

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

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

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

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

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

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

Awards and Prizes

The IVY 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 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 **WILLIAM PLUMMER POTTER PUBLIC SPEAKING FUND** was established in 1907. The income of the fund is used to sponsor three different annual contests: 1) the Potter Public Speaking Contest prizes totalling \$100.00, 2) the Potter Poetry Contest, \$50.00, 3) the One-Act Play Contest, \$50.00. The Potter Fund has also been used to establish a collection of dramatic and poetic records.

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 entered or plans to enter elementary or secondary school work. The recipient of the award is to pursue a course of study fitting her for more efficient work in an institution approved by the Committee of Award.

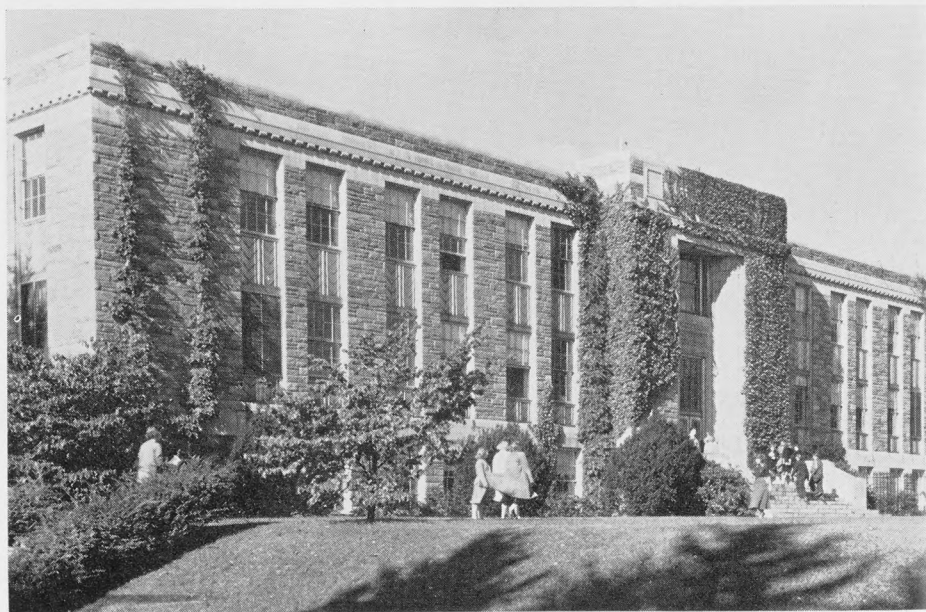
SIGMA XI RESEARCH FELLOWSHIP. The Swarthmore Chapter of Sigma Xi appoints, from time to time, as funds are available, Fellows with research grants with a maximum value of \$1,000. The holders of this fellowship are usually associates of the chapter who have shown conspicuous ability in graduate studies. The purpose of the chapter in awarding these fellowships is to relieve worthy students from teaching and other distracting duties so that they may concentrate as much as possible upon their research. Applications for these fellowships should be made to the secretary of the chapter not later than the middle of March. Appointments will be announced about the middle of April.



Worth Dormitory for Women



Wharton Hall, A Dormitory for Men



Martin Biological Laboratory

COURSES OF INSTRUCTION

NUMBERING OF COURSES AND SEMINARS

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

1 to 9—introductory courses

11 to 49—other courses open to students of all classes

51 to 69—advanced courses limited to juniors and seniors

Above 100—seminars for honors students

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

Biology

PROFESSOR: ROBERT K. ENDERS, *Chairman*

ASSOCIATE PROFESSORS: LAUNCE J. FLEMISTER
LUZERNE G. LIVINGSTON
NORMAN A. MEINKOTH
WALTER J. SCOTT
NEAL A. WEBER †

INSTRUCTOR: KURT K. BOHNSACK

LECTURER: SARAH C. FLEMISTER

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

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

REQUIREMENTS FOR MAJORS IN COURSE

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

Biology

1-2. GENERAL BIOLOGY. Staff.

Full Course

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

Two lectures and one discussion period, one three-hour laboratory per week.

Credit is not given for a single semester of this course.

† Absent on leave, 1951-52.

20. GENETICS.

Spring Semester

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

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

Prerequisite: Biology 1-2.

GREEK AND LATIN NOMENCLATURE (Classics X). Miss North.

This course is designed to help students of the biological sciences to understand terminology derived from Greek and Latin. Principles of word formation, the meaning of common roots, the use of prefixes and suffixes, the nature of combining forms, and rules for English pronunciation will be stressed.

Required of majors in the junior year. One hour per week. No credit.

Botany

16. DEVELOPMENTAL PLANT ANATOMY. Mr. Livingston.

The fundamentals of anatomy of seed plants approached from a developmental standpoint. The structure and behavior of meristems, problems and processes of differentiation, and a detailed analysis of cellular, tissue and organ structure in higher plants.

Two lectures and two three-hour laboratory periods per week.

Prerequisite: Biology 1-2.

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

Fall Semester

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

Two lectures and two laboratories or field trips per week.

Prerequisite: Biology 1-2.

67. PLANT PHYSIOLOGY. Mr. Livingston.

Spring Semester

(Not offered—1951-52.)

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.

68. BIOLOGY OF BACTERIA. Mr. Livingston.

Fall Semester

(Not offered—1951-52.)

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

Two lectures and two laboratory periods per week.

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

69. TAXONOMY OF SEED PLANTS. Mr. Livingston.

Spring Semester

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.

111. PLANT PHYSIOLOGY.

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

112. 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.

113. GENETICS.

An extension of the area covered in course 20, with particular emphasis on current research in the field of inheritance in all its aspects. The seminar discussion is accompanied by a full day of laboratory work each week.

114. TAXONOMY AND DISTRIBUTION OF FLOWERING PLANTS.

An extension of the area covered in course 69, integrated with a study of plant geography and distribution. Seminar discussions and field work, supplemented by laboratory work.

Zoology

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

Fall Semester

This course normally follows General Biology. It deals with the comparative and unique aspects of the anatomy of the integument, skeleton, muscular, digestive, respiratory, circulatory, excretory 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.

Spring Semester

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.

51. HISTOLOGY. Mrs. Flemister. *Fall Semester*
 This course consists of a detailed study of the microscopic structure of vertebrate tissues, together with the functions of such tissues. In the laboratory the student examines both prepared and living material, and becomes familiar with the principles of microtechniques. Three lectures and two laboratory periods per week.
 Prerequisites: 1-2, 11.
52. EMBRYOLOGY. *Spring Semester*
 A study of development of vertebrate anatomy. The lectures are concerned with an investigation of the events which precede development, an analysis of the development processes, and a brief survey of the contributions of the field of experimental embryology. Laboratory periods are devoted to the embryology of the frog, chick and pig. Three lectures and two laboratory periods per week.
53. ENTOMOLOGY. Mr. Weber. *Fall Semester*
 The study of insects and their relatives, their morphological and physiological adaptations and their effect on man. Each student will prepare a study collection from field trips.
54. BIOLOGY OF PARASITISM. Mr. Meinkoth. *Alternate Years, Spring Semester*
 A consideration of parasitology with reference to evolution and adaptation to the parasitic habit. Surveys are made of parasites in native animals. Classification, life cycles and epidemiology are reviewed.
 Prerequisite: 11 Comparative Vertebrate Anatomy.
55. FIELD ZOOLOGY. Mr. Weber, Mr. Bohnsack. *Fall Semester*
 Emphasis is on the living animals as they occur in nature, their systematics, relationships to the environment, habits and distribution. Most of the work will be done on field trips.
56. INVERTEBRATE ZOOLOGY. Mr. Meinkoth. *Alternate Years, Fall Semester*
 (Not given in 1951-52.)
 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. *Fall Semester*
 A course of lectures and laboratory experiments treating functional processes from the standpoint of adaptation of the animal to its environment. These processes in representative animals are compared in order to follow their elaboration from the more general to the more specialized.
 Two lectures, one conference and two laboratory periods per week.
 Prerequisites: Comparative Anatomy and Organic Chemistry.
58. PHYSIOLOGICAL ECOLOGY. Mr. Flemister. *Spring Semester*
 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, food-stuffs 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.

Given on demand

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 FOR SENIORS. Mr. Enders.

Spring Semester

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

63, 64. SPECIAL TOPICS. Staff.

Full or Half Course

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

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

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

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

HONORS WORK

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 consist of three half courses in biology and zoology (including 1-2). In addition, 104 requires one course in physics and chemistry through organic chemistry.

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

101. 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.

102. CYTOLOGY.

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

103. EMBRYOLOGY. Mr. Enders.

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

104. COMPARATIVE PHYSIOLOGY (for Biology 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.

105. PHYSIOLOGY (for non-Majors). Mr. Scott.

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. 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.

106. ENTOMOLOGY. Mr. Weber, Mr. Bohnsack.

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

110. SPECIAL TOPICS. The Staff.

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

Chemistry

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 7-8. 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.

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.

* Absent on leave, first semester, 1951-52.

** Absent on leave, Spring Semester, 1951-52.

IN COURSE

Freshman Year

Introductory Chemistry 1, 2
Mathematics 1, 2
*German 1-2
English Literature 1 and a half course in
philosophy, fine arts, music or religion
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
Physics 1-2
A year course in humanities or social
science

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 spring 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*.

* Students who have completed the foreign language requirement in another language may substitute German 7-8.

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 SURVEY.** Mr. Cox. *Fall Semester*
 This course is designed to meet the needs of students who do not elect chemistry as their major interest. The course covers classification, nomenclature and reactions of organic compounds of both the aliphatic and aromatic series. Structural relationships and chemical behavior of representative members 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 11 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 an additional four hours per week devoted to selected readings on modern developments in inorganic chemistry.

69. SPECIAL TOPICS IN ORGANIC CHEMISTRY. Mr. Fehnel.

Fall and Spring Semesters

An elective half-course which provides an opportunity for qualified advanced students to undertake original investigations in the field of organic chemistry. The course is designed to give the student practical experience in the application of the scientific method to the solution of a research problem, to develop facility in the use of advanced laboratory techniques, and to stimulate interest in current developments in organic chemical research. A thesis is required in lieu of a final examination.

One semester. Prerequisites: Chemistry 55 with a minimum grade of C, and Chemistry 56 either previously or concurrently.

Approximately ten hours of laboratory work and conferences per week.

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 four papers usually selected from mathematics, physics, or zoology. The following seminars are offered as preparation for the honors examination in chemistry.

101. 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.

102. 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.

103. ORGANIC CHEMISTRY. Mr. Cox and Mr. Fehnel.

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, 55 and 56.

Prerequisite: Chemistry 21.

Weekly Seminars and laboratory.

Classics

PROFESSORS: SUSAN P. COBBS

L. R. SHERO, *Chairman*

ASSISTANT PROFESSOR: HELEN F. NORTH

The Department of Classics offers courses in Greek and Latin that are designed to develop a capacity for the fruitful study of works written in those languages. A knowledge of Greek is particularly valuable for students of modern literature, philosophy, or the Christian religion; a knowledge of Latin, for students of the romance languages, mediaeval history, or law. Study in either field is helpful for the broadening and deepening of a student's educational experience.

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

REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS

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

Greek

- 1-2. ELEMENTARY GREEK. Miss Cobbs. *Full Course*
The essentials of Greek grammar are covered and easy selections from Greek literature are read.
- 11, 12. INTERMEDIATE GREEK. Mr. Shero. *Full Course*
Selections from Homer, a play of Euripides, and Plato's *Apology* are read.
- 13, 14. GREEK READING. Miss North. *Full Course*
The reading of some of the masterpieces of poetry and of prose, including selections from lyric poetry and from Herodotus and a play of Aeschylus 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. *Full Course*
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. *Full Course*
The course is designed for students who begin Latin in college or who are not prepared to enter Intermediate Latin, and it normally covers the equivalent of two years' work in secondary school. The course will be offered only when required.
- 3, 4. INTERMEDIATE LATIN. Miss North. *Full Course*
The course is primarily concerned with the reading of Virgil's *Aeneid*. For the benefit of students who have had only two years of preparatory Latin, a brief introductory period is devoted to a review of the fundamentals of Latin grammar. Credit is given for each semester.
- 11, 12. INTRODUCTION TO LATIN LITERATURE. Mr. Shero and Miss North. *Full Course*
The course aims to give some conception of the scope and characteristic qualities of Latin literature. The reading includes 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.
13. CATULLUS AND ELEGY. Mr. Shero. *Fall Semester*
A study of the poems of Catullus and the elegiac poets.
14. MEDIAEVAL LATIN. Miss North. *Spring Semester*
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. *Fall Semester*
The course is devoted to the study of the political and social history of the Greek states to the time of the Hellenistic kingdoms. This is preceded by a brief survey of the Oriental civilizations by which the Greeks were influenced. Special attention is given to the 6th and 5th centuries B. C. Considerable reading is done in the primary sources in translation. The course is given in alternate years and will be offered in 1951-1952.
33. GREEK CIVILIZATION. Mr. Shero. *Fall Semester*
Special stress is laid on those aspects of Greek culture which have had most 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 1952-1953.
34. HISTORY OF ROME. Mr. Shero. *Spring Semester*
The course is devoted to the study of the political and social history of Rome to the time of Constantine. Special attention is given to the last century of the Republic and the first century of the Empire. Considerable reading is done in the primary sources in translation.

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. *Spring Semester*

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.

37. LATIN LITERATURE IN TRANSLATION—CLASSICAL AND MEDIAEVAL. Miss North. *Fall Semester*

The works studied in this course range in time from the age of the Roman Republic to the twelfth century after Christ and are selected from those masterpieces written in the Latin language which possess significance for the history and literature of Western Europe, and which retain their value when read in translation. They include, from the classical period, such major authors as Cicero, Lucretius, Virgil, Livy, and Seneca; from the Latin Fathers, St. Jerome and St. Augustine; and from the Middle Ages, Boethius, Prudentius, Bede, the chief figures of the Carolingian Renaissance, and the writers of Mediaeval Latin hymns and secular poetry. The course is given when required and will be offered in the first semester of 1951-1952.

39. CLASSICAL MYTHOLOGY IN LITERATURE AND ART. Mr. Shero. *Fall Semester*

The course is designed to give familiarity with those myths and legends that have served as material for writers and artists from ancient times to the present. Plays, both ancient and modern, based on the more influential myths are read, and a study is made of the manner in which the themes have been handled in painting and sculpture of various periods. Special attention is given to the use made of stories from mythology by recent writers. The course is given in alternate years and will be offered in 1951-1952.

X. GREEK AND LATIN NOMENCLATURE. Miss North. *Fall Semester*

This course is designed to assist students of the biological sciences in understanding terminology derived from Greek and Latin. Principles of word formation, the meaning of common roots, the nature of combining forms, and rules for English pronunciation are stressed. The class meets one hour a week and is not counted towards a degree.

HONORS SEMINARS

101. 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 fall semester and will be offered in 1953-1954.

102. 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 spring semester and will be offered in 1951-1952.

103. LATIN EPIC. Miss North.

This seminar traces the development of Roman epic poetry, with particular emphasis on the *De Rerum Natura* of Lucretius and the *Aeneid* of Virgil. 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 fall semester and will be offered in 1952-1953.

104. 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 spring semester and will be offered in 1952-1953.

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

Economics

PROFESSORS: EDWARD K. CRATSLEY
HERBERT F. FRASER
CLAIR WILCOX, *Chairman*

ASSOCIATE PROFESSOR: FRANK C. PIERSON

ASSISTANT PROFESSORS: JOSEPH W. CONARD
WILLIS D. WEATHERFORD**

INSTRUCTOR: NEVIN A. SCHALL *

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 courses 61 and 62 in the senior year. Majors in honors are advised to take seminars 102 and 103. Courses and seminars should be taken, insofar as possible, in the order in which they are listed.

1-2. INTRODUCTION TO ECONOMICS. Messrs. Conard, Fraser, Pierson, Schall, Weatherford and Wilcox. *Full Course*

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 allocation 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 Taylor and Barger, *The American Economy in Operation*.

3. ACCOUNTING. Mr. Cratsley. *Fall 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.

4. STATISTICS. Mr. Cratsley. *Spring 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.

** Absent on leave, first semester, 1951-52.

* First semester, 1951-52.

- 19-20. SOVIET ECONOMICS AND POLITICS. Mr. Michaels. *Full Course*
(Also listed as Political Science 19-20 and Russian Studies 19-20.)
The structure and operation of the economic and political institutions of the Soviet Union, described and analyzed in the light of their theoretical and historical background.
51. MONEY AND BANKING. Mr. Schall. *Fall 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. *Spring 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. *Fall semester:* corporate organization and finance, investment banking and the securities exchanges. *Spring semester:* marketing, risk, speculation, insurance and the commodities exchanges.
55. LABOR PROBLEMS. Mr. Pierson. *Fall Semester*
The structure and functions of labor unions. Employer approaches to labor relations. Analysis of wage policies. Government control of labor relations.
56. SOCIAL ECONOMICS. Mr. Weatherford *Spring 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.
Fall semester: competition and monopoly in American industry, enforcement and interpretation of the anti-trust laws, delivered pricing, the patent system, regulation of extractive industries and distributive trades. *Spring semester:* regulation of municipal utilities, transportation, communications; American agricultural policy; control of prices in war-time; public ownership and operation of industry.
60. INTERNATIONAL ECONOMICS. Messrs. Conard and Wilcox. *Spring Semester*
The theory and practice of international trade, the balance of payments, foreign exchange, national commercial policies, international investment; world economic development; post-war reconstruction; relations between free and controlled economies.
61. ECONOMIC THEORY. Mr. Conard. *Fall Semester*
The determination of prices in economic theory and in business practice. The distribution of income. Determinants of the level of income and employment. Fluctuations in economic activity.
62. SENIOR MAJORS SEMINAR. Mr. Pierson. *Spring 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

101. FINANCE. Mr. Fraser.

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.

102. MONETARY AND FISCAL POLICY. Mr. Pierson.

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.

103. ECONOMIC THEORY. Mr. Conard.

Contemporary economic theory: price determination, the functional distribution of income, the level of employment. The function served by economic theory for Smith, Marx, and contemporary students. Criticism of theory in the light of empirical studies and simplifying assumptions.

104. 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.

105. INTERNATIONAL ECONOMICS. Messrs. Conard and Wilcox.

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.

106. SOCIAL ECONOMICS. Messrs. Weatherford and Wilcox.

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. The "welfare state."

THESIS

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

Division of Engineering

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

The engineering profession of today requires of its followers skill and resourcefulness as well as an integrated and thorough education in the natural and social sciences. The educational plan of the Division has been prepared with these requirements in mind. The objective of our program is to train the student professionally while providing the foundation of a liberal education. This is accomplished by educating the student in the professional disciplines of the engineer, such as critical analysis, humanistic studies, and the communication of ideas, as well as training in the techniques of the engineering sciences. Specifically, 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 with a view to later professional practice; (3) obtain a sufficient amount of general education to enable him to understand how his engineering activities fit into the great purposes of society.

A student who intends to major in Engineering * follows a common course of study for the first two years. This course adheres as far as possible to the general college program for freshmen and sophomores (see page 51), and prepares the student for his professional work of the junior and senior 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.

Each curriculum provides that the student of Engineering will take about one-fifth of his work in the Divisions 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. 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.

The entire engineering program is outlined on the pages following. First is given the detail of the curriculum for the freshman and sophomore years. Modifications in this program may be made in individual cases, but it is essential that this body of work be completed before the junior year. Next follows a description of certain general courses in engineering open to all students. This is followed by an outline of the curriculum and a description of the courses offered by each department.

* High school students intending to enter Engineering should take algebra, advanced algebra, plane and solid geometry, and trigonometry in secondary school.

OUTLINE OF THE BASIC ENGINEERING CURRICULUM
FOR THE FIRST TWO YEARS

First Semester

Second Semester

Freshman Year

English Literature
Chemistry
Algebra and Trigonometry
Engineering Drawing
Surveying I
Social Science Elective

English Composition
Chemistry
Analytic Geometry
Descriptive Geometry
Surveying II
Social Science Elective

Sophomore Year

Physics
Differential Calculus
Statics
Materials & Shop Processes
Non-Technical Elective

Physics
Integral Calculus
Dynamics
Electric & Magnetic Circuits
Non-technical Elective

GENERAL COURSES

GE1. ENGINEERING DRAWING. Mr. Prager.

Fall Semester

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. Prager.

Spring Semester

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 of 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.

Each Semester

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.

Spring Semester

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

CHARLES W. NEWLIN

MERTON J. WILLIS

RESEARCH CONSULTANT: CAPTAIN WENDELL P. ROOP

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

Fall Semester

EE51 D. C. Apparatus
CE51 Mechanics of Materials & Lab.
ME61 Applied Mechanics
ME11 Thermodynamics I

Junior Year

ME54 Fluid Mechanics
EE53 A. C. Apparatus & Circuits
CE52 Structural Theory
Non-Technical Elective

Senior Year

CE53 Structural Design
CE55 Soil Mechanics
CE56 Sanitary Engineering
Elective

CE54 Adv. Structural Theory
CE57 Reinforced Concrete
GE57 Engineering Economy
Elective

CE1 SURVEYING, I. Mr. Newlin, Mr. Willis. *Fall Semester*
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, Mr. Willis. *Spring Semester*
Topography, stadia work, preparation of profiles and maps from field notes, elements of photogrammetry, celestial observations, highway curves and earth work. Required course for freshmen engineers.
Prerequisite: CE1 Surveying. (1 recitation and 1 3-hour laboratory per week.)

- CE11 STATICS. Mr. Carpenter, Mr. Linsenmeyer. *Fall Semester*
 Concept and definition of force, scalar, and vector quantities; combination and resolution of forces; principle of moment and couples; graphical and analytical conditions for equilibrium; stress diagrams, cables; centroids of areas, volumes, and masses; area and volume theorems. Open to students who have taken Mathematics 1 and 2. (3 recitations and 1 3-hour laboratory per week.)
- CE12 DYNAMICS. Mr. Carpenter, Mr. Linsenmeyer. *Spring Semester*
 Principles of dynamics, motion of a particle, Newton's laws, general equation of motion, rectilinear motion, displacement, velocity, speed, and acceleration; simple harmonic motion, free and forced vibration; inertia forces, work and energy, momentum and impulse; curvilinear motion; kinetic energy of rotation; balancing of rotating bodies; relative motion, angular momentum; combined translation and rotation.
 Prerequisite: CE11. (3 recitations and 1 3-hour laboratory per week.)
- CE51 MECHANICS OF MATERIALS AND LABORATORY. Mr. Carpenter, Mr. Linsenmeyer, Mr. Newlin. *Fall Semester*
 This course deals with the internal stresses and changes of form which always occur when forces act upon solid bodies. The mechanics involved in the design of simple engineering structures is presented so that the student may realize the problems which must be solved in order to secure the required strength and stiffness in such structures. The laboratory work of this course is planned to clarify the theoretical considerations of beams, columns, combined stress, torsion and methods of strain measurement.
 Prerequisite: CE11, Statics. (3 recitations and 1 3-hour laboratory per week.)
- CE52 STRUCTURAL THEORY. Mr. Linsenmeyer, Mr. Newlin *Spring Semester*
 Analysis of determinate and indeterminate structures. A study of stresses in truss and rigid frame systems, influence lines.
 Prerequisite: CE51 Mechanics of Materials. (3 recitations and 1 3-hour laboratory per week.)
- CE53 STRUCTURAL DESIGN. Mr. Carpenter. *Fall Semester*
 Design of structural members and connections for metallic and timber structures.
 Prerequisite: CE52 Structural Theory. (3 recitations and 1 3-hour laboratory per week.)
- CE54 ADVANCED STRUCTURAL THEORY. Mr. Carpenter. *Spring Semester*
 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. *Fall Semester*
 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. *Fall Semester*
 The activities of the sanitary engineer, including the development and purification of water supplies; sewerage and sewage disposal. Also includes subjects dealing with advanced hydraulics.
 Prerequisite: ME54 Fluid Mechanics. (3 recitations and 1 3-hour laboratory per week.)

CE57 REINFORCED CONCRETE. Mr. Newlin.

Spring Semester

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 approved six weeks before the beginning of the semester.

Electrical Engineering

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

ASSISTANT PROFESSOR: C. JUSTUS GARRAHAN

INSTRUCTOR: ROBERT W. MERRIAM

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. 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. 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

First Semester

EE54 A. C. Circuits
EE56 Engineering Analysis I
CE51 Mechanics of Materials
ME51 Thermodynamics I

Second Semester

EE55 Electronics
EE57 Engineering Analysis II
ME54 Fluid Mechanics
Elective

Junior 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

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

* Absent on leave, fall semester, 1951-52.

- EE11 ELECTRIC AND MAGNETIC CIRCUITS. Mr. Jenkins. *Spring Semester*
 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 and to be preceded or accompanied by Integral Calculus.
- EE51 DIRECT CURRENT APPARATUS. Mr. Merriam. *Fall Semester*
 Theory of direct-current generators and motors; fundamentals of control for direct current machines. Topics include flux, generated voltage, armature reaction, commutation, torque, speed, voltage and speed regulation, losses, efficiency, and effects of control on motor characteristics.
 Three class periods per week; one laboratory each week.
 Prerequisite: EE11 Electric and Magnetic Circuits.
- EE52 DIRECT CURRENT MACHINERY. Mr. Jenkins. *Fall Semester*
 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.
 Three class periods per week; one laboratory each week.
 Prerequisite: EE11 Electric and Magnetic Circuits.
- EE53 ALTERNATING CURRENT CIRCUITS AND APPARATUS. Mr. Jenkins *Spring Semester*
 Relations of simple harmonic electromotive forces and currents, power, power factor; single phase circuits; polyphase circuits, balanced and unbalanced. The construction, characteristics, and operation of alternators, induction motors, transformers, synchronous motors, 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. Garrahan. *Spring Semester*
 A systematic study of single and polyphase electric circuits under steady state conditions.
 Three class periods per week; one laboratory each week.
 Prerequisite: EE11 Electric and Magnetic Circuits.
- EE55 ELECTRONICS. Mr. Garrahan. *Fall Semester*
 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. *Fall Semester*
 Formulation and application of the method of engineering analysis based upon fundamental physical laws, mathematics, and practical engineering considerations. Emphasis is placed on the professional approach to the analysis of 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. *Spring Semester*

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. *Fall Semester*

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.

EE59 ALTERNATING CURRENT MACHINERY II. Mr. Jenkins. *Spring Semester*

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. *Fall Semester*

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. *Spring Semester*

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.

EE71 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.

101. 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.

102. 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.

103. 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.

104. 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 PROFESSOR: BERNARD MORRILL

INSTRUCTOR: PHILIP C. PRAGER

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 the variety of problems related to the design, construction and operation of mechanical equipment used in industrial establishments. The arrangement of courses is intended also to prepare mechanical engineers for such activities as those which deal with fabrication of products and the eventual assumption of managerial responsibilities.

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

STANDARD PROGRAM FOR COURSE STUDENTS

Junior Year

Fall Semester

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

Spring Semester

ME52 Thermodynamics II
ME54 Fluid Mechanics
EE53 A. C. Apparatus & Circuits
Elective

Senior Year

ME53 Thermodynamics III
ME62 Adv. Strength of Materials
ME63 Kinematics and Design
Elective

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

ME51 THERMODYNAMICS I. Mr. Reaser.

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.

ME52 THERMODYNAMICS II. Mr. Reaser.

Extension of ME51; analysis of steam cycles basic to modern power plant practice; heat balance calculations; flow of elastic fluids through nozzles and orifices; combustion; air-conditioning; refrigeration. Study of application of fundamental principles as exemplified in steam power stations with emphasis upon design and test of fuel firing equipment, furnaces, boilers, air preheaters, economizers; auxiliary equipment such as pumps, condensers, fans. Class and laboratory investigations supplemented by field trips.

Prerequisite: ME51.

ME53 THERMODYNAMICS III. Mr. Prager.

Extension of ME51 and ME52; analysis of gas cycles basic to internal combustion engine practice; behavior of real gases and mixtures; general thermodynamic equations; combustion of liquid and gaseous fuels; gas compression. Study of application of fundamental principles as demonstrated in design, test and operation of spark-ignition and compression-ignition engines, gas turbines and compressors. Class and laboratory investigations supplemented by field trips.

Prerequisites: ME51 and ME52.

ME54 FLUID MECHANICS. Mr. Prager.

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

Prerequisites: Integral Calculus, ME51, Thermodynamics.

ME55 ADVANCED FLUID MECHANICS AND HEAT TRANSFER.

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.

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.

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. Staff.

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. Staff.

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.

ME71 MECHANICAL ENGINEERING THESIS. Staff.

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

English Literature

PROFESSORS: PHILIP MARSHALL HICKS, *Chairman*

EVERETT L. HUNT

TOWNSEND SCUDDER, 3RD †

ELIZABETH COX WRIGHT

ASSOCIATE PROFESSOR: GEORGE J. BECKER

ASSISTANT PROFESSORS: BRUCE DEARING †

FREDRIC S. KLEES **

STEPHEN E. WHICHER

INSTRUCTORS: DAVID COWDEN

HELEN M. HALL (part-time)

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 IN COURSE

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 preparation 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 shall acquire a reading knowledge in the languages required by the schools they propose to attend.

† Absent on leave, 1951-52.

** Absent on leave, second semester, 1951-52.

COURSES

1. MODERN LITERATURE: Introduction to Literary Study. Staff. *Each Semester*
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.
Prerequisite to all other literature courses offered by the department.

5. COMPOSITION. Mr. Cowden and Mr. Hynes. *Each Semester*
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. *Each Semester*
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. *Fall Semester*
Reading of *Troilus and Criseyde*, *The Canterbury Tales* and some of the minor poems in the original Middle English, with greater attention to the literary than to the linguistic aspects.

- 21, 22. POETRY. Mrs. Wright and Mr. Dearing. *Full Course*
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. Primarily for juniors and seniors; open to sophomores by special arrangement.

- 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.

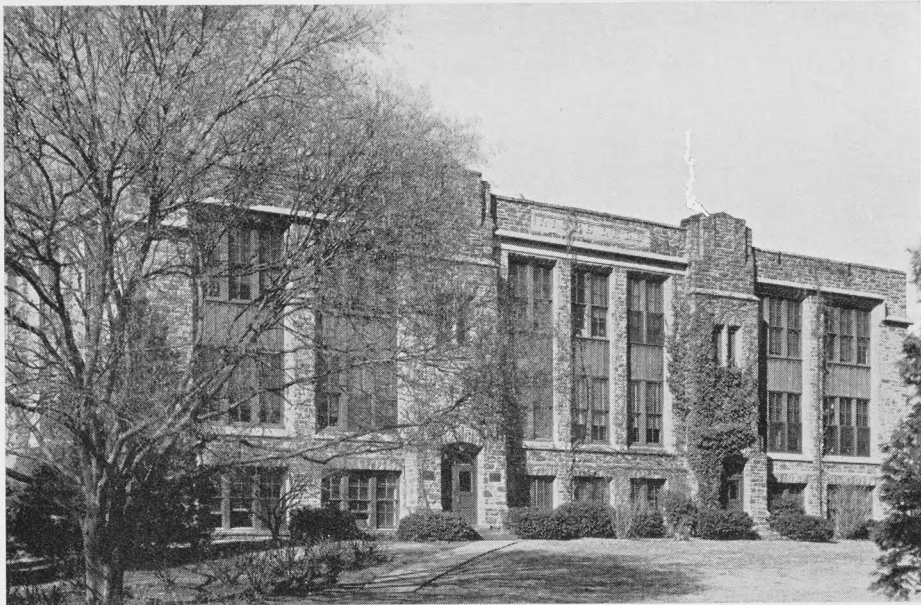
25. COMEDY. Mr. Klees. *Fall Semester*
Dramatic comedy in its various forms, English and American, with particular attention to the Elizabethan, Restoration, and modern periods.

26. TRAGEDY. Mr. Klees. *Spring Semester*
Dramatic tragedy from the *Agamemnon* trilogy to *Death of a Salesman*, with emphasis on Elizabethan and modern American tragedy.

27. BIOGRAPHY AND TRAVEL. Mr. Klees. *Fall Semester*
Biography from Pepys to the present, with stress on the times as well as the lives; representative travel literature from Hakluyt to Dos Passos.



Friends Meeting House



Hicks Hall, An Engineering Building



Lamb-Miller Field House

28. SOCIAL CRITICISM. Mr. Becker. *Fall Semester*
 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. *Full Course*
 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. SATIRE. Mr. Dearing and Mr. Hynes.
 An historically oriented consideration of some of the principal satires in world literature, with emphasis upon interpretation and evaluation as literature.
35. REALISM. Mr. Becker. *Spring Semester*
 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 and Mr. Hynes. *Each Semester*
 A study of the major plays. Not open to majors in this department.
49. ARGUMENT. Mr. Becker. *Each Semester*
 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. *Fall Semester*
 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. *Spring Semester*
 Group meetings of departmental majors held in the second semester of the senior year for the purpose of reviewing, integrating, and supplementing the student's course program.
56. LITERARY CRITICISM. Mr. Hunt. *Spring Semester*
 The theories and doctrines of English literary criticism and their background.
- GREEK LITERATURE IN TRANSLATION (Greek 36). Miss North.
- LATIN LITERATURE IN TRANSLATION (Latin 37). 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.

A special course in English for foreign students is offered by Mrs. Helen Hall. Selected readings in American Civilization are used, and intensive practice in writing and speaking is provided. The course may be given either as a half-course for one semester, or as a full course for the entire year.

Mrs. Hall also provides individual or group work in remedial reading and methods of study for students referred to her by the Deans or other members of the faculty. No academic credit is given, but students who need this work may be required to drop other courses in order to make room for it.

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

101. SHAKESPEARE. Mr. Cowden, Mr. Hicks and Mr. Whicher. *Each Semester*
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.
102. MILTON AND THE 17TH CENTURY. Mr. Hunt. *Fall Semester*
Milton, Donne, and the poetry of the Bible.
103. CHAUCER. Mr. Klees and Mr. Scudder. *Fall Semester*
A study of Chaucer's poetry and age.

Group II

105. 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.

106. DRAMA. Mr. Hicks and Mr. Klees. *Spring Semester*
Survey of the development of the drama in England and America following a preliminary study of classic drama.

107. NOVEL. Mrs. Wright and Mr. Cowden. *Each Semester*
Chiefly 19th century. Principles of aesthetics applied to the novel form are developed from the study of selected novels outside the Victorian tradition.

108. LITERARY CRITICISM. Mr. Hunt. *Spring Semester*
English literary criticism from Sidney to Pater, with some study of classical backgrounds and contemporary developments.

Group III

110. 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.

111. 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.

112. 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.

113. AMERICAN LITERATURE. Mr. Whicher. *Fall Semester*
A study of the major writers in this field.

120. 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.

130. 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*

ASSISTANT PROFESSOR: HEDLEY H. RHYS

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

Since it is the objective of the Department to foster an intelligent comprehension of the visual arts rather than to 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 in course and majors and minors in 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 will take advanced courses in their numerical order. For other students advanced courses need not be taken in numerical sequence.

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

Majors and Minors in Honors: Majors in honors take four seminars in the Department. In special cases the seminar in Aesthetics may be substituted for one in 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 (Fall semester).* Consideration is given in the first four weeks to 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 (Spring semester).* European and American architecture, sculpture and painting from the fifteenth century to the present day are studied from the same points of view and with the same methods as in the first semester. Three hours of lectures a week and one bi-weekly conference hour.

11. DESIGN IN DRAWING AND PAINTING. Mr. Rhys. *Spring 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. *Fall Semester*
 The development of the forms of architecture, sculpture and painting as expressing various cultural patterns of ancient civilizations: Egypt, Iran, Mesopotamia, Greece and Rome.
13. MEDIEVAL ART. Mr. Walker. *Spring Semester*
 A study of the relationship between art and society in Europe and the Near East from the fourth through the fourteenth centuries. The ideas and institutions which were instrumental in shaping Christian art during its formative stages of development. Special emphasis is placed on the Romanesque and Gothic periods in France: the abbey and the cathedral.
14. ITALIAN RENAISSANCE ART. Mr. Rhys. *Fall Semester*
 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. NORTHERN RENAISSANCE AND BAROQUE PAINTING. Mr. Walker. *Spring Semester*
 Developments in painting and drawing during the fifteenth, sixteenth and seventeenth centuries in France, the Netherlands, Germany and Spain through the study of individual artists such as the Van Eycks, Roger van der Weyden, Jean Fouquet, Dürer, Gruenewald, Holbein, El Greco, Rubens, Rembrandt, Vermeer, Poussin and Velasquez.
16. MODERN PAINTING. Mr. Rhys. *Fall 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. *Fall Semester*
 Architecture, sculpture and painting in North America from the Colonial Period to the present day, their connection with European art and their significance as a reflection of American culture.
18. MODERN BUILDING. Mr. Walker. *Spring Semester*
 An introduction to the nature of architecture and the function of the architect through a study of developments in European and American building during the late nineteenth and twentieth centuries. The specific influence of economic, technological and social changes upon design and structure. Emphasis placed on the study of original examples in the Philadelphia area and on the work of such men as Sullivan, Wright, Mies van der Rohe, Gropius and Le Corbusier.
 The prerequisite of Fine Arts 1-2 is waived for students in Engineering.

HONORS SEMINARS

101. 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.

102. NORTHERN RENAISSANCE AND BAROQUE PAINTING. 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.

103. 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.

104. 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.

History

PROFESSOR: MARY ALBERTSON, *Chairman*

ASSOCIATE PROFESSORS: PAUL H. BEIK

GEORGE P. CUTTINO (part-time)*

JAMES A. FIELD, JR.*

FREDERICK B. TOLLES (part-time)*

ASSISTANT PROFESSORS: LAURENCE D. LAFORE

THEODORE H. VON LAUE *

INSTRUCTORS: JOHN L. TEALL

RUSH E. WELTER

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

There is a group of courses (1, 2, 3, 4, 5) designed primarily to familiarize students with contemporary American civilization: its European backgrounds; England's influence, particularly through her literature, her law, and her constitution; and the heritage and the place in the world of the United States itself.

There is another group of courses (11, 12, 13, and 14) which are intended to introduce history majors as well as majors in other departments to the understanding of a foreign culture. All except course 14 may be taken by special arrangement without any prerequisite. It is suggested that freshmen and sophomores who do not intend to major in history should whenever possible elect these courses, even at the expense of not being able to take some of the work offered on England and the United States, for the reason that the cultures they treat are different from our own and can be touched on only briefly in History 1-2.

REQUIREMENTS AND RECOMMENDATIONS FOR A MAJOR IN HISTORY

The 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 18 half courses. Any freshman or sophomore who wishes to keep open the possibility of a major in history should ask the chairman of the department for advice on courses. Languages which are most useful to students of history and which are required by most graduate schools are French and German.

COURSE WORK FOR A MAJOR

History 1-2 should be taken in the freshman year if possible. Most of the courses listed below may be taken in the sophomore year, but in most cases it is wise to

* On leave of absence, 1951-52.

make one of the choices either a term of American history (4 or 5) or a term of English history (3). If the choice has to be made between a second term of American history and a first term of English history, the latter should be chosen.

The comprehensive examination includes a choice of questions on all the history courses taken by the individual major during the junior and senior years, and also more general questions on the fields of European, English, and American history reviewed in Special Topics (Course 65). All major students should elect this course.

The department takes a special responsibility for help in planning the entire program from at least the beginning of the sophomore year. We record the whole field of special competence of our majors so that the information can be given in letters of recommendation, etc. when it is desirable. A major in history may, for instance, be described as a major in history with emphasis on the social sciences, or with emphasis on American civilization, or French civilization, or with emphasis on international relations or Russian studies.

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 requirement for graduation for all students in the divisions of the humanities and the social sciences, and it is a prerequisite to all other work in history except in cases indicated. 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.
A survey of the history of the English people from the middle ages to the present day.
4. THE UNITED STATES BEFORE 1865. Mr. Field or Mr. Welter. *Fall Semester*
An advanced course on American history. Special help on the writing of long papers is given in connection with this course.
5. THE UNITED STATES SINCE 1865. Mr. Field or Mr. Welter. *Spring Semester*
An advanced course on American history.
11. THE OTHER AMERICAN REPUBLICS. Mr. Lafore. *Fall Semester*
The emphasis is on Mexico, Brazil, and Argentina. This is recommended for majors in Spanish as well as for majors in history, and as a general elective.
12. FRANCE. Miss Albertson.
The history of France from Roman times to the present day. This is recommended for majors in French as well as for majors in history and as a general elective.
13. GERMANY. Mr. Von Laue. (Not offered in 1951-52.)
The history of modern Germany from the Napoleonic era to the present. This is recommended for majors in German as well as for majors in history and as a general elective.
14. RUSSIA. Mr. Beik or Mr. Von Laue. *Fall Semester*
The history of modern Russia. The course begins with the reign of Peter and gives half its time to the period since the Revolution.

21. QUAKERISM. Mr. Tolles. (Not offered in 1951-52.)
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. It may be taken without a prerequisite.
30. RECENT HISTORICAL TRENDS. Mr. Beik or Mr. Lafore. *Fall Semester*
A course designed for students who do not intend to take more than one half course in history. It is not open to anyone who has taken History 1-2.
31. AN INTRODUCTION TO ECONOMIC HISTORY.
The emphasis is on the economic history of Europe and America from the fifteenth century to the present.
51. THE WESTWARD MOVEMENT. Mr. Field or Mr. Welter.
European colonization, the struggle for North America, westward expansion, sectional development, problems of growth and integration of newly settled regions.
52. MODERN BRITAIN. Mr. Lafore
Social thought and institutions from 1688 to 1945. Much of the reading is in fiction and biography. Open to juniors and seniors only.
53. THE FRENCH REVOLUTION AND NAPOLEON. Mr. Beik.
The significance of the period 1789-1815 in the development of modern European social theories and political institutions. Open to juniors and seniors only.
54. MEDIEVAL EUROPE. Mr. Cuttino or Mr. Teall. *Spring Semester*
The history of western Europe from the decline of the Roman Empire through the thirteenth century. Open to juniors and seniors only.
55. THE RENAISSANCE. Miss Albertson.
The history of the period of the Renaissance in Europe. Open to juniors and seniors only.
65. SPECIAL TOPICS. All members of the department. *Spring Semester*
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.

HONORS SEMINARS

The following seminars are offered by the department to juniors and seniors to prepare for the examinations for a degree with Honors. They may be taken in any combination. The prerequisite is History 1-2 except in the seminars for which an additional prerequisite is indicated.

American History

101. THE COLONIES AND THE REVOLUTION. Mr. Tolles.
(Not offered in 1951-52.)
Topics in the history of the thirteen colonies and the American states to 1783.
102. PROBLEMS IN AMERICAN HISTORY. Mr. Field or Mr. Welter.
Selected topics in the history of the United States. Open only to students who have taken course 4.

103. PROBLEMS IN AMERICAN HISTORY: FOREIGN. Mr. Field.
(Not offered in 1951-52.)

A study of the United States in the world community. It takes into account wars, industrial, technological and population changes abroad, and changes in national attitudes at home, with special reference for instance to the Louisiana Purchase, the Monroe Doctrine, the Mexican War, the problem of the Pacific, and the World Wars. Open only to students who have taken course 4.

104. THE SUPREME COURT.

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

106. MEDIEVAL ENGLAND. Miss Albertson.

The period from 1066 to 1485.

108. TUDOR AND STUART ENGLAND. Miss Albertson.

The period from 1485 to 1688.

Spring Semester

109. MODERN ENGLAND. Mr. Lafore.

The nineteenth century.

European History

111. MEDIEVAL EUROPE. Mr. Cuttino or Mr. Teall.

The civilization of the twelfth and thirteenth centuries.

Spring Semester

112. THE RENAISSANCE AND REFORMATION. Miss Albertson.

Europe from the fourteenth to the seventeenth centuries.

114. EUROPE 1760 TO 1870. Mr. Beik.

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

115. EUROPE 1870 TO 1939: MODERN EUROPE. Mr. Beik or Mr. Lafore.

Political and social changes which preceded the second world war.

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

The management of international affairs and problems.

117. EUROPE 1900 TO THE PRESENT: EASTERN EUROPE. Mr. Von Laue.

(Not offered in 1951-52.)

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

THESIS (120).

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. It must be finished and a copy filed in the Library by the middle of the senior year.

International Relations

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

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

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

Group I

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

Group II

History 3. ENGLAND
History 11. THE OTHER AMERICAN REPUBLICS
History 12. FRANCE
History 13. GERMANY
History 14. RUSSIA

Group III

Political Science 15. COMPARATIVE GOVERNMENTS
Political Science 16. DEMOCRACY AND DICTATORSHIP
Russian Studies 19-20. SOVIET ECONOMICS AND POLITICS

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

Mathematics and Astronomy

PROFESSORS: HEINRICH BRINKMANN

ARNOLD DRESDEN, *Chairman*

PETER VAN DE KAMP, *Director of Sproul Observatory*

ROSS W. MARRIOTT

ASSOCIATE PROFESSORS: PHILIP W. CARRUTH

JOHN H. PITMAN

INSTRUCTOR: JOANNE ELLIOTT

RESEARCH ASSOCIATES: ROBERT FLEISCHER

SARAH L. LIPPINCOTT

ASSISTANT: JULIA E. DAMKOEHLER

OBSERVER: A. WAYNE CONGER (part-time)

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, among which geometry occupies a central position. The courses offered in the department of Mathematics attempt to combine these points of view and to give a picture of the power and beauty of the subject when studied for its own sake, as well as its many relations to other fields of thought. The study of mathematics is essential as a tool for the understanding of the principles of the physical sciences and engineering; a knowledge of its techniques is indispensable for a successful pursuit of these subjects. The same is becoming increasingly true in the biological sciences and in some of the social sciences.

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, 54. 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.

1-2. FIRST YEAR MATHEMATICS. Mr. Dresden, Miss Elliott, Mr. Marriott.

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.

7. INTRODUCTION TO MATHEMATICS. Mr. Brinkmann.

The purpose of this course is to acquaint the student with the principles and some of the fundamental concepts of mathematics, as well as to bring out its relationship to physical sciences. The course is planned for students who do not intend to take further work in mathematics or natural science and cannot be used as a prerequisite for other courses in mathematics.

11-12. DIFFERENTIAL AND INTEGRAL CALCULUS. Miss Elliott, Mr. Carruth, Mr. Dresden, Mr. Marriott.

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.

Prerequisite: Courses 1-2.

14. THEORY OF EQUATIONS.

Spring 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.

Prerequisites: Courses 1-2, 11-12.

15. SOLID ANALYTIC GEOMETRY.
(Not given in 1951-52.)

Fall Semester

Metric theory of planes, lines and quadric surfaces in Euclidean three-dimensional space, emphasis on the use of determinants and matrices.

Prerequisites: Courses 1-2, 11-12.

19. PROJECTIVE GEOMETRY. Mr. Brinkmann.

Fall 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. Carruth.

Fall Semester

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

Prerequisites: Courses 1-2, 11-12.

52. DIFFERENTIAL EQUATIONS. Mr. Carruth. *Spring 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. *Spring 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; Functions of a Complex Variable.
 Prerequisites: Courses 1-2, 11-12, 51, 52 (Course 52 may be taken concurrently).
54. PROBABILITY AND STATISTICS. *Spring Semester*
 This course deals with the mathematical theory of statistics, based upon a study of the theory of probability. An introduction to the theory of sampling and statistical inference will be given.
 Prerequisites: Courses 1-2, 11-12, 51 (Course 51 may be taken concurrently).
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

101. ADVANCED CALCULUS. *Fall Semester*
 The subject matter of this seminar includes the differential calculus of functions of several variables, the elements of vector analysis, multiple integrals, line and surface integrals, improper integrals, infinite series, uniform convergence of infinite processes. The treatment of these various subjects is sufficiently detailed to give the student an introduction to the rigorous processes of analysis.
102. DIFFERENTIAL EQUATIONS. *Spring Semester*
 This seminar 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.
103. 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 distributions, sampling theory and a short introduction to the theory of statistical estimation.
104. MODERN ALGEBRA.
 This seminar deals with the theoretical properties of such formal systems as groups, rings, fields and vector spaces. While these concepts will be illustrated by many concrete examples, the emphasis will be on the abstract nature of the subject; the student will thus be introduced to an important aspect of modern mathematics. Among the specific topics to be studied are the algebra of matrices, of classes and of ideals.

105. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE.

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

106. 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.

107. DIFFERENTIAL GEOMETRY.

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

108. 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.

109. ALGEBRAIC GEOMETRY.

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.

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.

101. SPHERICAL ASTRONOMY.

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

102. ORBIT COMPUTATION.

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

103. CELESTIAL MECHANICS.

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

104. 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.

105. 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.

106. STELLAR 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. 60), 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.

Modern Languages and Literatures

PROFESSORS: HAROLD MARCH (French)

EDITH PHILIPS, *Chairman* (French)

ASSOCIATE PROFESSORS: LYDIA BAER (German)

KARL REUNING (German)

JAMES D. SORBER (Spanish)

LEON WENCELIUS (French)

ASSISTANT PROFESSORS: HILDE D. COHN (German)

ELISA ASENSIO (Spanish)

INSTRUCTORS: OLGA LAMKERT (Russian)

JEANNE THEISS (French)

The department of modern languages and literatures aims to give its majors a comprehensive view of the literature and culture represented by these languages, in relation to other humanistic studies. Courses are conducted in the language of the literature being studied, and progress in the language is always one of the aims.

The elementary and intermediate courses are designed to prepare the students for advanced work in literature as well as to meet college and departmental requirements. It is not impossible, with some extra reading, to major or to enter honors seminars in a language started in college. Prerequisites and recommended subjects for majors are noted under the listing of each language section.

French

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

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

Required:

French 11-12 Introduction to Literature, or evidence of equivalent work.

French 6 Advanced Composition and Diction.

Recommended supporting subjects:

French History, History of Modern Philosophy, Psychology, courses in other literatures, 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.

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

COURSES

1-2. ELEMENTARY FRENCH.

For students who begin French in College. Equivalent to two years' French in high school. The initial approach is oral but a foundation is laid for a reading knowledge. No credit is given for French 1 alone. 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. Every effort is made to help the student to increase his vocabulary and to discuss what he has read in the French language. Completion of French 4 satisfies the language requirement. The normal course to follow French 4 is French 11. (Both courses are offered each semester.)

6. ADVANCED COMPOSITION AND DICTION. Miss Theiss.

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

11, 12. INTRODUCTION TO LITERATURE.

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

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

14. PROSE DE LA RENAISSANCE.

Readings from Rabelais, Calvin, Montaigne.

15. LA PENSÉE DU 17e 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.

20. POÉSIE MODERNE.
Baudelaire, the Symbolists, modern tendencies.
21. LITTÉRATURE DU MOYEN AGE.
Readings from medieval literature in modern French translations.
22. ROMAN MODERNE.
Representative novelists from Balzac to the present.
23. PROUST AND GIDE.
(Not given in 1951-52.)
The dominant writers of the early twentieth century. Novels and essays which illustrate their importance in contemporary literature.
24. SAINT-EXUPÉRY, MALRAUX, SARTRE, CAMUS.
Neo-humanism and contemporary tendencies.
30. MOUVEMENT DES IDÉES.
Ideological background of modern literature.
51. SPECIAL TOPICS. (For senior majors.)
Readings selected to fit the needs of individual seniors and to supplement their selection of courses. Not designed to prepare for any specific type of comprehensive examination but to give an opportunity in the senior year for the student to see his courses in perspective and to see possible relationships with work in other fields.

HONORS SEMINARS

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

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

German

ASSOCIATE PROFESSORS: LYDIA BAER
KARL REUNING *
ASSISTANT PROFESSOR: HILDE D. COHN

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

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

Required:

German 11-12. Introduction to German Literature.

Recommended supporting subjects:

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

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

1-2. ELEMENTARY GERMAN.

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.

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.

Fulfills the college requirement for all students who wish to learn reading through the medium of literary and cultural material, of the type of 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.

6. WRITING AND SPEAKING GERMAN.

Composition and conversation. Introduction to *Volkskunde*: the social and cultural backgrounds of modern Germany.

Prerequisite: Course 3-4 or equivalent.

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

Full Course

A special reading course designed for those who wish to acquire a reading knowledge of German in a single year. German 7-8 may be used to fulfill the requirements of certain departments or of graduate schools, but not to satisfy the college foreign language requirement. German 7-8 supplants the former Half Course in Scientific German (German 5).

* Absent on leave, spring semester, 1951-52.

11, 12. INTRODUCTION TO GERMAN LITERATURE.

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.

13. DIE DEUTSCHE ROMANTIK.

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 11-12 or equivalent.

14. DIE DEUTSCHE NOVELLE VON GOETHE BIS THOMAS MANN.

Significant examples of this typically German genre will be read and interpreted as to contents, form and historical importance, as well as its relations to other European literatures. Authors: Goethe, Eichendorff, Kleist, Stiffen, Meyer, Keller, Storm, Thomas Mann.

15-16. DIE GOETHE ZEIT.

Goethe, Schiller and their contemporaries in relationship to their times. Their ideas and aesthetic problems discussed and reflected in their works.

18. MODERNE DEUTSCHE LITERATUR.

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 11-12 or equivalent.

19. GERMAN AUTHORS IN TRANSLATION.

Half Course

Lectures in English; discussion; frequent book reports in English by students. Open to all students.

HONORS WORK

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

101. MIDDLE HIGH GERMAN LITERATURE AND PHILOLOGY.

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

102. THE AGE OF LUTHER.

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.

103. DEUTSCHES BAROCK UND AUFKLAERUNG.

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

104. GOETHE.

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

105. DIE DEUTSCHE ROMANTIK.

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

106. POETISCHER REALISMUS.

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.

107. DEUTSCHE LITERATUR SEIT 1900.

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.

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

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.)

Italian

(Not given in 1951-52)

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.

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.

COURSES

1-2. ELEMENTARY ITALIAN.

Full Course

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

3. INTERMEDIATE ITALIAN.

Grammar review and composition. Reading from modern literature.

4. INTERMEDIATE ITALIAN.

Readings from Dante's *Inferno*.

11-12. INTRODUCTION TO MODERN ITALIAN LITERATURE.

Representative texts of modern Italian writers.

Russian

INSTRUCTOR: OLGA LAMKERT

Courses in the Russian language may be used to fulfill the college's language requirement, but cannot comprise a major subject. These courses are part of the Russian Studies program offered at Bryn Mawr, Haverford and Swarthmore Colleges (see p. 141).

- 1-2. ELEMENTARY RUSSIAN. Miss Lamkert. *Full Course*
Vocabulary and grammar. Reading of easy short stories and dialogues. Area reader. Short stories by Lermontoff, Pushkin, Tchehoff. Oral and written translation into Russian. Easy compositions.
- 3, 4. INTERMEDIATE RUSSIAN. Miss Lamkert. *Full Course*
Readings: *Inspector General* by Gogol, *Captain's Daughier* by Pushkin, and other short stories. Discussion of readings in Russian. Translation of essays and stories from English to Russian.
11. INTRODUCTION TO LITERATURE. Miss Lamkert.
Literature of 19th and beginning of 20th century. Readings: Dostoyevsky, Turgenev, Tolstoy. Compositions.
12. INTRODUCTION TO LITERATURE. Miss Lamkert.
Additional reading in contemporary literature and periodicals. Compositions.

Spanish

ASSOCIATE PROFESSOR: JAMES D. SORBER

ASSISTANT PROFESSOR: ELISA ASENSIO

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

Required:

Spanish 11-12 Introduction to Literature.

Recommended supporting subjects:

Introduction to Philosophy, Psychology, English or 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.

9. ADVANCED COMPOSITION AND DICTION.

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

11, 12. INTRODUCTION TO SPANISH LITERATURE.

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

13. EL TEATRO MODERNE.

Plays of the major Spanish writers in the nineteenth and twentieth centuries.

14. LA NOVELA HISPANOAMERICANA.

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 procurors of Modernism; Modernism; contemporaries.

18. LA NOVELA ESPAÑOLA DEL SIGLO XIX.

Outstanding novelists from Fernán Caballero to Blasco Ibañez.

20. SPECIAL TOPICS FOR SENIOR MAJORS.

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

SEMINARS

101. LA NOVELA HISPANOAMERICANA.

102. LA NOVELA ESPAÑOLA DEL SIGLO XIX.

103. LAS OBRAS DE CERVANTES.

104. EL TEATRO MODERNO.

105. EL TEATRO DEL SIGLO DE ORO.

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

Music

PROFESSOR: ALFRED J. SWAN, *Chairman*

ASSISTANT PROFESSOR: IRMA WOLPÉ (part-time)

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. ELEMENTARY MUSIC THEORY AND APPRECIATION. Mr. Swan. *Full Course*
This course is devised for the unprepared music lover. It will deal primarily with the fundamental laws of the musical language: intervals, scales, musical notation, inter-relation of consonance and dissonance, and the formation of melody, chords, etc. In the course of the above, a number of models will be referred to, from the works of medieval, Renaissance, and modern composers, also Bach and the classics.
- 11-12. HARMONY AND COUNTERPOINT. Mr. Swan. *Full Course*
This course is devised for beginning composers. Prerequisite is Music 1-2, or its equivalent.
- 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. There is a charge of seventy-five dollars for this course.

31-32. ADVANCED MUSICAL COMPOSITION AND HISTORY. Mr. Swan. *Full Course*

Conducted as a Seminar for advanced students who have already had some of their works performed at student concerts and who can take part in discussions of orchestral writing, scoring a cappella, and the large musical forms (historically and practically).

HONORS WORK

To be admitted to honors a student must have completed Music 11-12 and have shown his aptitude for either composition or musicology, or for both. Honors students and music majors in course should take advantage of the offerings at Bryn Mawr College and the University of Pennsylvania. They should normally also have had prolonged instruction in piano playing, so as to be able to show their new compositions at the piano.

Philosophy and Religion

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

ASSOCIATE PROFESSORS: RICHARD B. BRANDT, *Chairman*
JOHN M. MOORE *

ASSISTANT PROFESSORS: MONROE C. BEARDSLEY
RODERICK FIRTH

INSTRUCTORS: WILLIAM HORDERN
ERNA F. SCHNEIDER (part-time)

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

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

REQUIREMENTS AND RECOMMENDATIONS FOR MAJORS AND MINORS

The minimum prerequisite to admission as a major in either philosophy or religion will normally be the completion of course 1 and one additional course in philosophy or religion, respectively. Students who major in philosophy must obtain permission in order to count for credit in fulfillment of their major requirement more than one course in religion; and students who major in religion must obtain permission in order to count for credit in fulfillment of their major requirement more than one course in philosophy. (Course 25 may be counted either as a course in philosophy or as a course in religion.) As supporting material for a major program in philosophy, the department recommends work in psychology and physics.

1. INTRODUCTION TO PHILOSOPHY. All instructors. *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 is a prerequisite for any other course in philosophy. 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.

* Absent on leave, first semester, 1951-52.

11. **ETHICS.** Mr. Brandt and Mr. Firth. *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.** Miss Schneider. *First Semester*
 A beginning study of the tests of valid reasoning, both inductive and deductive. Practical application of logic and scientific method will be emphasized. The formal apparatus will be kept to a minimum.
13. **SELECTED MODERN PHILOSOPHERS.** Mr. Firth. *Second Semester*
 A history of modern philosophy with primary emphasis on Descartes, Hume, and Schopenhauer, considered as representatives of three great traditions of modern thought. This course may appropriately be combined with work in any of the three divisions.
14. **ANCIENT PHILOSOPHY.** Mr. Firth. *First Semester*
 A study of ancient philosophy in all its aspects: ethics, political theory, metaphysics, and aesthetics. Primary emphasis is placed on the dialogues of Plato; briefer attention is given to the pre-Socratics, Plato's contemporaries, and Aristotle. Recommended for students of literature and the social sciences.
15. **PHILOSOPHY OF SCIENCE.** *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.
16. **CONTEMPORARY PROBLEMS.** Mr. Brandt. *First Semester*
 Contemporary answers to fundamental problems, such as the functions of language, the definition of truth, the foundations of knowledge, the nature of the self, and the perception of physical things. Readings in the works of the leading philosophers, such as Russell, Lewis, Ayer, and Dewey.
17. **AESTHETICS.** Mr. Beardsley. *Second 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.** *Second Semester*
 A study of the methods of the social sciences, and of philosophical problems arising in this domain. Attention will be given to theories of sociocultural change, with particular emphasis on problems of historical interpretation.
25. **PHILOSOPHY OF RELIGION.** Mr. Moore. *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. **BIBLICAL RELIGION AND ETHICS.** Mr. Moore. *First Semester*
 (Not offered in 1951-52.)
 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. *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. *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. *First Semester*
An historical and comparative study of the world's religions: primitive religions, ancient religions, Hinduism, Buddhism, Confucianism, Mohammedanism. Stress will be placed upon the ethical and philosophical teachings of these religions and their role in the interaction of modern cultures. Comparisons and contrasts will be made between these religions and Judaism and Christianity.
36. PROBLEMS OF CHRISTIANITY TODAY. Mr. Hordern. *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. *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.
- PSYCHOLOGY 60. SYSTEMATIC PSYCHOLOGY. Mr. Köhler.
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.)

HONORS WORK

For admission to honors work in philosophy, the requirement is normally at least two semester courses, one of which must be the *Introduction to Philosophy*, unless with special permission. Students should normally present as their second course one selected from courses numbered 11 to 25. For admission to honors work in religion, the requirement is at least two semester courses, one of which, unless with special permission, will be the *Introduction to Philosophy*, and the other of which will normally be selected from courses numbered 25 to 45.

101. MORAL PHILOSOPHY. Mr. Firth.
A seminar in ethics, both systematic and historical. The first part of the semester is devoted to the basic theory of value and obligation; the second part to problems concerning justice, liberty, reward, punishment, human rights, and other issues of social ethics.
102. PLATO. Mr. Firth.
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.

103. 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.
104. 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.
105. PHILOSOPHY OF SCIENCE. Miss Schneider.
An investigation into the nature of scientific knowledge, the distinctions between sciences, the methods appropriate to them. Analyses of the concepts of probability, induction, verifiability, explanation, space, time, causality, as these are used in science.
106. 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.
107. SOCIAL PHILOSOPHY. Miss Schneider.
A study of the methods of the social sciences, and of philosophical problems arising within this domain. The problems of historical interpretation will receive emphasis. Materials will be drawn from the social sciences with which the members of the seminar are most familiar.
111. THE IDEA OF GOD IN WESTERN THOUGHT. Mr. Hordern.
An examination will be made of writings which have contributed most to Western concepts of God. The study will include Plato, Aristotle, the Bible, Athanasius, Augustine, St. Thomas Aquinas, Luther, Calvin, Schleiermacher, Rudolf Otto and Paul Tillich.
112. MODERN RELIGIOUS PHILOSOPHERS. Mr. Hordern.
This seminar will concentrate on representative religious thinkers of the present century, with the reading of their major works. The seminar will include Jacques Maritain, F. R. Tennant, Reinhold Niebuhr, E. S. Brightman, A. N. Whitehead, H. N. Wieman.
120. THESIS.
A thesis may be submitted by majors in the department in place of one of the seminars, upon application by the student and at the discretion of the Department.

Physical Education for Men

DIRECTOR OF ATHLETICS AND PHYSICAL EDUCATION FOR MEN AND ASSOCIATE PROFESSOR: WILLIS J. STETSON

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

ASSISTANTS: ROBERT BACH
AVERY F. BLAKE
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	*Soccer	Tennis
*Football	Swimming	Touch Football

WINTER ACTIVITIES

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

SPRING ACTIVITIES

*Baseball	*Lacrosse	*Tennis
*Golf	Softball	*Track

* Indicates intercollegiate competition.

Physical Education for Women

ASSOCIATE PROFESSOR: VIRGINIA RATH,* *Chairman*

ASSISTANT PROFESSORS: IRENE MOLL
MAY E. PARRY

ASSISTANT: JANET SCANTLEBURY (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, Miss Rath. *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. *Fall and Spring*
Class and Varsity.
5. SWIMMING. Miss Rath. *Fall, Winter and Spring*
Beginner, intermediate and advanced classes in strokes and diving.
Class and Varsity.
6. BASKETBALL. Miss Moll. *Winter*
Class and Varsity.

* Absent on leave, Fall Semester.

7. BADMINTON. Miss Rath, Miss Parry, Miss Moll, Mr. Faulkner. *Winter*
Class and Varsity.
8. SOFT BALL. Miss Moll. *Spring*
Class and Varsity.
9. LACROSSE. *Spring*
Class and Varsity.

RHYTHMIC ACTIVITIES

10. DANCING. Miss Scantlebury. *Fall, Winter and Spring*
Class and Club.
11. FOLK AND SQUARE DANCING. Miss Moll. *Fall, Winter and Spring*
Open to men students also.

DEVELOPMENTAL AND SERVICE ACTIVITIES

12. TUMBLING. MISS RATH. *Winter*
13. BODY MECHANICS. Miss Rath. *Winter*
Required of all first-year students whose posture indicates a need for it.
14. RECREATIONAL LEADERSHIP. Miss Moll. *Winter and Spring*
Theory and practice teaching in recreational activities of all kinds. Given in alternate years.
15. RED CROSS LIFE SAVING. Miss Rath and Red Cross Field Representative. *Winter and Spring*
Senior and instructors' courses.

Physics

PROFESSORS: WINTHROP R. WRIGHT
WILLIAM C. ELMORE, *Chairman*

ASSOCIATE PROFESSOR: 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, inasmuch 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.

Full Course

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, hydro-dynamics, 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.

† Absent on leave, 1951-52.

HONORS WORK

101. 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.
102. ELECTRICITY AND MAGNETISM. Mr. Elmore. *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.
103. 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.
104. 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*

ASSISTANT PROFESSORS: GERARD J. MANGONE
JOHN I. MICHAELS, JR.
MURRAY S. STEDMAN, JR.
PAUL N. YLVISAKER *

INSTRUCTOR: JOHN W. CHAPMAN **

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, preferably, take Course 1-2 in the freshman year and Course 11 in the sophomore year. Students who desire to concentrate on international affairs without taking the full International Relations Program referred to below may substitute Comparative Government (Political Science 15) or Soviet Economics and Politics (Political Science 19-20). Majors are also required to take Economics 1-2. Courses in Statistics (Economics 4) and in American History are recommended. Political Theory, either in seminar or in course, is required of all majors; course majors should take course 60.

PROGRAM IN INTERNATIONAL RELATIONS

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

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

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

* Absent on leave, fall semester, 1951-52.

** For the fall semester, 1951-52.

GROUP I

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

GROUP II

History 3—England
History 11—The Other American Republics
History 12—France
History 13—Germany
History 14—Russia

GROUP III

Political Science 15—Comparative Government
Political Science 16—Democracy and Dictatorship
Russian Studies 19-20—Soviet Economics and Politics

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

COURSES

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

Full Course

The foundations of politics—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 1-2 is open to all students and is prerequisite to all other courses offered by the department. Credit is not given for a single semester of this course.

11. AMERICAN STATE AND LOCAL GOVERNMENT. Mr. Ylvisaker. *Spring 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 POLITICS. Mr. Mangone.

Fall Semester

An introduction to the principles and problems of international politics—including the study of political geography, the composition and balance of international power, such worldwide phenomena as nationalism and imperialism, and the techniques of diplomacy.

13. INTERNATIONAL LAW AND ORGANIZATION. Mr. Mangone.

(Not offered in 1951-52.)

The development of international law and organization—including a study of the major problems of international law and world government, the organization and work of the League of Nations, the United Nations, regional agencies, and international administration.

15. COMPARATIVE GOVERNMENT. Mr. Stedman.

Alternate years, Fall Semester

A critical study of the major political systems and of their significance for the problem of constitutional order. Special emphasis is placed on the governments of Western Europe and of the British dominions.

16. DEMOCRACY AND DICTATORSHIP. Mr. Pennock. *Spring 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.
- 19-20. SOVIET ECONOMICS AND POLITICS. Mr. Michaels. *Full Course*
 (Also listed as Economics 19-20 and Russian Studies 19-20.)
 The structure and operation of the economic and political institutions of the Soviet Union, described and analyzed in the light of their theoretical and historical background.
51. PUBLIC ADMINISTRATION. Mr. Chapman. *Fall Semester*
 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. Chapman. *Fall Semester*
 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. AMERICAN PARTY POLITICS. Mr. Stedman. *Alternate years, Fall Semester*
 (Not offered in 1951-52.)
 An historical and functional analysis of American political parties, including a study of interest groups, public opinion, electoral devices, political leaders, and proposals for the reorganization of the existing party structure.
54. HISTORY OF POLITICAL THEORY. Mr. Pennock. *Fall Semester*
 (Not offered in 1951-52.)
 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.
55. AMERICAN POLITICAL THOUGHT. Mr. Stedman. *Spring Semester*
 (Not offered in 1951-52.)
 A study of the development of American political thought: the colonial period; the Revolution; Jeffersonian Democracy; Jacksonian Democracy; the nature of the Union; newer currents, including the progressive movement, labor, and conflicts between church and state.
56. JURISPRUDENCE. Mr. Pennock.
 (Not offered in 1951-52.)
 A study of the sources and nature of law; historical, sociological and philosophic approaches to legal theory; the nature of the judicial process; key problems of jurisprudence illustrated by case study in selected areas of American constitutional law.

57. AMERICAN FOREIGN POLICY: THE FAR EAST AND THE NEAR EAST. Mr. Mangone.
Spring Semester
The study of American foreign policy towards selected areas of the Far East and the Near East, including an analysis of underlying factors, contemporary problems of the region, and the policy determinants within the United States.
58. AMERICAN FOREIGN POLICY: LATIN AMERICA AND EUROPE. Mr. Mangone.
(Not offered in 1951-52.)
The study of American foreign policy towards selected areas of Latin America and Europe, including an analysis of underlying factors, contemporary problems of the region, and the policy determinants within the United States.
60. SPECIAL TOPICS IN POLITICAL SCIENCE. Mr. Stedman. *Spring Semester*
This course, conducted in seminar fashion, is designed for senior majors. By means of papers and assigned readings it covers aspects of political science not elsewhere intensively developed and helps the students to integrate materials studied previously.

HONORS WORK

Prerequisite: Political Science 1-2. The following seminars prepare for examination for a degree with Honors:

101. POLITICAL THEORY. Mr. Pennock. *Spring Semester*
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.
102. POLITICS AND LEGISLATION. Mr. Stedman. *Fall Semester*
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.
103. PROBLEMS IN GOVERNMENT AND ADMINISTRATION. Mr. Chapman and Mr. Ylvisaker. *Each Semester*
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, government reorganization, administrative areas, governmental corporations, and problems of public service personnel administration.
104. INTERNATIONAL POLITICS, LAW, AND ORGANIZATION. Mr. Mangone. *Fall Semester*
A comprehensive inquiry into the principles and problems of international politics, international law, and international organization.
105. AMERICAN FOREIGN POLICY. Mr. Mangone. *Spring Semester*
A study of the economic, political and strategic factors in American foreign policy since 1890.
106. PUBLIC LAW AND JURISPRUDENCE. Mr. Pennock. *Spring Semester*
Sources and nature of law; historical, sociological, philosophic, and "realistic" approaches to law; key problems of jurisprudence illustrated by study of the fields of federalism and civil liberties in American constitutional law.
120. THESIS. All members of the department.
Approval 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 **

JOSEPH B. SHANE, *Vice-President and Professor of Education*

RICHARD S. CRUTCHFIELD, *Chairman*

ASSOCIATE PROFESSORS: WILLIAM C. H. PRENTICE

HANS WALLACH †

ASSISTANT PROFESSORS: CAROL F. CREEDON

HENRY GLEITMAN

PETER MADISON

LECTURER: ALICE K. BRODHEAD

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

REQUIREMENTS AND RECOMMENDATIONS

Courses 1 and 2 are prerequisite to all further courses and seminars in psychology. Course majors are required to take Courses 3, 52, and 53. Course 63 is recommended.

Honors majors are required to take courses 1, 2, 3, and advised to take during their freshmen and sophomore years introductory work in zoology and, if possible, work beyond the introductory course in philosophy. A reading knowledge of German is useful.

Courses in education—10, 12, 13, 14, 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, 10, 11, 12 and 13.

* Absent on leave, first semester, 1951-52.

** Absent on leave, 2nd semester, 1951-52.

† Absent on leave, 1951-52.

Psychology

1. INTRODUCTION TO PSYCHOLOGY. Mr. Crutchfield. *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. GENERAL PSYCHOLOGY. Mr. Gleitman. *Each Semester*
An extension of the introductory course, giving special attention to problems of cognition including facts and theories of perception, learning, memory, and thinking. In general, the orientation is historical, and students will learn about major theoretical movements in the realm of cognition.

3. PSYCHOLOGICAL METHODS. *Spring 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: a survey of the types of experimental designs, the methods of measurement, and the kinds of apparatus employed in different psychological studies, and an analysis of the historical background of selected contemporary theoretical problems.
Prerequisite: Course 1.

52. MOTIVATION. Mrs. Creedon. *Fall 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. Asch, Mr. Prentice. *Fall 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 3.

54. ANIMAL EXPERIMENTATION. Mr. Gleitman.
(Not offered 1951-52.)
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. Creedon. *Spring 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. Mrs. Creedon. *Spring Semester*
 A study of some basic processes and products of interaction between persons and groups and between groups. The following topics are covered: The formation of the social field of the individual. Perception of persons as psychological entities. Perception of groups. Formation of the self; social relations of the self. Psychological forces supporting group-belonging. Functional consequences of group membership. The psychological investigation of group processes. Group requirements and group standards. Formation and change of attitudes.
 Prerequisites: Courses 1 and 2.
57. DIAGNOSIS OF ABILITIES AND PERSONALITY. Mr. Madison. *Fall Semester*
 Theory and techniques of assessing personality, intelligence, ability, and interest. Actual practice with such tests and procedures as the Thematic Apperception Test, Rorschach, Wechsler-Bellevue, Stanford-Binet, Non-Directive Interview, and other methods of diagnosis. Study of theory and research on the concept of measurement in psychological testing.
 Prerequisites: Courses 1, 2 and 3.
58. PERSONALITY THEORY. Mr. Madison. *Fall Semester*
 A study of the leading concepts of personality theory, including the psycho-analytic, Lewinian, socio-cultural, self-theorists and other non-systematic formulations. Application of these concepts will be made to case studies.
 Prerequisites: Courses 1 and 2.
59. PSYCHOPATHOLOGY. Mr. Madison. *Spring Semester*
 A study of the current theories of mental illness and of the main forms of mental disorders. Theories and techniques of therapy are considered. Extensive use of the case study method. Emphasis is on the evaluation of theories of psychopathology and of their significance for normal personality theory.
 Prerequisites: Courses 1 and 2. Course 58 strongly recommended but not required.
60. SYSTEMATIC PSYCHOLOGY. Mr. Köhler. *Spring 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, 3 and 53.
63. **PSYCHOLOGICAL TUTORIAL.** The staff. *Spring 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

10. **INTRODUCTION TO EDUCATION.**
 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.**
 The application of psychological principles concerned with the processes of thinking, learning and motivation to the problems of education.
 Prerequisites: Courses 1, 2.
12. **PRINCIPLES OF SECONDARY EDUCATION.**
 A study of the principles of secondary education, with emphasis upon aims and organization. Visits to nearby schools are made.
13. **METHODS OF SECONDARY EDUCATION.** Mr. Shane. *Fall Semester*
 A review and critical analysis of the methods used in secondary education.
14. **INTRODUCTION TO TEACHING.** Mrs. Brodhead.
 Weekly seminar plus 3 hours a week in the local schools. Enrolment limited to 15.

HONORS SEMINARS

101. **PERCEPTION.** Mr. Prentice.
 Reading and discussion combined with independent experimental projects. The student is expected to know the basic facts about human perceptual mechanisms, particularly visual ones, by the time he has completed this seminar. Specific topics covered are: color vision, grouping and form, depth and distance, size, movement, influences of learning and of needs or attitudes, general theory of perception. When time permits, some attention is given to parallel problems in other senses.
102. **LEARNING AND THINKING.** Mr. Asch, Mr. Gleitman.
 Deals with principles of adaptive behavior; the functions of memory and thinking; the nature of understanding and problem-solving; the nature of intelligence.
103. **MOTIVATION.** Mrs. Creedon, Mr. Crutchfield.
 A systematic and experimental approach to the dynamics of behavior, based on material drawn from the laboratory and the clinic, and covering the following topics: instinctive behavior and biological drives; the relation of motivation and learning; derived motivation; the relation of perception and motivation; frustration and its relation to aggression, regression; level of aspiration; success and failure; substitution and sublimation; ego needs and the nature of the ego; emotion and feeling; contemporary theories of motivation.

104. **INDIVIDUAL IN SOCIETY.** Mr. Asch, Mr. Crutchfield, Mrs. Creedon.

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

105. **PERSONALITY.** Mr. Madison.

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.

106. **DEVELOPMENT.** Mr. Prentice.

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

107. **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.

120. **THESIS.** All members of the department.

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

MASTER'S DEGREE

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

The program of work for the Master's degree requires the completion of four seminars, or their 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.

Russian Studies

The Russian Studies program, inaugurated in the fall of 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 is offering courses in Russian language, history, and economic and political institutions.

Courses in this group cannot themselves comprise a major subject. Courses in the Russian language may be used to fulfill the college foreign 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*
Vocabulary and grammar. Reading of easy short stories and dialogues. Area reader. Short stories by Lermontoff, Pushkin, Tchehoff. Oral and written translation into Russian. Easy compositions.
- 3, 4. INTERMEDIATE RUSSIAN. Miss Lamkert. *Full Course*
Readings: *Inspector General* by Gogol, *Captain's Daughter* by Pushkin, and other short stories. Discussion of readings in Russian. Translation of essays and short stories from English to Russian.
11. INTRODUCTION TO LITERATURE. Miss Lamkert.
Literature of 19th and beginning of 20th century. Readings: Dostoyevsky, Turgenyev, Tolstoy. Compositions.
12. INTRODUCTION TO LITERATURE. Miss Lamkert.
Additional reading in contemporary literature and periodicals. Compositions.

HISTORY

14. RUSSIA. Mr. Beik or 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.

ECONOMIC AND POLITICAL INSTITUTIONS

- 19-20. SOVIET ECONOMICS AND POLITICS. Mr. Michaels. *Full Course*
(Also listed as Economics 19-20 and Political Science 19-20.)
The structure and operation of the economic and political institutions of the Soviet Union, described and analyzed in the light of their theoretical and historical background.

REFERENCE SECTION

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

Visiting Honors Examiners—May-June, 1951

- BIOLOGY:** PROFESSOR JOSEPH BERRY, *Bryn Mawr College*; PROFESSOR GEORGE L. GRAHAM, *University of Pennsylvania*; PROFESSOR GRAYSON P. MCCOUCH, *University of Pennsylvania*; PROFESSOR GEORGE H. PAFF, *Hahnemann Medical College*; PROFESSOR JOHN PREER, *University of Pennsylvania*.
- CHEMISTRY:** PROFESSOR ERNST BERLINER, *Bryn Mawr College*; PROFESSOR JOHN G. MILLER, *University of Pennsylvania*.
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- HISTORY:** PROFESSOR ROBERT F. BYRNES, *Rutgers University*; DR. PHILIP A. CROWL, *Historical Division, Dept. of the Army*; PROFESSOR SIDNEY PAINTER, *Johns Hopkins University*; PROFESSOR ROBERT R. PALMER, *Princeton University*; PROFESSOR WILLIAM BEANY, *Princeton University*.
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Degrees Conferred

June 11, 1951

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LARK HARGRAVES (English Literature)
STEPHEN NORTHUP HAY (Romance Languages)
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NANCY MCDANIEL (Fine Arts)
CLARE MCGRATH (French)
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JOYCE MERTZ (English Literature)
PATRICIA MEYER (*High Honors*—English Literature)
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 WINIFRED ARMSTRONG (Psychology)
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 D. TYNER BROWN (Political Science)
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 ROBIN SARAH LOBECK (Psychology)
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* As of June 12, 1950.

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HARRY KARL IHRIG (Mechanical Engineering)
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* As of June 12, 1950.

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ROBERT LEVIS SHAFFNER (Civil Engineering)

CARTER THOMAS SMITH (Mechanical Engineering)
ASA EDWARD SNYDER (Mechanical Engineering)
EDWARD PALMER STABLER (Electrical Engineering)
JOHN ALOYSIUS VASEY (Mechanical Engineering)
STANLEY MOREY WETHERALD (Mechanical Engineering)
DUDLEY HOOKER WOODBRIDGE (Civil Engineering)
JOHN AREND YNTEMA (Mechanical Engineering)

MASTER OF ARTS

IRWIN FEINBERG (Psychology)
RICHARD G. HENSON (Philosophy)

ALBERT P. PAUL (Chemistry)

MASTER OF SCIENCE

THOMAS E. SWEENEY, JR. (Mechanical Engineering)

ELECTRICAL ENGINEER

THOMAS SUMNER OLIVER

Enrollment of Students by Classes, 1950-51

	<i>Men</i>	<i>Women</i>	<i>Total</i>
Seniors	114	94	208
Juniors	117	86	203
Sophomores	135	102	237
Freshmen	134	109	243
Total	500	391	891
Special	9	4	13
Graduate	7	0	7
	516	395	911

Geographical Distribution

Pennsylvania	261	Maine	2
New York	226	Montana	2
New Jersey	82	South Carolina	2
Massachusetts	42	Arizona	1
Maryland	32	Kansas	1
Illinois	27	Mississippi	1
Ohio	22	South Dakota	1
District of Columbia	21		
Connecticut	16	Total of U. S. Students	875
California	12		
Indiana	10	Brazil	6
Virginia	10	England	4
Wisconsin	10	Germany	3
Florida	9	Nigeria	3
Minnesota	8	Venezuela	3
Colorado	7	China	2
Michigan	7	Hawaii	2
West Virginia	7	Holland	2
Kentucky	6	Japan	2
North Carolina	6	Canada	1
New Hampshire	6	Egypt	1
Tennessee	6	Ethiopia	1
Delaware	4	Indonesia	1
Missouri	4	Lebanon	1
Washington	4	Mexico	1
Alabama	3	Libya	1
Georgia	3	Palestine	1
Iowa	3	Panama	1
Nebraska	3		
Texas	3	Total from Abroad	36
Vermont	3	Grand Total	911
Louisiana	2		

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- GAGER, CHARLES S., Theatres, Gardens and Horticulture. *Science*. v. 95, p. 635-39. June 26, 1942.
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- NASON, JOHN W., Cooperation between Haverford, Bryn Mawr and Swarthmore. *Haverford Review*, v. 1, p. 4-7. Autumn 1941.
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- SWARTHMORE COLLEGE, The Inauguration of John William Nason as President of Swarthmore College, October 26, 1940. In *Bulletin of Swarthmore College*. v. 38, no. 5; First Month 1941. 63 p.
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- WALTON, JEAN B., Recent Changes in Group Activities Program at Swarthmore College. *Journal of the National Association of Deans of Women*. v. 6, p. 164-65. June 1943.
- WISTER, JOHN C., The Arthur Hoyt Scott Horticultural Foundation: a Ten Year History: January 1, 1930 to December 31, 1939. In *Bulletin of Swarthmore College*. v. 37, no. 5. Sixth Month 1940. 89 p.
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Index

- Absence from Classes and Collection, 57
Absence from Examinations, 59
Academic Requirements, committee on, 18, 59
Addams, Jane, Peace Collection (See Swarthmore College Peace Collection)
Administrative Officers, 19-21
ADMISSIONS PROCEDURE, 28-30
 Application Dates, 29
 Scholastic Aptitude and Achievement Tests, 29, 30
 School Subjects Recommended, 29
Advanced Degrees, 60-61
Advanced Standing, 30
Advisers, 46
Alumnae Scholarship, 35
Alumni Association, Officers of, 10
Alumni Council, 10
Alumni Office, 46
Arthur Hoyt Scott Horticultural Foundation, 42
Astronomical Observatories, 40, 111
Astronomy, Courses in, 111-113
Athletic Fields, see Map, 156
Athletics and Physical Education, 128-130
Atkinson (Barclay G.) Scholarship, 38
Atkinson (Rebecca M.) Scholarship, 38
Attendance at Classes and Collection, 57
Automobiles, Regulations concerning, 59
Awards and Prizes, 62-63

Bachelor of Arts Degree, 60
Bachelor of Science Degree, 60
Baker, (George F.) Scholarships, 33
Benjamin West House, 43
Benjamin West Society, 43
Bibliography of Swarthmore, 150
Biddle Memorial Library, Honorary Curators of, 21
Biology, Courses in, 66-71
Board of Managers, Committees of, 9
Board of Managers, Members of, 8
Book Bill, 31
Botany, Courses in, 66-68
BUILDINGS, see Map, 156
 Activities and Class Lodges
 Astronomical Observatories
 Bartol Research Foundation
 Bassett House
 Beardsley Hall
 Benjamin West House
 Biddle Memorial Library
 Bond Memorial
 Chemistry, Hall of
 Faculty Residences
 Field House
 Hall Gymnasium
 Hicks Hall
 Isaac H. Clothier Memorial
 Library Building
 Martin (Edward) Biological Laboratory
 Meeting House
 Palmer Hall
 Pittenger Hall
 Parrish Hall
 Roberts Hall
 Scott (Arthur Hoyt) Outdoor Auditorium
 Somerville Hall (Gymnasium for Women)
 Sproul Observatory
 Students' Observatory
 Swimming Pools
 Thomas House
 Trotter Hall
 Wharton Hall
 Worth Hall
Bunting (Ella Frances) Extemporaneous Speaking Contest, 63

Calendar, College, 5-6
Calendar, Lunar, 4
Catherwood Fellowship, 63
Chemistry, Courses in, 72-76
Chi Omega Scholarship, 37
Churches, 44
Class of 1913 Loan Fund, 39
Class of 1915 Scholarship Fund, 36
Class of 1916 Loan Fund, 393
Classics, Courses in, 77-80
Collection, 44
Collection Attendance, Regulation concerning, 58
College Community, 25, 44-48
College Entrance Examinations, 29-30
College Jobs, 33
Committees of the Board of Managers, 9
Committees of the Faculty, 18
Comprehensive Examinations, 51, 53, 60
Cooper (Sarah Kaighn) Scholarship, 35
Cooper (William J.) Foundation, 41, 42
Cooperation with Neighboring Institutions, 24, 142

Index

- Corporation, Officers of, 8
Course Advisers, 46, 53
COURSES OF INSTRUCTION, 65-142
 Biology, 66-71
 Chemistry, 72-76
 Classics, 77-80
 Economics, 81-83
 Engineering, 84-94
 Civil, 86-88
 Electrical, 89-92
 Mechanical, 93-94
 English Literature, 95-99
 Fine Arts, 100-102
 History, 103-106
 International Relations, 107
 Mathematics and Astronomy, 108-113
 Modern Languages, 114-121
 Music, 122-123
 Philosophy and Religion, 124-127
 Physical Education for Men, 128
 Physical Education for Women, 128-129
 Physics, 131-132
 Political Science, 133-136
 Psychology and Education, 137-141
 Russian Studies, 141
Crane Prize, 62
Curators of Biddle Memorial Library, 21
Cutting (Bronson M.) Collection, 43
DEGREES, 60-62
 Advanced Engineering
 Bachelor of Arts
 Bachelor of Science
 Master of Arts
 Master of Science
Degrees Conferred, 145-148
Dining Room, 44
Directions for Correspondence, 2
Directions for Reaching the College, 24
Divisions and Departments, 17
Dormitories, 44
Dorsey (William) Scholarship, 38
Economics, Courses in, 81-83
Education, Courses in, 140
Education, Physical, 128-130
Educational Program, 26, 49-57
Ellsler (George) Scholarship, 38
Emeritus Professors, 11
Engineering, Courses in, 84-94
Engineering, Degrees in, 60, 62, 84
English Literature, Courses in, 95-99
Entrance Requirements, 28-30
Examination Regulations, 59
Examinations, College Board, 29, 30
Exclusion from College, 60
Expenses, 31
Extra or Fewer Courses, 58
Extra-Curricular Activities, 48
Faculty, Members of, 11-16
Faculty Regulations, 57-62
Fees (Tuition, Residence, etc.), 31
Fellowships, 63, 64
Ferguson (Donald Renwick), Scholarship, 34
Fine Arts, Courses in, 100-102
Foreign Language Requirements, 52, 53
Foreign Students, 149
French, Courses in, 114-116
Friends College Scholarships, 39
Friends Historical Library, 41
Friends Meeting, 44
Geographical Distribution of Students, 149
German Language and Literature, Courses in, 117-119
Gillingham (Joseph E.) Fund, 38
Grades, 58
Graduation, Requirements for, 60-61
Grants-in-aid, 33
Greek Language and Literature, Courses in, 77
Hayes (John Russell) Poetry Prizes, 63
Health, Care of Student, 45-46
Hillborn (Rachel W.) Scholarship, 37
History, Courses in, 103-106
HONORS WORK, 54-56
 Admission to, 56
 Combinations of Majors and Minors, 55-56
 Examinations, 55
 Examiners, 55, 144
Housing, 25, 44
Infirmaries, 45-46
Insurance, Accident and Sickness, 32
International Relations, Courses in, 107
Italian, Courses in, 119
Ivins (Aaron B.) Scholarship, 34
Ivy Medal, 62

Index

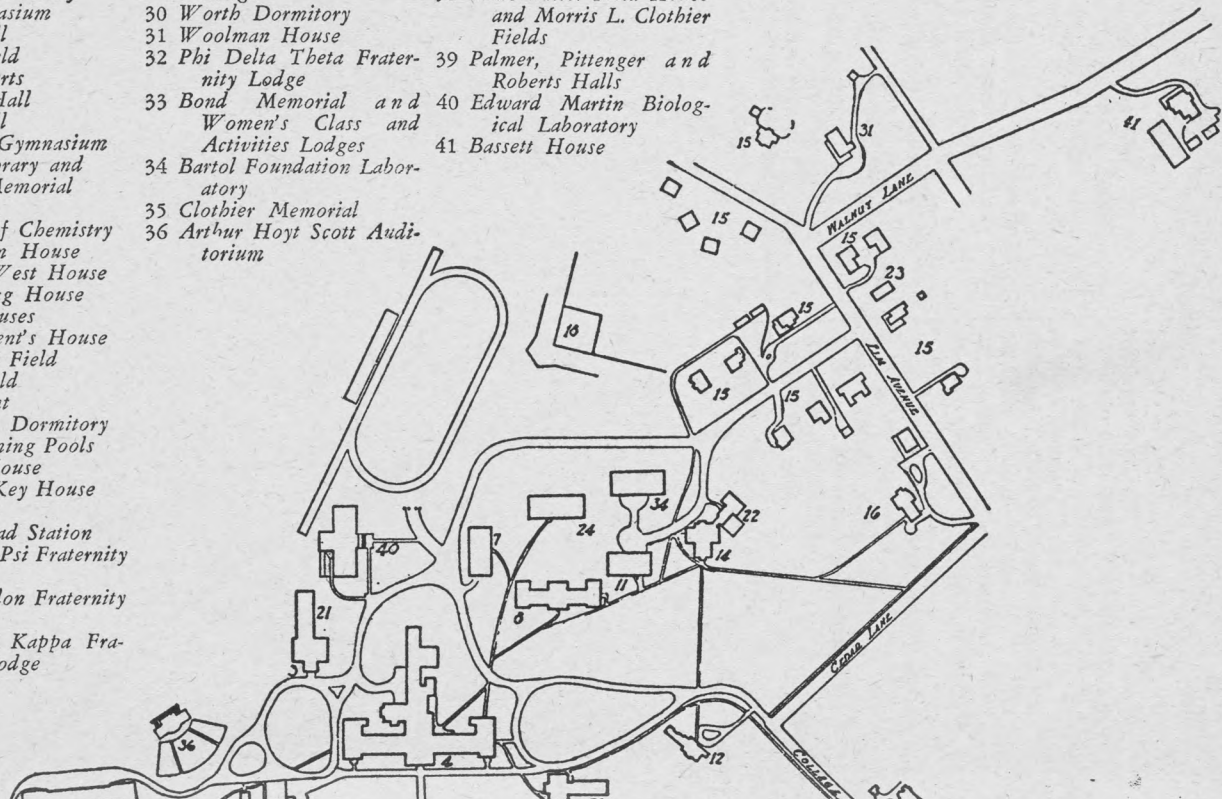
- Johnson (George K. and Sallie K.) Fund, 35
- Kappa Alpha Theta Scholarship Fund, 36
- Kovalenko (Jessie Stevenson) Scholarship, 36
- Latin Language and Literature, Courses in, 78-80
- Leedom (Hannah A.) Fellowship, 63
- Leedom (Thomas L.) Scholarship, 38
- LIBRARIES, 40-41
- Biddle Memorial, 40
- College, 40
- Friends Historical, 41
- Lilly (Scott B.) Scholarship, 34
- Lippincott (Joshua) Fellowship, 64
- Lippincott (Sarah E.) Scholarship, 38
- Loans to Students, 33, 39
- Location of the College, 24
- Lockwood (John) Memorial Fellowship, 64
- Longstreth (Mary T.) Scholarship, 36
- Lucretia Mott Fellowship, 64
- Managers, Board of, 7, 8
- Map of College Grounds, 156-157
- Martin Biological Laboratory, 40
- Mary Lyon School Property, 44
- Mathematics, Courses in, 108-111
- McCabe Engineering Award, 62
- Meeting House, 44
- Men's Executive Committee, 47
- Miller (James E.) Scholarship, 37
- Miller (John A.) Loan Fund, 39
- Moon, Owen, Fund for Public Speaking, 63
- Morrell (Lois) Poetry Award, 63
- Mott (Lucretia) Fellowship, 64
- Music, Courses in, 122-123
- Newton (A. Edward) Library Prize, 62
- Oak Leaf Medal, 62
- Observatories, Astronomical, 40, 111
- Open Scholarships for Men, 34
- Open Scholarships for Women, 35
- Paiste (Harriet) Fund, 35
- Palmer Hall, 44
- Parrish Hall, 44
- Pearson (Paul M.) Loan Fund, 39
- Perkins (T. H. Dudley) Memorial Scholarship, 34
- Philosophy, Courses in, 124-127
- Physical Education for Men, 128
- Physical Education for Women, 129-130
- Physical Education Requirements, 128-130
- Physics, Courses in, 131-132
- Pittenger Hall, 44
- Plan of College Grounds, 156-157
- Political Science, Courses in, 133-136
- Potter (Wm. Plummer) Public Speaking Fund, 63
- Pre-Medical Program, 57
- Presser Music Scholarships, 38
- Preston (Mary Coates) Scholarship Fund, 35
- Prizes, 62-63
- PROGRAM OF STUDY, 49-57
- For Freshmen and Sophomores, 51-53
- For Juniors and Seniors, 53-56
- Honors Work, 54-56
- Pre-Medical Program, 57
- Psychology, Courses in, 137-141
- Public Speaking Prizes, 63
- Reeves (Mark E.) Scholarship, 38
- Religion, Courses in, 125-127
- Religious Life, 44
- Requirements for Admission, 28-30
- Requirements for Graduation, 60-62
- Residence, Regulations concerning, 59-60
- Roberts Hall, 44
- Russian Studies, Courses in, 142
- Scholarships, List of, 33-39
- Scholastic Aptitude Test, 29, 30
- Scott (Arthur Hoyt) Horticultural Foundation, 42
- Serrill (William G. and Mary N.) Scholarship, 34
- Shoemaker (Annie) Scholarship, 35
- Sicard (Katherine B.) Prize, 62
- Sigma Xi Fellowship, 64
- Social Committee, 47
- Somerville Committee, 47
- Spanish, Courses in, 120-121
- Sproul (Mary) Scholarship, 38
- Squier (Helen) Scholarship, 38
- States, Summary of Students by, 149
- Student Aid, 33
- Student Council, 47
- Student's Handbook, 48
- Sullivan (Joseph T.) Scholarship, 38

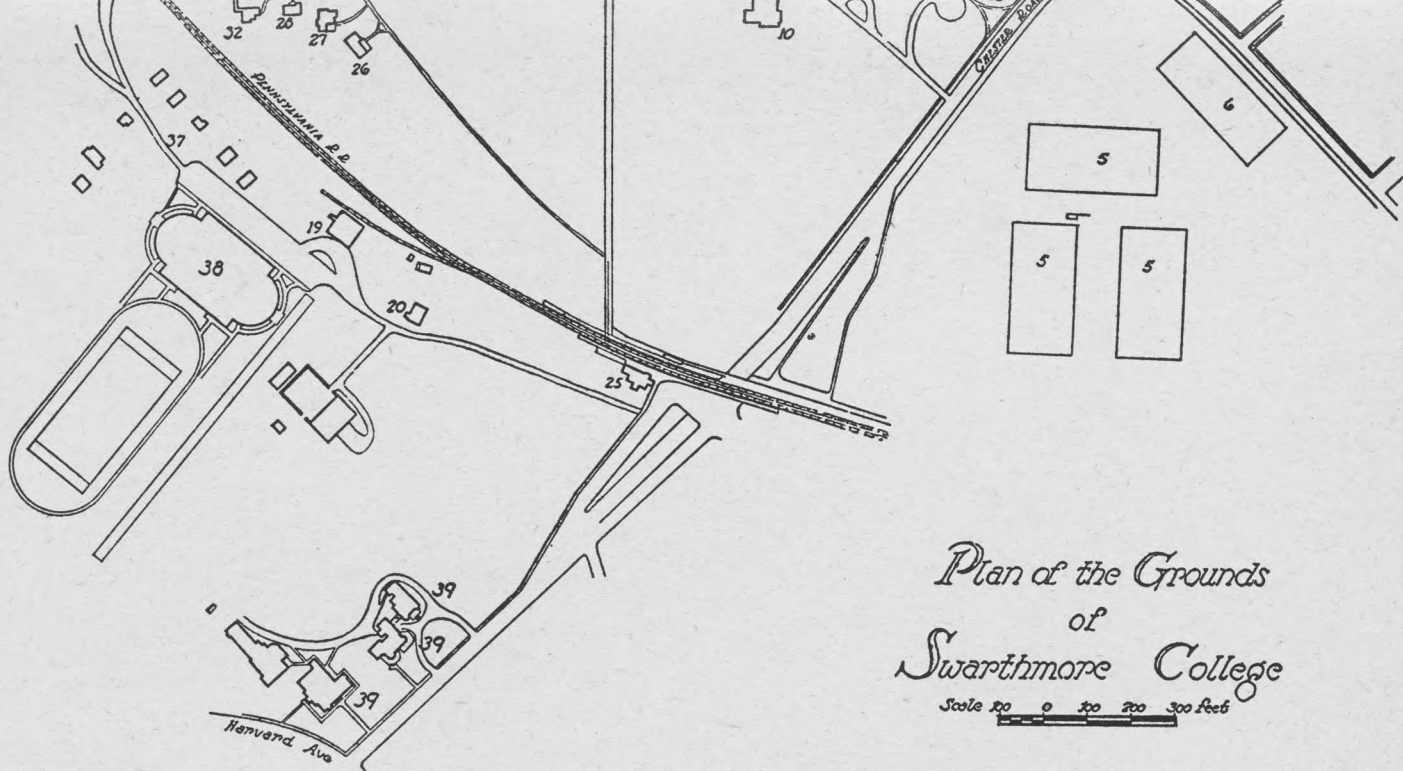
Index

- Summer School Work, 59
Swarthmore College Peace Collection, 41
Swarthmore College Student Loan Fund,
39
Taylor, (Jonathan K.) Scholarship, 37
Thorne (Phebe Anna) Fund, 37
Tuition and Other Fees, 31
Tuition Plan, 31
Tyson (Martha E.) Fellowship, 64
Underhill (Daniel) Scholarship, 37
Vocational Office, 46
West, Benjamin, Society, 43
Westbury Quarterly Meeting Scholarship,
37
Wharton Hall, 44
Wharton (Deborah F.) Scholarship, 38
White Open Scholarships for Women, 35
Willets (Samuel) Fund, 38
William J. Cooper Foundation, 41, 42
Williams (Ellis D.) Fund, 39
Williamson (I. V.) Scholarships, 38
Wilson (Edward Clarkson) Scholarship,
36
Women's Student Government Associa-
tion, 47
Wood (Mary) Fund, 36
Woodnutt (Thomas) Scholarship, 38
Woolman House, 44
Worth Hall, 44
Zoölogy, Courses in 68-71

- 1 Wharton Hall
- 2 Sproul Observatory
- 3 Hall Gymnasium
- 4 Parrish Hall
- 5 Hockey Field
- 6 Tennis Courts
- 7 Beardsley Hall
- 8 Trotter Hall
- 9 Somerville Gymnasium
- 10 College Library and Biddle Memorial Library
- 11 The Hall of Chemistry
- 12 Cunningham House
- 13 Benjamin West House
- 14 The Meeting House
- 15 Faculty Houses
- 16 The President's House
- 17 Swarthmore Field
- 18 Alumni Field
- 19 Power Plant
- 20 Employees' Dormitory
- 21 The Swimming Pools
- 22 Whittier House
- 23 Book and Key House
- 24 Hicks Hall
- 25 The Railroad Station
- 26 Phi Kappa Psi Fraternity Lodge
- 27 Delta Upsilon Fraternity Lodge
- 28 Phi Sigma Kappa Fraternity Lodge

- 29 Kappa Sigma Fraternity Lodge
- 30 Worth Dormitory
- 31 Woolman House
- 32 Phi Delta Theta Fraternity Lodge
- 33 Bond Memorial and Women's Class and Activities Lodges
- 34 Bartol Foundation Laboratory
- 35 Clothier Memorial
- 36 Arthur Hoyt Scott Auditorium
- 37 Employees' Houses
- 38 Lamb-Miller Field House and Morris L. Clothier Fields
- 39 Palmer, Pittenger and Roberts Halls
- 40 Edward Martin Biological Laboratory
- 41 Bassett House





*Plan of the Grounds
of
Swarthmore College*

Scale 0 100 200 300 feet

The University of
Michigan Library

1850-1855



