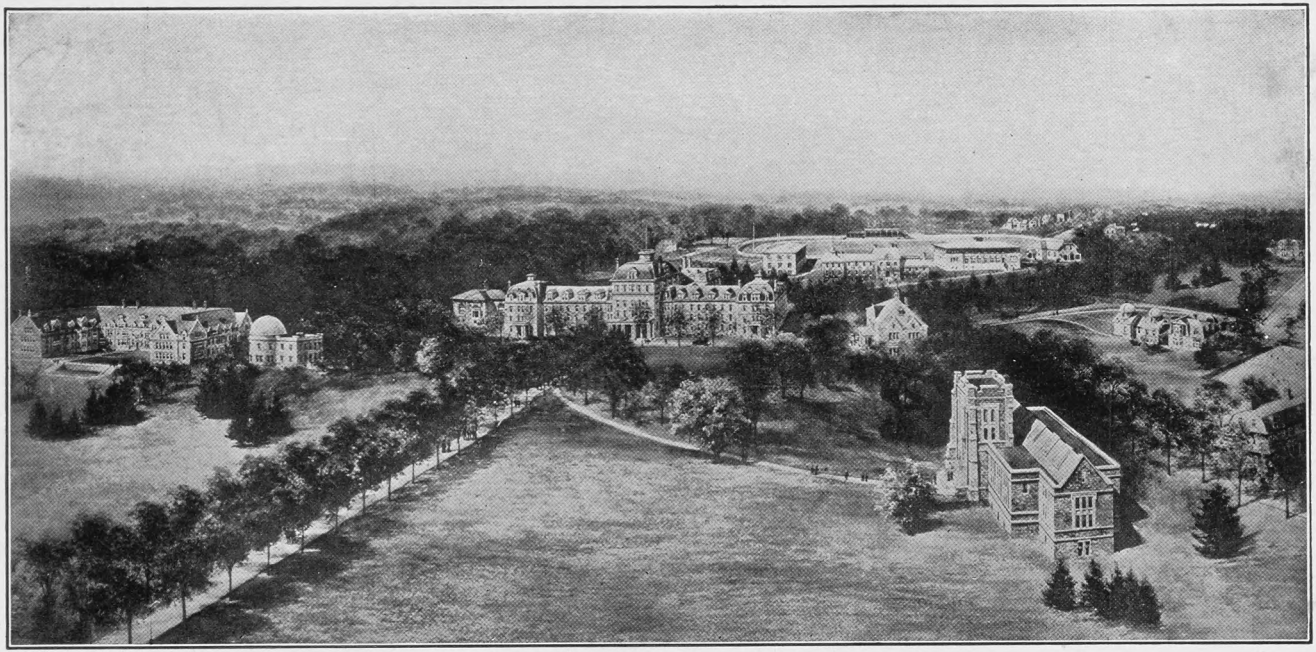
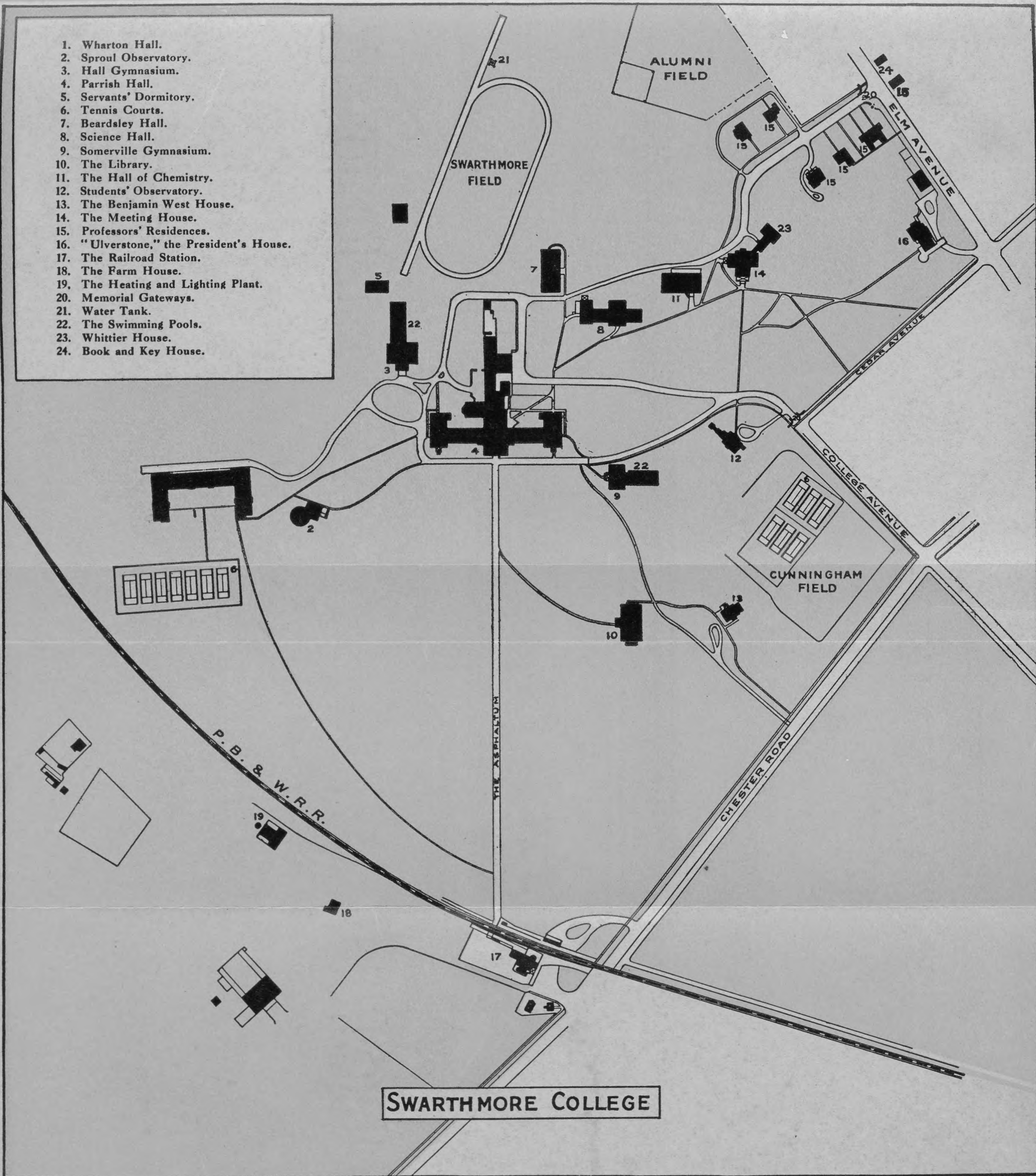


SWARTHMORE COLLEGE


1. Wharton Hall.
2. Sproul Observatory.
3. Hall Gymnasium.
4. Parrish Hall.
5. Servants' Dormitory.
6. Tennis Courts.
7. Beardsley Hall.
8. Science Hall.
9. Somerville Gymnasium.
10. The Library.
11. The Hall of Chemistry.
12. Students' Observatory.
13. The Benjamin West House.
14. The Meeting House.
15. Professors' Residences.
16. "Ulverstone," the President's House.
17. The Railroad Station.
18. The Farm House.
19. The Heating and Lighting Plant.
20. Memorial Gateways.
21. Water Tank.
22. The Swimming Pools.
23. Whittier House.
24. Book and Key House.
ALUMNI FIELD
SWARTHMORE FIELD
ELM AVENUE
CEDAR AVENUE
COLLEGE AVENUE
CUNNINGHAM FIELD
THE ASPHALTUM
P. B. & W. R. R.
CHESTER ROAD
SWARTHMORE COLLEGE

SWARTHMORE COLLEGE

SWARTHMORE COLLEGE BULLETIN

CATALOGUE NUMBER

FIFTY-FIRST YEAR

1919–1920

FOUNDERS' DAY

The Jubilee Million Dollar Endowment Fund

General College Information

SWARTHMORE, PENNSYLVANIA

Printed for the College

Vol. XVII. No. 2. Twelfth Month, 1919

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Philadelphia, Pa.
1919

SWARTHMORE COLLEGE

1919-20

FOUNDERS' DAY, 1919

The fiftieth anniversary of the opening of the College was commemorated in the twelfth celebration of Founders' Day, October 25, 1919. Fifty years before, on the tenth of November, 1869, the opening of the College had been marked by the planting of two oak trees and by appropriate addresses in Parrish Hall. It seemed fitting, therefore, that that interesting event should be recalled by the College in its golden prime.

Thanks to the *Friends' Intelligencer* of November 20, 1869, which published a special supplement giving an excellent account of the opening of the College, and to a contemporary photograph of the ceremony of planting the oak trees, it was possible to recall the opening day with a fair degree of accuracy. A company of about thirty students, selected from the four undergraduate classes, devoted themselves with much enthusiasm to representing the appearance and words of those who participated prominently on the original occasion.

Friendly costumes of the olden time were kindly loaned by Friends' families in the borough, and the students who attempted to portray Lucretia Mott, Samuel Willits, Edward Parrish, Edward Magill, Hugh McIlvain and others of the founders, tried to look as well as to speak their respective parts in the program. Two of them, representing Lucretia Mott and her son, Thomas, performed the ceremony of planting two oak trees on the East Campus, near Somerville Hall, and near the site of the two trees which were planted on the opening day, but which unfortunately have disappeared with the building of Somerville Hall and the Sharples Swimming Pool for girls. The heart of the messages contributed by the speakers in 1869 was then given by eight of the students, and served to recall in an impressive way the ideals, the labors, and the hopes of the founders.

Two other oak trees were then planted, to commemorate the fiftieth anniversary itself, one in the Presidential and Guber-

natorial Row, the other near by. The first of these was planted by Susan J. Cunningham, the only surviving member of the original faculty; by Charles M. Biddle, the Treasurer of the College for many years; and by Governor William Cameron Sproul, of the Class of 1891, who was unavoidably delayed in arriving, but who came in time to complete the planting of the tree and to attend the further exercises of the day. The other tree was planted by Isaac H. Clothier, the oldest member, in point of age and service, of the Board of Managers.

These ceremonies on the East Campus were attended by the faculty, undergraduates of the four classes, about one hundred and twenty-five prospective members of future classes down to 1939, and a large company of alumni and other friends of the College. The academic procession then moved to Parrish Hall, which was filled to overflowing, the men students standing in solid masses along the walls and in the gallery.

Robert M. Janney, President of the Board of Managers, presided over the exercises in Parrish Hall, which included the singing of the class songs, the national anthem, and "Alma Mater," and the delivery of an address by Dr. Thomas E. Finegan, Superintendent of Public Instruction in the State of Pennsylvania. Dr. Finegan's address outlined and illustrated in vigorous and vivid fashion the ideals of the founders of the Quaker Commonwealth and the Quaker College of Pennsylvania.

These exercises were followed by a football game with the team representing Johns Hopkins University, and a tea in the Library given in honor of Dr. and Mrs. Finegan and attended by a hundred or more teachers in neighboring schools. In the evening, Professor Paul M. Pearson delivered in Parrish Hall an instructive and stimulating lecture-recital, entitled "Who is Great?"

The various events of the day were photographed by newspaper and professional cameras, and a moving-picture establishment requested and received permission to take a series of views for the benefit of its many moving-picture patrons throughout the country. The Swarthmore *Phœnix,* also, with characteristic energy and efficiency, published a detailed account of the various features of the day's celebration. Hence it is hoped that 1919, in grateful appreciation of the message of 1869 which was transmitted across the half century by pen and picture, has pro-

vided as well as it could for passing its message on to 1969. Nearly a score of those present also at the opening ceremonies in 1869 attended the semi-centennial celebration in 1919, and signed their names in a book provided for the purpose; and it is probable that many of those present on the latter occasion will attend the centennial celebration a half century hence, thus serving as living links in the golden chain that binds the successive generations of Swarthmoreans together.

THE JUBILEE MILLION DOLLAR ENDOWMENT FUND

I

GENERAL PURPOSE

The period from March 1st to June 7, 1920, has been set aside for the continuance and completion of the Swarthmore Jubilee Endowment Fund Campaign which was interrupted by the War. The total of the subscription at the time the work was suspended amounted to $525,000 for endowment purposes, and $100,000 for building purposes. This is still insufficient to procure the conditional gift from the General Education Board.

Since a dollar purchases now not more than 47 cents purchased ten years ago, it is absolutely necessary in order to maintain Swarthmore on its pre-war basis, that at least $500,000 be yet secured for our Jubilee Endowment Fund. An extension of time, owing to the interruption of the War, has been procured from the General Education Board.

The College has already substantially raised the price of tuition and board to students, and income from this source cannot be sufficiently increased to meet the emergency without the danger of excluding a class of students needing the benefits and essential to the best interests of the College.

The following reasons for the appeal are to be emphasized:

1. Increased requirements for the ordinary annual budget owing to the decrease in the value of the dollar and to the corresponding increase in prices of all food supplies and necessities in operating the College.

2. The absolute necessity for increasing the salaries of the teaching staff.

3. The importance of Swarthmore's future to the general community and the necessity of our maintaining our position among institutions of the first class.

A particular appeal should be made on this ground to substantiate the reason for the existence of the College. It should impress not only Swarthmore's present friends but all responsible persons who appreciate the importance of perpetuating the traditions underlying the foundation of the colony of Pennsylvania.

An endeavor must be made to have the persons who have promised annual subscriptions for a three-year period to extend these for additional years, and also to increase the amounts where possible, and to procure many new subscriptions from persons who have not already responded.

II

FORM OF ORGANIZATION FOR THE COMPLETION OF THE CAMPAIGN

The scores by classes of subscriptions by the Alumni will be carefully maintained and published.

In order that a personal approach may be made to all possible contributors, and in view of the necessity of extending the appeal beyond the alumni body, the committee for the completion of the campaign will be organized geographically. The former committees of the Board of Managers and Alumni have been merged into a single Campaign Committee which has been appointed jointly by the Board of Managers and by the Executive Committee of the Alumni Association.

There will be the following:

(1) THE ENDOWMENT COMMITTEE, consisting of representative Alumni and friends of the College, divided into geographical districts.

The members of this committee will meet simultaneously at weekly luncheons on a specified day each week during the months of March, April and May, 1920, in Philadelphia, New York, Baltimore, Atlantic City, Boston, Chicago, Denver, Birmingham, Alabama, and London, where they will learn the latest returns from other divisions, and will telegraph at that time to the headquarters of the committee the results of their own week's work.

Names and addresses of possible subscribers within a district will be furnished to each district chairman, and will be apportioned among the members of the committee for that district.

(2) THE EXECUTIVE COMMITTEE, composed of the officers of the Endowment Committee and the chairmen of the Geographical divisions.

The duties of the Executive Committee will be to direct the general policy of the work, to have charge of the publicity and administrative work of the campaign, and to approach persons most likely to make large contributions.

(3) THE ADVISORY COMMITTEE, composed of friends of the College of long standing who, although furnishing advice, may not be able to work actively in the campaign.

III

PUBLICITY

In addition to newspaper publicity, personal interviews, telephone conversations and letters, a series of bulletins will be issued, possibly in connection with the *Phœnix,* but to be circulated over a large mailing list, which will treat among other subjects, the following:

(1) A general bulletin on the requirements and purpose of the campaign.

(2) A bulletin of guidance as to the amount expected from each contributor, based upon incomes, property, or length of time since graduation.

(3) A bulletin graphically illustrating increases of costs and a comparison of professors' incomes with incomes of laborers and other classes of workers.

(4) A bulletin showing the deductions from taxable incomes made possible by gifts to Swarthmore under the Hollis amendment.

(5) A bulletin showing the amount which each Alumnus has received from the College as determined by the difference between the tuition fee which he paid and the actual cost of his education, with compound interest to date.

In addition to these methods, graphic placards and charts will

be prepared and displayed at athletic games and gatherings of Alumni.

There will also be prepared a separate booklet of instructions to be issued to canvassers for the fund.

Swarthmore's critical needs must be sounded during the months of the campaign before all meetings where her friends come together, no matter what the occasion. She not only has the right to be heard, but her real friends are anxious to learn the exact condition of her affairs. They will hold us responsible if the standard of the College falls because of any failure on our part to bring the need to their attention.

To accomplish this, a bureau of speakers will be maintained which will supply speakers for different meetings held while the campaign is under way.

SWARTHMORE COLLEGE CATALOGUE

FIFTY-FIRST YEAR

1919–1920

SESSION DAYS OF COLLEGE IN BOLD-FACE TYPE

1920

January

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

February

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29						

March

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28	29	**30**	**31**			

April

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May

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30	**31**					

June

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August

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29	30	31				

September

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26	**27**	**28**	**29**	**30**		

October

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24	**25**	**26**	**27**	**28**	**29**	30
31						

November

S	M	T	W	T	F	S
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7	**8**	**9**	**10**	**11**	**12**	**13**
14	**15**	**16**	**17**	**18**	**19**	**20**
21	**22**	**23**	**24**	25	26	27
28	**29**	**30**				

December

S	M	T	W	T	F	S
			1	**2**	**3**	4
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1921

January

S	M	T	W	T	F	S
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9	**10**	**11**	**12**	**13**	**14**	**15**
16	**17**	**18**	**19**	**20**	**21**	**22**
23	**24**	**25**	**26**	**27**	**28**	**29**
30	**31**					

February

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

March

S	M	T	W	T	F	S
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6	**7**	**8**	**9**	**10**	**11**	**12**
13	**14**	**15**	**16**	**17**	**18**	**19**
20	**21**	**22**	**23**	**24**	**25**	26
27	28	29	30	31		

April

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10	**11**	**12**	**13**	**14**	**15**	**16**
17	**18**	**19**	**20**	**21**	**22**	**23**
24	**25**	**26**	**27**	**28**	**29**	**30**

May

S	M	T	W	T	F	S
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8	**9**	**10**	**11**	**12**	**13**	**14**
15	**16**	**17**	**18**	**19**	**20**	**21**
22	**23**	**24**	**25**	**26**	**27**	**28**
29	**30**	**31**				

June

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5	**6**	**7**	**8**	**9**	**10**	11
12	**13**	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

COLLEGE CALENDAR

1920

First Month 6 ..... College Work resumes at 8.00 A. M.
First Month 26 ..... Registration and Enrollment in Classes for the Second Semester, 9 A. M. to 12 M.
First Month 26 ..... Mid-year Examinations begin at 2 P. M.
Second Month 3 ..... First Semester ends.
Second Month 4 ..... Second Semester begins.
Third Month 9 ..... Meeting of Board of Managers.
Third Month 19 ..... College Work ends at 4.00 P. M. for the Spring Recess.
Third Month 30 ..... College Work resumes at 8.00 A. M.
Fifth Month 25 ..... Final Examinations begin.
Sixth Month 2 ..... Final Examinations end.
Sixth Month 4 ..... Meeting of Board of Managers.
Sixth Month 4 ..... Class Day.
Sixth Month 5 ..... Alumni Day.
Sixth Month 6 ..... Baccalaureate Day.
Sixth Month 7 ..... *Commencement.*
Sixth Month 8 to Ninth Month 20. Summer Recess.
Ninth Month 20 ..... Examinations for Admission.
Ninth Month 21 ..... Examinations for Admission.
Ninth Month 21 ..... Matriculation, Registration and Enrollment in Classes.
Ninth Month 22 ..... Examinations for Admission.
Ninth Month 22 ..... College Work begins at 8.00 A. M.
Tenth Month 5 ..... Meeting of Board of Managers.
Tenth Month 30 ..... Founders' Day. Class Work suspended for the day.
Eleventh Month 24 ..... College Work ends at 1.00 P. M. for the Thanksgiving Recess.
Eleventh Month 29 ..... College Work resumes at 8.00 A. M.
Twelfth Month 7 ..... *Annual Meeting of Corporation.*
Twelfth Month 17 ..... College Work ends at 4.00 P. M. for the Christmas Recess.

1921

First Month 4 ..... College Work resumes at 8.00 A. M.
First Month 31 ..... Registration and Enrollment in Classes 9 A. M. to 12. M.
First Month 31 ..... Mid-year Examinations begin at 2 P. M.
Second Month 2 ..... First Semester Ends.
Second Month 3 ..... Second Semester begins.
Second Month 22 ..... College Work suspended for the day.
Third Month 8 ..... Meeting of Board of Managers.
Third Month 25 ..... College Work ends at 4.00 P. M. for the Spring Recess.
Fourth Month 5 ..... College Work resumes at 8.00 A. M.
Fifth Month 31 ..... Final Examinations begin.
Sixth Month 8 ..... Final Examinations end.
Sixth Month 10 ..... Meeting of Board of Managers.
Sixth Month 10 ..... Class Day.
Sixth Month 11 ..... Alumni Day.
Sixth Month 12 ..... Baccalaureate Day.
Sixth Month 13 ..... *Commencement.*

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Rebecca C. Longstreth,
Joanna W. Lippincott,
Emma C. Bancroft,
William C. Sproul,
Caroline H. Worth,
Wilson M. Powell,
Lucy Biddle Lewis,
Philip M. Sharples,
Henry C. Turner,
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"Ulverstone," College Campus

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"Pennyscroft," Cheyney, Pa.

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PHILIP MARSHALL HICKS, A.M., *Assistant Professor of Public Speaking,*.....318 N. Chester Road
JOHN HIMES PITMAN, A.M., *Assistant Professor of Mathematics and Astronomy,*.....317 N. Chester Road
CHARLES GARRETT THATCHER, M.E., *Assistant Professor of Mechanical Engineering,*.....307 Lafayette Avenue
LANDER MACCLINTOCK, Ph.D., *Assistant Professor of French,*.....
Cedar Lane and Swarthmore Avenue
EUGENE LEROY MERCER, M.D., *Assistant Professor of Physical Education,*...
Benjamin West House
WINTHROP R. WRIGHT, Ph.D., *Assistant Professor of Physics,*.....
4 Whittier Place
ERNEST C. WHITE, C. E., *Assistant Professor of Civil Engineering,*.....
202 Dartmouth Avenue
ROY PETRAN LINGLE, Litt.B., *Acting Assistant Professor of English,*.....
2253 N. 53d Street, Philadelphia
HELEN COLLINS CULIN, A.B., *Director of Physical Education of the Women,*.....1 Whittier Place
PAUL MARTIN PEARSON, Litt.D., *Lecturer in Public Speaking,*.....
516 Walnut Lane
MARY R. LEWIS, M.D., *Lecturer in Hygiene*.....46 N. 40th St., Philadelphia
RAYMOND MORSE HERRICK, A.M., *Instructor in English,*.....
318 N. Chester Road
ESTHER ELIZABETH BALDWIN, A.M., *Instructor in English,*.....
West Chester, Pa.
KATE W. TIBBALS, Ph.D., *Instructor in English,*.....409 College Avenue
EDITH D. DAVISON, *Instructor in Foods and Cookery,*.....
515 W. 122d Street, New York City
ALLEN I. MYERS, A.B., *Instructor in Chemistry,*.....114 Cornell Avenue
CLAUDE C. SMITH, A.B., *Instructor in Law,*.....Walnut and Hillborn
E. SHANNON BRADFIELD, A.B., *Instructor in Engineering,*.....
35 E. 4th Street, Media
MERCEDES C. IRIBAS, *Assistant in Spanish,*.....Cynwyd, Pa.
ELIZABETH LANNING, *Assistant in Physical Education of the Women,*.....
1 Whittier Place
MARGARET ELGAR POWELL, A.B., *Assistant in Astronomy and Mathematics,*.....Parrish Hall
ELIZABETH NEUMANN FRORER, A.B., *Assistant in Mathematics,*.....
ISABELLE BRIGGS MYERS, A.B., *Assistant in Economics,*....Woolman School

ADMINISTRATIVE OFFICERS

JOSEPH SWAIN, M.S., LL.D., *President.*
JOHN ANTHONY MILLER, Ph.D., *Vice-President.*
WILLIAM ALBERT ALEXANDER, A.B., *Dean.*
EDNA HARRIET RICHARDS, A.M., *Dean of Women.*
JOHN RUSSELL HAYES, A.B., LL.B., *Librarian.*
HARRIET E. WORRELL, *Secretary to the President.*
CHESTER ROBERTS, *Superintendent.*
ELLA MICHENER, *Assistant to the Dean of Women.*
JULIA R. YOUNG, A.B., *Secretary to the Dean.*
ELIZABETH NEUMANN FRORER, A.B., *Assistant in Dean's Office.*
ALICE W. SWAYNE, *Assistant Librarian.*
ANNE C. BRIERLY, *Dietitian.*
CAROLINE AUGUSTA LUKENS, B.L., *Matron of Parrish Hall Center.*
HANNAH TURNER YARDLEY, *Matron of Wharton Hall.*
MARY E. COOK, *Director of the Laundry.*
ELIZABETH REDHEFFER HIRST, *Bookkeeper.*
FLORENCE B. BARRETT, *Nurse.*
ELSIE M. HOISINGTON, *Stenographer to the Dean.*

SWARTHMORE COLLEGE

LOCATION AND FOUNDATION

The Borough of Swarthmore is situated southwest of Philadelphia on the Central Division of the Philadelphia, Baltimore, and Washington Railroad. It is eleven miles from Broad Street Station, with which it is connected by eighteen inbound and twenty-two outbound trains daily, the running time of which varies from nineteen minutes on express schedule to thirty-six minutes on the local schedule. Three trolley lines, running cars at twenty- and thirty-minute intervals, also connect with Philadelphia elevated and surface lines.

The college buildings and campus occupy a commanding position upon a hill not far from the center of the town. The view includes several miles of the Delaware River, the nearest point of which is about four miles distant. The college property comprises over two hundred acres of ground, including a large tract of woodland and the beautiful rocky valley of Crum Creek.

The College was founded in 1864 through the efforts of members of the Religious Society of Friends, for the purpose of securing to the youth of the Society an opportunity for higher educational training under the guarded supervision and care of those of their own religious faith. Other applicants are admitted upon the same terms as Friends, and nothing of a sectarian character exists in the instruction or in the management of the College. According to its first charter, membership on the Board of Managers of the College was limited to persons belonging to the Society of Friends. The purpose of this restriction was not to establish sectarian control, but to prevent forever the possibility of such control by any sectarian element which might otherwise have come to be represented on the Board. This restriction is now believed to be no longer needed and is omitted from the revised charter. The intention of its founders was to make the promotion of Christian character the first considera-

tion, and to provide opportunities for liberal culture while maintaining a high standard of scholarship. These aims have been faithfully observed in the administration of the institution.

BUILDINGS

Parish Hall is a massive stone structure, with its central portion separated from the two wings by fireproof compartments. The central building, three hundred and forty-eight feet long and five stories high, furnishes assembly room, lecture rooms, museum, parlors, dining hall, and offices. The wings are four stories high. The ground floor of each wing is used for lecture and recitation rooms; the remaining floors contain the dormitories of the women students. The Dean of Women and several instructors and matrons reside in the building.

Wharton Hall, the dormitory for young men, named in honor of its donor, Joseph Wharton, late President of the Board of Managers, was opened for occupancy at the beginning of the college year 1904-05. The third section of the building was completed in 1916. The total capacity of the hall is about two hundred. It stands in the west campus on the same ridge as Parrish Hall, and commands a fine view of the Delaware River valley.

The *Hall of Physics and Engineering* is a two-story stone building devoted to the departments of Physics and Engineering. It contains lecture and recitation rooms, electrical, physical and engineering laboratories, draughting rooms, engine and boiler rooms. All departments are well equipped, and new apparatus and machinery are added as occasion demands.

The *Hall of Chemistry,* which was completed in 1904, is a red brick building two stories high, and contains a finished basement. The basement has an assay laboratory furnished with wind and muffle furnaces, a fireproof combustion room, a laboratory for gas analysis, a photometric dark room, large stock room, and cloak and toilet rooms. On the first floor are offices, and laboratories for quantitative analysis and for general chemistry. The large amphitheater lecture room, seating one hundred persons and extending to the basement, is reached from this floor. The second floor contains the organic laboratory, the laboratory for

qualitative analysis, the laboratory for physical chemistry, the laboratory for electrolytic chemistry, and the library. Two balance rooms, one on the first floor and one on the second floor, contain balances mounted on columns built independently of the foundations and floors of the building. The laboratories are splendidly equipped with all the necessary modern apparatus. The chemical library contains a well-selected list of scientific and technical books pertaining to chemistry, and complete sets of five of the leading chemical journals. Through the generosity of Mrs. Peter T. Berdan, the library has received a complete set of the publications of the London Chemical Society, and a set of the *Journal of the London Society of Chemical Industry,* presented by Mrs. Berdan as a memorial to her son, Frederick T. Berdan, a member of the Class of 1890.

The *Sproul Astronomical Observatory,* equipped by Governor William Cameron Sproul, '91, stands on the site formerly occupied by the President's house, and contains nine rooms. On the first floor are an office, a departmental library, a computation room, two class rooms, and a shop room. On the second floor are a modern lecture room seating seventy-five persons, a dark room, and the dome room. The dome is a steel structure covered with copper, forty-five feet in diameter. It is revolved by an electric motor. Practically all the classes of the department of Mathematics and Astronomy, and some classes of other departments, are held in the Observatory.

The chief instrument of the equipment is an equatorial refractor of twenty-four inches aperture, and thirty-six feet focal length, the mounting and optical parts of which were made by the John A. Brashear Co., Ltd. The mounting is modern and convenient, motors being provided for winding the clock and moving the telescope. The driving clock is electrically controlled. A disc driven by a sidereal clock situated on the north side of the pier reads right ascensions directly. The telescope is provided with the usual oculars, helioscope, position micrometer, double-slide plateholder, and three ray filters.

There is also a photographic telescope of nine inches aperture and forty-five inches focal length, mounted after the design of the Bruce telescope at Yerkes Observatory. The instrument is provided with a heavy mounting, a heavy driving clock,

coarse and fine position circles, a guide telescope, and such other accessories as make it an effective and convenient instrument. There are also two measuring engines for measuring five-by-seven photographic plates. One of these was built by Brashear, the other by Gaertner. There is also a blink microscope.

Stephen Loines has recently given to the observatory a Polar Equatorial, a new type of telescope, designed and built by the Alvan Clark and Sons' Corporation. With this type of telescope the observer is enabled to make his observations while seated in a warm room. It is housed in the Sproul Observatory.

The *Students' Astronomical Observatory,* situated on the campus a short distance southeast of Parrish Hall, is especially equipped for the purposes of instruction. It contains a refracting telescope of six inches aperture, mounted equatorially, fitted with the usual accessories, including a position micrometer and a very good spectroscope. The observatory also contains a transit instrument of three inches aperture, a mean time and a sidereal clock and a chronograph. Mounted in a room adjoining the transit room is a Milne seismograph, presented by Joseph Wharton, which records photographically all vibrations of the crust of the earth. The latest addition to this observatory building contains the photographic telescope referred to above.

The Library Building. On the lower east campus, near the Benjamin West House, stands the Library, a fine specimen of the English Scholastic Gothic style. The Library was built and furnished from the $50,000 generously presented to the College by Mr. Andrew Carnegie and is maintained from the income on a like sum subscribed by several friends of the College. The building is constructed of local granite, with terra cotta and Indiana limestone trimmings and was erected under the supervision of Mr. Edward L. Tilton, of New York. In the second story of the massive entrance tower, is a large fireproof apartment, which contains the Friends' Historical Library; in the third story, are placed the Westminster chimes of four bells and the Seth Thomas Clock presented to the College in June, 1910, by Mr. Morris L. Clothier in commemoration of the twentieth anniversary of the graduation of the class of 1890. The first floor of the main building contains a stack room and a large, well-lighted reading room finished in dark oak. The reading

room is two stories high, with a gallery round three sides. On this gallery open the seminar rooms and the tower room devoted to the Friends' Historical Library; below are alcoves containing reference books and other books in common use.

Beardsley Hall. This building is of concrete block construction with reinforced concrete floors, columns, and stairs. It is three stories high. In architectural design it is simple and effective, representing the latest and best type of factory building construction.

The *President's House.* The property on the east edge of the campus on the corner of Elm Avenue and Cedar Lane, recently owned by W. H. Miller, has been purchased by the College and is used for the President's house.

The *Wm. J. Hall Gymnasium* for men is a two-story stone building. On the first floor are offices, examining room, and the main exercise hall, a room fifty by eighty feet, equipped with apparatus for individual and class work and a good court for basketball. A trophy room and running track are on the second floor. In the basement are lockers, shower baths, a dressing room for visiting teams, and handball courts.

Somerville Hall, erected in 1893 through the efforts of the Somerville Literary Society, is used as a gymnasium for the women. It is furnished with apparatus adapted to the Swedish system of gymnastics. In the basement are dressing rooms, showers, and lockers for the use of day students who take work in the department of Physical Education.

Two *Swimming Pools,* one for the women and another for the men, were erected during the summer of 1912. These pools were presented to the College by Philip M. Sharples. The building which contains the women's swimming pool is connected by a corridor with Somerville Hall, and the men's pool is connected in like manner with the William J. Hall Gymnasium.

The *Heating and Lighting Plant.* A central heat, light, and power plant was erected in 1911 at a cost of about one hundred thousand dollars. The power house is a single-story brick structure, located south of the P. B. & W. R. R. tracks.

Other buildings upon the campus are the *Meeting-house,* the *Benjamin West House* (birthplace of Benjamin West, P. R. A., erected in 1724), *Cunningham House* (the residence of the

Professor of Astronomy and Mathematics), six residences for members of the Faculty, a laundry building, a lodging house for the domestic servants, and the necessary farm buildings.

Swarthmore Field and *Alumni Field* provide excellent facilities for outdoor athletics of the men. Swarthmore Field comprises the football, lacrosse, and soccer grounds, and a good quarter-mile cinder track with a two hundred and twenty yards straight-away. Alumni Feld is contiguous with Swarthmore Field and provides an excellent baseball ground. The men's tennis courts are being constructed in front of Wharton Hall.

Cunningham Field, the women's athletic ground, includes a part of the east campus beyond Somerville Hall. This field, enclosed by a hedge of California privet, is divided into the three terraces which make ample provision for basketball, tennis, and English field hockey. This field was given by students, alumnæ, and friends of the College as a tribute to Susan J. Cunningham, who has for many years been closely identified with the interests of the women students of Swarthmore.

SOCIAL LIFE

Swarthmore, as a coeducational institution, undertakes to provide college life in a home setting; to supply an atmosphere in which manly and womanly character may develop naturally and completely. The intercourse of the students is under the care of the Dean of Women and her assistants, who aim to make it a means of social culture.

RELIGIOUS LIFE

The daily sessions of the College include a gathering of students and instructors for the reading of the Bible, or for some other suitable exercise, preceded and followed by a period of silence. Students under twenty-one years of age are expected to attend either Friends' Meeting, held every First-day morning in the Meeting House, or, at the request of their parents, the church in the borough of the religious denomination to which they belong. A class to which all students are invited is held at 9.00 on First-day mornings for the consideration of religious

subjects. Preceding the meeting there are also classes in the First-day School to which students are invited. By these means, and particularly by individual influence, and by the constant effort to maintain in the institution a spirit in harmony with the purpose of its founders, it is believed that a proper care is exercised to mould the characters of the students in conformity with Christian standards.

STUDENTS' SOCIETIES

Two literary societies are maintained by the students: the *Athenæum* by the men, the *Somerville* by the women. Each society has, under the management of its own members, but accessible to all students, a library and a reading room containing periodicals and daily papers. The total number of books in these libraries is over four thousand.

The *Cercle français* holds frequent meetings and is open to all students in the French Department after the middle of their first year. Its object is to afford increased opportunities for acquiring a practical knowledge of the French language.

The *Deutscher Verein* holds occasional sessions for the purpose of affording its members a greater ease and facility in expressing themselves in idiomatic German. Students are thus brought into more positive acquaintance with German customs, amusements, music, and literature.

The *Mathematical and Astronomical Club* is an association of students in Mathematics and allied subjects, and of instructors in Mathematics. It meets on the first and third Tuesdays of each month to discuss subjects not pertinent to the class room.

The *Classical Club* meets once a month during the college year. Addresses and papers are given on subjects which emphasize the broader aspect of classical culture and civilization.

The *English Club,* open to all students, meets twice a month to hold discussions and to listen to papers and addresses upon topics of literary and dramatic interest.

The *Engineers Club* has for its purpose the reviewing of recent discoveries and achievements in engineering, discussing questions not raised in the class room, giving power in the presentation of topics, promoting intimacy between faculty and

students, and providing guidance in the engineering vocations. Meetings are held once in each month in the Beardsley Hall Library. Students majoring in engineering are eligible for membership.

The *Athletic Association* is an organization of the men for the encouragement of physical training and athletic sports.

The *Women's Athletic Association* is a similar organization of the women students.

Christian Associations. The religious life among the students is furthered by the Young Men's and Young Women's Christian Associations. Formal and informal receptions and other social functions are given with the especial object of promoting closer fellowship and a truly democratic spirit. Public meetings for worship are held every Sunday evening, the young men meeting in Wharton Hall and the young women in Parrish Hall.

No student organization of the College may incur any financial obligation, or make any contract involving a monetary consideration, without first obtaining the sanction of the President of the College, or of the proper faculty committee under whose supervision the organization is placed. Students contemplating a new organization must first consult the President of the College. If he desires to grant them permission to effect such an organization, he will advise the student representatives of the particular faculty committee under whose supervision the organization is placed.

COLLEGE PUBLICATIONS

Two periodicals are published by the students under the supervision of the faculty: *The Phœnix,* a weekly publication, is devoted to undergraduate journalism; the *Halcyon* is published annually by the Junior Class.

The *Swarthmore College Bulletin* is published every three months and contains a record of the matters of permanent importance in the progress of the College.

LIBRARIES AND READING ROOMS

The libraries of the College collectively contain about forty thousand volumes.

The chief sources of income for increasing the collection in

the college library are these: the Edgar Allen Brown Fund, established by his family in memory of Edgar Allen Brown, of the Class of 1890; the Alumni Fund; and the General Library Fund.

The library is open daily except Sunday, as follows: Monday to Friday, inclusive, 8.00 A. M. to 6.00 P. M. and 7.15 to 10.00 P. M.; Saturday, 8.00 A. M. to 5.00 P. M., and 7.15 to 10.00 P. M.

Residents of the borough of Swarthmore are cordially invited to use the library.

The Friends' Historical Library, founded by the late Anson Lapham, of Skaneateles, N. Y., contains a valuable and growing collection of Friends' books, tracts, and early writings (many very rare), photographs of representative Friends, other objects of personal and historic interest, and manuscripts relating to the Society and its history. This collection is stored in rooms practically fireproof, and it is hoped that Friends and others will deem it a secure place in which to deposit books and other material in their possession which may be of interest in connection with the history of the Society. Such contributions are solicited, and should be addressed to the Friends' Historical Library, Swarthmore, Pa. The library is accessible to all persons interested in the doctrines and history of Friends, and ample arrangements are provided for its use for consultation and for reference.

Moreover, the great collections of books in the Library of the University of Pennsylvania, the Philadelphia Library and its Ridgway Branch, the Mercantile Library, the Free Library of Philadelphia, as well as those in the special and technical libraries of the city, are open to the use of students under proper regulations. The Philadelphia library resources, which are of especial utility in connection with the various departments of the College, are referred to in the departmental statements.

The Library and the departmental reading rooms are supplied with reference books and the leading literary, scientific, and technical journals.

THE MUSEUM OF BIOLOGY AND GEOLOGY

The Museum contains a collection for educational purposes only, and the specimens from its cases are in constant use in the lecture room and laboratory. It is steadily becoming a more per-

fect means of illustrating the different departments of biology and geology.

It includes the following collections:

1. The *Joseph Leidy Collection of Minerals,* the result of thirty years' discriminating collection by its founder, consists of exceedingly valuable cabinet specimens of minerals, characteristic rocks and ores, and models of the various systems of crystallization.

2. The *Collection Illustrating Comparative Osteology* is composed of a large series of partial and complete skeletons, prepared at Prof. Henry Ward's Natural History Establishment in Rochester, N. Y. The collection illustrates the structure and framework of vertebrates.

3. The *Wilcox and Farnham Collection of Birds* comprises stuffed specimens of native and foreign birds. Nearly all the species visiting this State are represented.

4. The *Frederick Kohl Ethnological Collection* consists of Indian implements, weapons, clothing, etc., mostly from Alaska.

5. The *C. F. Parker Collection of Shells* is made up of choice typical land, fresh water, and marine shells. These specimens were all selected by the late Dr. Joseph Leidy from the extensive collection of the founder, C. F. Parker, who was for many years the Curator in charge of the Academy of Natural Sciences of Philadelphia.

6. The *Robert R. Corson Collection of Stalactites and Stalagmites* is composed of specimens from the Luray Caverns, which illustrates the peculiar limestone formations of Luray and similar districts.

7. The *Eckfeldt Herbarium* contains over two thousand specimens illustrating the flora of Pennsylvania. The *Annie Shoemaker Collection* is a valuable addition to this.

8. The *Joel Scarlet Collection of Minerals and Crystallographic Specimens* was presented to the Chemical Department by the heirs of the late Joel Scarlet of Kennett Square, Pa. This collection, which has been placed in cases located in the library of the Chemical Building, consists of about three thousand well-selected specimens, many rare and valuable. It is used for the course in Mineralogy and is accessible to students under the supervision of the instructor.

In addition to the above, there is a large and constantly increasing collection of specimens of vertebrates and invertebrates (including the U. S. Fish Commission Educational Collection), of dissected specimens for demonstration in the lectures on Physiology, of glass and papier-maché models illustrating special points in vegetable and animal morphology, besides about three hundred classified diagrams and colored charts illustrating every branch of natural history.

EXPENSES

The charge for tuition is $200 a year, payable in advance. A contingent fee of $50 a year, payable in advance by every student, has been added to partly meet increased cost of wages, coal, and the labor and materials for the up-keep of the physical property. This contingent fee is not applied to any increase in the cost of tuition or food. Students holding scholarships given for financial need are exempt from the payment of this contingent fee. No reduction of the charge of $250 can be made on account of absence, illness, dismissal during the year, or for any other reason whatever, and no refunding will be made on account of any said causes in case of a payment in advance.

The charge for board and residence ranges from $300 to $400, of which at least half is payable in advance. The remainder is due on the first of January. This charge varies in accordance with the size and location of the room. Of this charge $200 is the charge for board; the remainder is room-rent.

If any student for any reason whatsoever shall withdraw or be withdrawn from College, no portion of the payment for room-rent shall be refunded or remitted.

In case of illness and absence from the college extending over a continuous period of six weeks or more or withdrawal from the college for a continuous period of six weeks or more, there will be a special proportionate reduction in the charge for board provided that written notice be given to the Superintendent at the time of withdrawal, or, in case the student is ill at home, as soon as possible after the illness is proven. Verbal notice will not be sufficient to secure this allowance.

Bills for the first payment are mailed before the opening of the College year and bills for the second payment are mailed before the first of January following. Payments shall be made by check or draft to the order of SWARTHMORE COLLEGE, SWARTHMORE, PA. Every student is responsible for prompt payment when due. Thirty days after any payment is due, 5 per cent. will be added to any amount overdue. If not paid within thirty days after due the student may be excluded from College, but such exclusion shall not relieve the student or his or her parent or guardian from any liability theretofore incurred.

Students withdrawing or dismissed from college on or before the end of the first semester receive no benefit from scholarships, as scholarships are credited at the beginning of the second semester.

All students except upper class women choose rooms according to date of application for admission. After the Freshman year women choose rooms by lot. In order to reserve a room in any one of the dormitories each student must make a deposit of $25 when the room is chosen. Of this amount $15 will be deducted from the first payment for board and room. The remainder will be held as a fund to cover breakage or any other damage to College property, and the loss involved if a student fails to occupy the room reserved for him. No part of the room deposit will be returned if the student fails to occupy the room. When the amount of a student's breakage exceeds $5, the unexpended balance is returned and a new deposit is required.

The necessary furnishings for the rooms in the dormitories are provided by the College, with the exception of rugs, which are to be furnished by the students.

Special students who enroll for less than the prescribed number of hours will be charged according to the number of hours carried and at the rate of $10 per credit hour.

DINING-ROOM RATES

Per college year, $225; per month, $28; per week, $7; single breakfast, 30 cents; single lunch, 35 cents; single dinner (except Sunday), 40 cents; Sunday dinner, 50 cents; dinners per month, $11.50; lunches per month, $8.50; breakfasts per month, $8.

The college year for instructors and administrative officers begins with the Saturday preceding Registration Day, and ends with the Saturday following Commencement Day, but does not include the Christmas vacation. Instructors and officers who wish meals before the beginning or after the end of the college year are expected to make arrangements in advance at the Superintendent's office.

The charge for board and room for instructors and administrative officers is $300 per year.

The College is closed during the Christmas recess. Students who desire to remain in Swarthmore or its vicinity at that time

may secure board at moderate charge in homes recommended by the faculty. Students who desire to remain at the College during the spring recess will be charged a proportionate sum for board. Students leaving property in any college building during the summer recess do so at their own risk.

Freshmen are expected to leave the College immediately after their last examination is over in the spring in order that their rooms may be used by Commencement visitors.

Students purchase their own books, which are furnished by the College at the lowest rates obtainable. They also buy their own stationery and drawing implements, and pay a reasonable rate for laundry work done at the College.

A fee of $3 a semester is charged in every laboratory science, except in Chemistry and Engineering.

The fees in the department of Chemistry and Chemical Engineering are as follows: For the course of Assaying, no fee, but students pay for all breakage and all materials used; for the course in Mineralogy $3 a semester; for all other courses in this department $10 a semester. In addition to the above-named fees every student graduating in the department of Chemistry and Chemical Engineering is charged $25 in lieu of fees for apparatus and materials used, in connection with his thesis. This last named fee is payable at the beginning of the second semester of the Senior year.

A fee of $5 a semester is charged for each course in woodworking, forging, and machine practice; a fee of $2 a semester is charged for each course in field practice and surveying; an additional fee of $2 is charged for the annual survey.

A deposit of $5 is required for each course in shop work or founding. This deposit will be retained to cover breakage and loss of tools or supplies, and, after deduction for such items, the balance will be refunded upon the completion of the course.

Students are charged a fee of $1 a seemster for the use of gymnasium and swimming pools. This amount includes locker rental.

In addition to the payments made directly to the College there are a number of other items of living expense such as clothing, care of health, recreation, traveling, etc., which the student must meet. The combined expenditures of both classes vary considerably, of course, from student to student.

FELLOWSHIPS AND SCHOLARSHIPS

FELLOWSHIPS

The JOSHUA LIPPINCOTT FELLOWSHIP of $450 founded by HOWARD W. LIPPINCOTT, A.B., of the Class of 1875, in memory of his father, is awarded annually by the faculty, with the concurrence of the Instruction Committee, to a graduate of the College of at least one year's standing for the pursuit of graduate study under the direction of the faculty or with their approval. Applications for the Joshua Lippincott Fellowship for the year 1920-21 must be received by the faculty before February 20, 1920.

The LUCRETIA MOTT FELLOWSHIP, founded by the Somerville Literary Society and sustained by the contributions 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 JOHN LOCKWOOD MEMORIAL FELLOWSHIP of $450 was founded by the bequest of Lydia A. Lockwood, of 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. It is to be awarded annually by the faculty, with the consent of the Instruction Committee, to a graduate of the College of at least one year's standing, for the pursuit of graduate studies under the direction of the faculty or with their approval. Applications for this fellowship for 1920-21 must be received by the faculty by February 20, 1920.

The HANNAH A. LEEDOM FELLOWSHIP of $400 was founded by the bequest of Hannah A. Leedom. It is awarded annually by the faculty with the consent of the Instruction Committee to a graduate of the College of at least one year's stand-

ing for the pursuit of graduate studies under the direction of the faculty or with their approval. Applications for this fellowship for 1920-21 must be received by the faculty by February 20, 1920.

The MARTHA E. TYSON FELLOWSHIP of $450, founded by the Somerville Literary Society in 1913, is sustained by the contributions of the life members of the society. It is awarded annually, by a joint committee of the faculty and the society (elected by the society) with the concurrence of the life members of the society to a woman graduate of Swarthmore College, who has taught successfully for two years after her graduation, and expects to continue teaching. The recipient of the award is to pursue a course of study fitting her for more efficient work in an institution approved by the Committee of Award. Applications for this fellowship for 1920-21 must be received by the Committee of Award not later than February 1, 1920.

SCHOLARSHIPS

1. The WESTBURY QUARTERLY MEETING, N. Y., SCHOLARSHIP is awarded annually by a committee of that Quarterly Meeting.

2. Each of the following funds yields annually about $200 and is awarded at the discretion of the College to students needing pecuniary aid, whose previous work has demonstrated their earnestness and ability:

(*a*) The REBECCA M. ATKINSON SCHOLARSHIP FUND.
(*b*) The BARCLAY G. ATKINSON SCHOLARSHIP FUND.
(*c*) The THOMAS L. LEEDOM SCHOLARSHIP FUND.
(*d*) The MARK E. REEVES SCHOLARSHIP FUND.
(*e*) The THOMAS WOODNUTT SCHOLARSHIP FUND.
(*f*) The SARAH E. LIPPINCOTT SCHOLARSHIP FUND.

3. The ANNIE SHOEMAKER SCHOLARSHIP, a free scholarship for board and tuition, is awarded annually to a young woman graduate of Friends' Central School, Philadelphia.

4. The HARRIET W. PAISTE FUND is limited by the following words from the donor's will: "the interest to be applied an-

nually to the education of female members of our Society of Friends (holding their Yearly Meeting at Fifteenth and Race Streets, Philadelphia) whose limited means would exclude them from enjoying the advantages of an education at the College."

5. The MARY WOOD FUND is limited by the following words from the donor's will: "the income thereof to be, by the proper officers thereof, applied to the maintenance and education at said college of one female student therein, one preparing for the avocation of a teacher to be preferred as the beneficiary, but in all other respects the application of the income of said Fund to be in the absolute discretion of the college."

6. The WILLIAM C. SPROUL SCHOLARSHIP. William C. Sproul, a graduate of the Class of 1891, offers annually a scholarship to a graduate of the Chester High School. This scholarship may continue throughout the college course. Details may be secured from the principal of the Chester High School.

7. The following scholarships are offered for work done in the College in 1919-20. They are of the value of $200 each for resident, and $100 each for day students, and are awarded in each instance to that member of each of the respective classes who shall be promoted without conditions, and shall have the best record of scholarship upon the regular work of the year:

(*a*) The DEBORAH FISHER WHARTON SCHOLARSHIP will be awarded to a member of the Junior Class.

(*b*) The SAMUEL J. UNDERHILL SCHOLARSHIP will be awarded to a member of the Sophomore Class.

(*c*) The ANSON LAPHAM SCHOLARSHIP will be awarded to a member of the Freshman Class.

8. The SAMUEL WILLETS FUND provides several scholarships for resident students needing pecuniary aid, whose previous work has demonstrated their earnestness and their ability. They will be awarded at the discretion of the Committee on Trusts. Application should be made to the President of the College.

9. The ISAAC STEPHENS SCHOLARSHIPS. Four scholarships of $50 per year.

10. The I. V. WILLIAMSON SCHOLARSHIPS FOR PREPARATORY SCHOOLS. Ten scholarships of the value of $150 each for resident students, and $75 each for day students, are offered to members of classes graduating in 1920 in the following schools:

1 to Friends' Central School (Boys' Department) ..... Philadelphia.
1 to Friends' Central School (Girls' Department) ..... Philadelphia.
1 to Friends' Seminary ..... New York, N. Y.
1 to Friends' School ..... Baltimore, Md.
1 to Friends' School ..... Wilmington, Del.
1 to Friends' High School ..... Moorestown, N. J.
1 to Friends' Academy ..... Locust Valley, N. Y.
1 to Friends' Select School ..... Washington, D. C.
1 to George School (Boys' Department) .... George School, Pa.
1 to George School (Girls' Department) .... George School, Pa.

Beginning with the classes graduating in 1920 from the schools listed above, these scholarships will be awarded under the following conditions:

(*a*) There must be two or more candidates from each school for the scholarship.

(*b*) The candidates will be required to take the examinations of the College Entrance Examination Board. The scholarship will be awarded only to that candidate who makes a passing grade of 60 per cent, in each subject required for admission and who makes the highest average grade.

(*c*) Examinations must be completed before July 1 preceding the year of admission to College. A candidate may take any examination for which his preparation is complete in any year of the college preparatory course.

(*d*) No scholarships will be awarded to applicants who fail to be admitted without conditions.

(*e*) Every holder of such scholarship must pursue in College the studies leading regularly to the degree of Bachelor of Arts.

(*f*) The College reserves the right to require some form of service from students receiving scholarships from the College.

11. For the year 1920-21, Swarthmore College offers three scholarships of $150 each for resident students and $75 each for day students, to members of classes graduating in 1920 in the following schools:

1 to Swarthmore Preparatory School ..... Swarthmore, Pa.
1 to Swarthmore Public High School..... Swarthmore, Pa.
1 to The West Chester High School..... West Chester, Pa.

Beginning with the classes graduating in 1920 from the schools listed above, these scholarships will be awarded under the same conditions as the I. V. Williamson scholarships described under caption 10.

12. The Phœbe Anne Thomas Fund provides several 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. Application should be made to the President of the College.

13. A friend of Swarthmore College and of the University of Pennsylvania offers a scholarship of $100 for the college year 1920-21 to a graduate of Swarthmore College taking work in any department of the University.

14. The Western Swarthmore Club offers in conjunction with the College, one competitive scholarship of $450 to a man. The scholarship is open for competition to all high and preparatory school graduates west of the Allegheny Mountains. Students interested are requested to apply to the President of the Club, Professor T. A. Jenkins, University of Chicago, Chicago, Illinois.

15. The Mary Coates Preston Scholarship Fund. A sum of money has been left by will of Elizabeth Coates to Josephine

Beistle, of Swarthmore, as trustee, the annual interest of which will be about $300. This amount is given by the trustee as a scholarship to a young woman student in Swarthmore College, preferably to a relative of the donor.

16. The Woman's Medical College of Pennsylvania offers a scholarship of $175, full tuition, to a young woman graduate of Swarthmore College. This amount is to be given annually during the four years of medical work, thus having a total value of $700 to the student receiving the scholarship.

17. The Ivy Medal is placed in the hands of the faculty by a friend of the College, to be awarded on Commencement Day to a male member of the graduating class for character, scholarship, and influence.

ADMISSION

APPLICATION FOR ADMISSION should be made as early as possible by letter to the Dean of the College. Students are not admitted for a period of less than the current college year, but, when vacancies exist, students may enter profitably upon the work of a sufficient number of courses. All applicants must present satisfactory testimonials of good character from their former teachers, and students coming from other colleges must present certificates of honorable dismissal.

ADMISSION TO THE COLLEGE is granted (1) to candidates who pass satisfactory examinations covering the entrance requirements stated below, pages 41 to 43; and (2) to those who present certificates signed by the principals of duly accredited schools, made out upon forms furnished by the College, affording sufficient evidence that the entrance requirements have been met.

1. EXAMINATIONS FOR ADMISSION must be taken in June if possible. Candidates for admission by examination in June are required to take the examinations of the College Entrance Examination Board. For those who find it impossible to take examinations in June examinations in all subjects will be held at the College in September.

COLLEGE ENTRANCE EXAMINATION BOARD

ENTRANCE EXAMINATIONS, JUNE 21-26, 1920

In June, 1920, there will be separate blank forms for the "Application for Examination" and "Certificate of Recommendation." The former should be addressed to the College Entrance Examination Board, 431 West 117th Street, New York, N. Y., the latter to the Chairman of the Committee on Admission of the university, college, or scientific school that the candidate wishes to enter. Both forms may be obtained from the Secretary of the College Entrance Examination Board upon request by mail.

Provided that the application reach the College Entrance Examination Board not later than the date specified below, the examination fee will be $6 if the candidate is to be examined in the United States, $20 if the candidate is to be examined outside of the United States. The fee should be remitted by postal order, express order, or draft on New York to the College Entrance Examination Board.

Applications and fees of candidates who wish to be examined outside of the United States must reach the Secretary of the Board at least six weeks in advance of the examinations, that is, on or before May 10, 1920.

Applications and fees of candidates who wish to be examined at points in the United States west of the Mississippi River must be received at least four weeks in advance of the examinations, that is, on or before May 24, 1920.

Applications and fees of candidates who wish to be examined at points in the United States east of or on the Mississippi River must be received at least three weeks in advance of the examinations, that is, on or before May 31, 1920.

When the candidate has failed to obtain the required blank form of application for examination, the usual examination fee will be accepted if the fee arrive not later than the specified date accompanied by a memorandum containing the name and address of the candidate, the examination center at which he wishes to present himself, and a list of all subjects in which he may have occasion to take the Board's examinations.

Applications received later than the dates named will be accepted only upon payment of $6 in addition to the usual fee.

A list of the places at which the examinations are to be held by the Board in June, 1920, will be published about March 1. Requests that the examinations be held at particular points, to receive proper consideration, should be transmitted to the Secretary of the Board not later than February 1.

2. Admission by Certificate. Graduates of Friends' schools and of public high schools, approved by the faculty and Instruction Committee, will be admitted to the College on certificate of the principal, but are not in every case received without condition. The faculty admits these students *on trial,* and reserves

the right to change their classification or to decline to continue their connection with the College if they find them to be insufficiently prepared. The privilege of sending students on certificate may be withdrawn from any school whose pupils are found to be deficient. Principals of other schools who wish to have students admitted on their recommendation should correspond with the Dean on the subject.

Certificates issued by the College Entrance Examination Board will be accepted in place of examinations on the subjects therein certified to as passed. See page 39 for information as to the examinations held by this board. Additional information, if needed, may be obtained by addressing The Secretary of the College Entrance Examination Board, 431 West 117th Street, New York, N. Y.

Graduation from an acceptable four years' high school course or its equivalent is required for admission to the Freshman class on certificate. An applicant may offer substitutes for some of the optional subjects listed below, but in such cases the student is required to substitute for college electives such work as had been omitted in preparatory school. Thus there would be no increase in the number of credit hours required for graduation, but fewer electives could be included in the four-year college course.

ENTRANCE REQUIREMENTS

It is to be carefully noted that the subjects included among the entrance requirements are rated as strictly as possible according to the *time* that should have been devoted to preparatory work in each.

In regard to a *unit* of admission requirements, the faculty of Swarthmore College has approved the following statement, which has been adopted by the National Conference Committee on Standards of Colleges and Secondary Schools, the College Entrance Examination Board, and the Carnegie Foundation for the Advancement of Teaching:

A unit represents a year's study in any subject in a secondary school, constituting approximately a quarter of a full year's work.

This statement is designed to afford a standard of measure-

ment for the work done in secondary schools. It takes the four-year high school course as a basis, and assumes that the length of the school year is from thirty-six to forty weeks, that a period is from forty to sixty minutes in length, and that the study is pursued for four or five periods a week. By this standard a satisfactory year's work in any subject cannot be accomplished under ordinary circumstances in less than one hundred and twenty sixty-minute hours or their equivalent. Schools organized on any other than a four-year basis can, nevertheless, estimate their work in terms of this unit.

The total number of units required on this basis for admission to Swarthmore College is *fourteen and a half.*

AURAL AND ORAL TESTS IN FOREIGN MODERN LANGUAGES

In accordance with a resolution adopted in 1908 by the Modern Language Association of America and a similar one adopted in 1914 by the Association of Modern Language Teachers of the Middle States and Maryland, it is recommended that the schools preparing students for Swarthmore College prescribe adequate aural and oral tests for all candidates who desire to present a foreign modern language in satisfaction of requirements for admission.

I. General Statement of Subjects Required for Entrance

1. Elementary Algebra	1½ units	*Required* subjects, *seven and one half* units.
2. Plane Geometry	1 unit	
3. English	3 units	
4. History	2 units	
5. Elementary French	2 units	*Optional* subjects. Of these enough must be offered to *aggregate seven* units.
6. Intermediate French	1 unit	
7. Advanced French	1 unit	
8. Elementary German	2 units	
9. Intermediate German	1 unit	
10. Advanced German	1 unit	
11. Greek	3 units	
12. Elementary Latin	2 units	
13. Advanced Latin	1 or 2 units	
14. Elementary Spanish	2 units	
15. Elementary Science	1 or 2 units	
16. Solid Geometry	½ unit	
17. Trigonometry	½ unit	

II. Detailed definitions of the requirements in all subjects listed under the general statement on page 42, including lists of experiments in the natural sciences, are given in a special circular of information published annually by the College Entrance Examination Board. The edition published July 1, 1919, was designated as Document No. 93. Copies of this document may be obtained from the Secretary of the Board, 431 West 117th Street, New York, N. Y. Upon request to the Board a single copy will be sent to any teacher without charge. In general a charge of ten cents, which may be remitted in postage stamps, will be made.

ADVANCED STANDING

No student is admitted to advanced standing later than the beginning of the senior year. Students entering from other colleges must complete at least one full year's work at Swarthmore College in fulfillment of the requirements for the degree of Bachelor of Arts. Students who come from other colleges must present full credentials for both college and preparatory work, and a letter of honorable dismissal. If the credentials are satisfactory to the Committee on Admission, the candidate will be given, without examination, an equivalent amount of credit upon the records of the College. All applicants for advanced standing for work done in other than approved colleges or universities will be admitted to such standing only by examination. Examinations for such credit shall cover the full equivalent of corresponding courses at Swarthmore College. Application for advanced standing should be made in writing to the Dean. Examinations will be held only at the College.

REQUIREMENTS FOR GRADUATION

THE GENERAL UNDERGRADUATE COURSE OF STUDY

The degree of Bachelor of Arts is conferred upon those who complete the undergraduate course as outlined below. This course is based upon uniform requirements for admission, and upon certain studies which are prescribed for all matriculates. In addition to securing this fundamental uniformity, it provides for the varied needs and capacities of individuals by permitting a wide range of election on the part of the student or his adviser; and it seeks, also, to provide a thorough training, extending over three or four years, in some one department of study. The requirement of a thesis from a candidate for the Bachelor's degree is left to the option of the head of the department in which the major is taken.

Candidates for graduation in the Department of Liberal Arts are required to complete one hundred and twenty-four "hours" in addition to the prescribed work in physical education. For the number of hours required for graduation in the Departments of Engineering and in the Department of Chemistry, see the courses of study outlined under the various departments. *The foregoing are minimum requirements. Students may be required to complete additional "hours" for graduation as penalties for absences from collection or from class room, laboratory, or other college exercises.* An "hour" signifies one recitation or lecture (or its equivalent) a week throughout one college semester. A recitation or lecture is regularly fifty-five minutes long, and the preparation of the student is estimated at an average of two hours for each class exercise. In the Departments of Engineering, Biology, and Chemistry a laboratory period is three hours in length. In other departments, where additional work is required outside of the laboratory, the laboratory period is two hours in length. It is designed to make the laboratory exercise, as nearly as possible, equivalent in its demands to the hours defined above.

The prescribed number of hours for students majoring in the Departments of Liberal Arts is seventeen for each semester

of the freshman year and fifteen for each semester of the sophomore, junior, and senior years. The prescribed number of hours for students majoring in Engineering ranges from fifteen to twenty for each semester.

Quality Points.—An average quality grade shall be required for graduation, and for the purpose of determining this quality grade, numerical values called "points," shall be given to the grade letters, as follows: for grade A, three points for each semester hour of course in which the grade is received; for grade B, two points; for grade C, one point; for grade D, no point. The grade D is sufficient to pass a course, but does not count any "point."

In accordance with this valuation the requirements in "points" for graduation of all students, both those in arts and in applied science, is one hundred and twenty-four. This is a requirement for Arts students of an average grade of C. In other words, Arts students are required for graduation to present one hundred and twenty-four hours of credit and one hundred and twenty-four "points." Students in applied science will be required for graduation to present the number of hours of credit now prescribed (ranging from one hundred and thirty-two to one hundred and fifty-one) and one hundred and twenty-four "points."

Extra or Less Hours.—Students are not allowed to carry more nor less than the prescribed amount of work except in special cases approved by the Committee on Prescribed and Extra Work. Students often find it difficult, however, to make out a course of study for the exact number of hours, and for this reason a variation of one hour more or less than the prescribed number of hours may be allowed by the course adviser. In such cases the endorsement of the course adviser must be secured in writing on the Enrollment Card.

Students desiring to carry more than one hour in excess of the prescribed number, or more than one hour below the prescribed number, must make application to the Committee on Prescribed and Extra Work on a regular form provided for the purpose by the Dean. No student whose marks have fallen below C in any subject or below B in more than one department during the preceding semester shall be permitted to enroll for

more than one hour in excess of the prescribed number. For students entering from other schools or colleges these grades shall be determined from their entrance certificates. No application of a student to enroll for more or less than the prescribed number of hours shall be considered by the committee unless accompanied by the written endorsement of the course adviser.

I. *Prescribed Studies.*—These studies must be taken by all students who are candidates for graduation, unless for special reasons permission to substitute some other work is obtained from the proper faculty committee. The whole of the first year is devoted to five of the prescribed studies with one elective.

The time and order in which the remaining studies are taken may vary according to the requirements of each department. The prescribed work, amounting to forty-three hours, exclusive of the Physical Education, includes the following studies:

Group 1. English.—Ten hours, four of which must be taken in English Composition, and six in English Literature.

Group 2. Greek, Latin, French, German, Spanish.—Twelve hours in any one of these languages, or six hours in each of two.

Group 3. Nine hours, three of which must be taken in Bible Study, and six in one of the following departments: History, History of Religion and Philosophy, Economics, Political Science, Psychology and Education.

Group 4. Biology, Chemistry, Physics.—Six hours, to be taken in any one of the three departments, and to include at least one credit-hour of laboratory work throughout a year.

Group 5. Mathematics, Astronomy.—Six hours, to be taken in either one of the two studies.

Group 6. Physical Education.—For the prescribed amount of work in this department, see the statements under the Department of Physical Education.

Students who fail in the required courses of the freshman year should enroll in these courses during the sophomore year. No deviation from this rule will be allowed except on the written endorsement of the course adviser, and after notification to

the professor in charge of the subject in which the student failed.

All prescribed studies must be completed or in actual process of completion at the beginning of the senior year except in cases where such prescribed work is not offered until the second semester of the senior year.

No substitution of elective for prescribed work where more than one semester is involved shall be permitted after the beginning of the senior year, nor in any case after the beginning of the second semester of the senior year.

Application for permission to substitute an elective for a prescribed study must be made to the Committee on Prescribed and Extra Work on a regular form provided by the Dean for the purpose.

II. *Major Subject.*—Every candidate for graduation is required to select the work of some one department as his major. In most cases the selection may well be postponed until the beginning of the second year. In the department thus chosen the student must complete eighteen hours as a minimum (the prescribed work done in the major study to be included in this minimum), and the professor in charge may, at his option, determine the work of thirty-six hours, provided six hours shall not be in his own department. If the major study is one of the languages, at least six hours of the prescribed work must be taken in another language. No matter how much credit may have been given on entrance, no student is allowed to graduate who has not been enrolled as a student of Swarthmore College at least one year and who has not had in the College at least one year's work in his major.

If the major study is changed from any branch of Engineering to a department in Arts, the number of credit hours then on record will be adjusted to the basis of 124 hours.

III. *Elective Studies.*—The remaining work required for graduation may be elected from any department or departments of the College.

The following subjects are open to election, in so far as the exigencies of the college programme will permit:

Anthropology,
Art,
Astronomy,
Bible Study,
Biology,
Botany,
Chemistry,
Economics,
Education,
Engineering,
English,
French,
Geology,
German,
Greek,
History,
History of Religion,
Latin,
Law,
Mathematics,
Philosophy,
Physics,
Political Science,
Psychology,
Public Speaking,
Spanish,
Zoölogy.

UNIFORM CURRICULUM FOR THE FRESHMAN YEAR IN THE COURSES IN ARTS

FRESHMAN YEAR

First Semester			Hours per Week		
See Page			Class	Lab'y	Credits
	Major Study or Elective		—	—	3
59	English 1	Composition	2	—	2
60	English 4	General Introduction	3	—	3
113	Mathematics 251	Solid Geometry	3	—	3
	or				
115	Astronomy 262	Descriptive Astronomy	—	—	—
	Language		3	—	3
	Elective		—	—	3
117	Physical Education		2	—	—
		Totals	13	—	17

Second Semester

	Major Study or Elective		—	—	3
59	English 1	Composition	2	—	2
60	English 4	General Introduction	3	—	3
113	Mathematics 253	Trigonometry	3	—	3
	or				
115	Astronomy 262	Descriptive Astronomy	—	—	—
	Language		3	—	3
	Elective		—	—	3
117	Physical Education		2	—	—
		Totals	13	—	17

THE COURSES OF STUDY IN APPLIED SCIENCE

The degree of Bachelor of Arts in the Departments of Mechanical, Civil, Electrical, and Chemical Engineering, and in the Department of Chemistry, is conferred upon those students who complete the prescribed work as outlined under the various departments above named.

IRREGULAR COURSES OF STUDY

Irregular courses of study, not including in due proportion the prescribed major and elective studies, may be pursued by students who have been regularly admitted to the College by examination or by certificate only in special cases and by approval of the Faculty Committee on Prescribed and Extra Work.

UNIFORM CURRICULUM FOR THE FRESHMAN AND SOPHOMORE YEARS IN APPLIED SCIENCE

The curriculum for the first and second years of the four-years' courses leading to degrees in the Departments of Mechanical, Civil, Electrical, and Chemical Engineering is the same in every respect. For the first and second year students in Chemistry as applied science and in Chemical Engineering follow the same courses as given below except that women students are required to take certain electives instead of the prescribed courses, where specified.

FRESHMAN YEAR

See Page	*First Semester*		Hours per Week		
			Class	Lab'y	Credit
	Shop 203*	Pattern-making	—	6	2
113	Mathematics 251	Solid Geometry	3	—	3
113	Mathematics 252	Algebra	3	—	3
59	English 1	Composition	2	—	2
60	English 4	General Introduction	3	—	3
89	Chemistry 171	General Inorganic	2	3	3
105	Drawing 191	Engineering	—	6	2
117	Physical Education		2	—	—
		Totals	15	15	18

	Second Semester				
	Shop 203 and 204*	Pattern-making and Foundry	—	6	2
113	Mathematics 253	Trigonometry	3	—	3
113	Mathematics 252	Algebra	2	—	2
59	English 1	Composition	2	—	2
60	English 4	General Introduction	3	—	3
89	Chemistry 171	General Inorganic	2	3	3
105	Drawing 192	Engineering	—	6	2
117	Physical Education		2	—	—
		Totals	14	15	17

*Women majoring in Chemistry may substitute an elective for Shop Work and Drawing.

SOPHOMORE YEAR

First Semester			Hours per Week		
See Page			Class	Lab'y	Credit
105	Drawing **193***	Descriptive Geometry	—	6	2
106	Shop **205** and **206***	Forgework and Machinework	—	6	2
113	Mathematics **254**	Analytical Geometry	3	—	3
89	Chemistry **172**	Qualitative Analysis	1	6	3
46	Group 2†		3	—	3
116	Physics **271**	General Physics	2	3	3
107	Mechanical Engineering **213**	Materials of Construction	2	—	2
117	Physical Education		2	—	—
		Totals	13	21	18

Second Semester

105	Drawing **194***	Empirical Design	—	6	2
107	Shop **206***	Machine Work	—	6	2
113	Mathematics **255**	Differential Calculus	3	—	3
89	Chemistry **172**	Qualitative Analysis	1	6	3
46	Group 2†		3	—	3
116	Physics **271**	General Physics	2	3	3
108	Civil Engineering **223** or Elective*	Surveying	—	4	2
109	Annual Survey **230***	Long Survey	—	—	1
117	Physical Education		2	—	—
		Totals	11	25	19

* Women majoring in Chemistry may substitute electives for Drawing, Shop, and Surveying.
† The courses to be followed in Group 2 are determined by the student's previous training in these languages.

COURSE ADVISERS

All students are expected to confer with their respective course advisers before enrolling in classes. The professor in charge of the major subject will serve as course adviser for each student who has chosen a major subject. The President will designate the course adviser for students who have not chosen their major subjects.

EXTRA WORK DONE OUTSIDE OF CLASSES

No student will be granted credit for work in excess of that regularly listed on the Enrollment Card unless permission to do so is granted by the Committee on Prescribed and Extra Work at the written request of the course adviser. All students except those desiring credit for intercollegiate debating must gain permission of the Committee on Prescribed and Extra Work before the work is entered upon.

SUMMER SCHOOL WORK

Students desiring to transfer credit in a prescribed subject from a University Summer School are required to secure the endorsement of the head of the department concerned before entering upon the work.

REMOVAL OF CONDITIONS

Members of the graduating class must make up all outstanding conditions and deficiencies by the end of the first semester of the senior year, and no student whose record is not then clear shall be considered a candidate for graduation in that year.

All conditions must be made up in the semester immediately following that in which the work reported as conditioned was done, and as early in the semester as possible; except that by special permission of the professor concerned the time for making up the condition may be extended to the second semester following in case (1) the course for which the condition was imposed is not repeated until said second semester, and (2) it is considered necessary by the professor that the student should

make up part or all of the class or laboratory work involved at the time the course is repeated. Any condition not made up within a year from the time it is imposed shall thereafter have the effect upon the records of an "E," *i. e.,* complete failure, which cannot be made up.

SYSTEM OF GRADES

Reports of students' work are received at the Dean's office four times a year; at the end of each semester and at each mid-semester. All grades are mailed to parents at the end of each semester, and are also given out to students at each mid-semester and the end of the first semester.

The following system of marking is used by instructors: A (excellent, 100-90 per cent.); B (good, 89-80 per cent.); C (fair, 79-70 per cent.); D (poor, 69-60 per cent.); E (failed); W (withdrawn); Cond. (Conditioned).

The mark "conditioned" shall be reported for only two reasons: (1) for unsatisfactory work in a semester course in which the condition may be removed by doing satisfactory work either in another semester course which involves the subject-matter of the first course or in the second semester of a year's course; (2) when the work of a course is incomplete; that is, when the work done in the course is satisfactory with the exception of a small, definite part of it; for example, the writing of a theme, the reading of an assignment, or the taking of a final examination. The mark "conditioned" shall not be given to a student whose work in a course has been below the passing grade. Such a student shall be reported "E" (failed).

When the reports of grades are filed at the Dean's office, the exact character of the conditions imposed will be defined, and the nature of the work required to remove conditions reported in writing. The students will then be notified by the Dean of the terms of the conditions.

EXEMPTION FROM EXAMINATIONS

No underclassmen shall be exempted from semester final examinations; seniors with grades of A or B at the beginning of final examinations shall be exempt in the final examinations of the second semester.

ABSENCES FROM EXAMINATION

Any student who is absent from an examination, announcement of which was made in advance of the date of the examination, shall be given an examination at another than the scheduled hour only after presentation by the student to the instructor in charge of the course (1) of a certificate from the Committee on Absences that the student has submitted a written statement satisfactorily explaining the cause making the absence from examination imperatively necessary, and (2) of a receipt from the office of the superintendent for a fee of $2. This fee shall be remitted only in the case of duly certified quarantine. In case of continuous illness the maximum fee shall be $5.

No examinations *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.

ABSENCES FROM CLASSES

Each instructor shall make on the form provided for the purpose daily reports of student absences to the office of the Dean.

All powers of supervision and discipline over student absences are vested in a Committee on Absences to be composed of the Dean, The Dean of Women, both *ex officio*, and three other faculty members appointed annually by the President of the College, who shall designate the Chairman of the Committee from among its members.

In dealing with all student absences the Committee on Absences shall classify them either (a) as allowable absences, or (b) as disallowed absences. Allowable absences are absences which in the opinion of the Committee on Absences are incurred for sufficient cause. By sufficient cause is meant any grounds for absence which would justify failure to keep a stated business appointment; provided, however, that no absence shall be considered allowable by the Committee on Absences unless a written explanation of it is made by the student incurring it on a form provided for this purpose at the Dean's office. Such explanation must be made by the student in advance of the absence, when possible. Written explanations of all absences must be

filed at the Dean's office within three college days after the absence, or such absences will be disallowed automatically.

All absences not coming under the definition of allowable absences shall be considered disallowed absences subject to discipline. In the exercise of their powers of discipline over absences of the latter character the Committee on Absences may warn students, parents, or guardians; may place students on probation and fix the terms of said probation; and may require students to make hours of credit for graduation in addition to the requirements as stated in the Catalogue; provided that, in the case of students who reach the end of the first semester of their senior year with a penalty of less than one full hour of credit imposed under this section, said penalty may be removed by the Committee on Absences. For the year 1919-20 students will be penalized one-half credit hour for each disallowed absence after the fifth.

For each disallowed absence on days beginning or ending all vacations and holidays, including the summer vacation, students shall be required to make one half hour of credit for graduation in addition to the requirements as stated in the Catalogue. Absences penalized under this section shall not be subject to discipline provided under other sections of these rules.

Students shall have the right to a hearing before the Committee on Absences in cases involving the imposition of credit penalties by the Committee, and the right to petition the Faculty in cases where, after such hearing has been given, they are dissatisfied with the decision of the Committee. In all questions involving the number of a student's absences the reports of Instructors shall be considered authoritative.

DEGREES

BACHELOR OF ARTS

The degree of Bachelor of Arts is conferred upon students who have complied with the requirements for graduation as stated on pages 44 to 48.

MASTER OF ARTS *

1. The degree of Master of Arts may be conferred upon graduates of Swarthmore College or of other institutions of satisfactory standing who have spent at least a year in residence at this College, pursuing a systematic course of non-professional study approved by the faculty. The amount of work required of candidates for the Master's degree consists of the equivalent of thirty credit hours in courses of instruction of advanced grade, of which at least twenty hours shall be in a major subject and the remainder in a minor subject to be approved by the professor in charge of the major subject. All candidates must have completed the work of the major subject in the undergraduate course as stated on page 47, before entering upon graduate work. *No work counted for the first degree will be accepted for the second degree.* In no case will the Master's degree be conferred upon resident students in less than one year after the conferring of the Bachelor's degree. It must be understood, however, that only students of ability and maturity will be able to finish the work in one year. No person will be recommended for the Master's degree who shall not have attained a grade of A or B on examination in each subject.

2. The degree may be conferred upon graduates of Swarthmore College who have devoted one year to graduate work in residence at another college or university, and who have fulfilled the requirements indicated in the preceding section.

3. The degree may be conferred upon graduates of Swarthmore College not in residence at any college or university, who

* Candidates holding the degree of Bachelor of Science, who have fulfilled all the requirements prescribed for the degree of Master of Arts, may at their option receive the degree of Master of Science.

have completed a course of non-professional advanced study approved by the faculty, substantially equivalent in kind, grade, and amount to that prescribed for the resident candidates for that degree. Courses of study will be assigned to candidates upon an application to the faculty, in which they state the subjects they desire to pursue.

All candidates *in absentia* must register (by correspondence, if necessary) at the beginning of each college year, and make reports to the faculty at the end of each semester.

Each candidate for the Master's degree must prepare a satisfactory thesis on a subject assigned by the professor in charge of the major subject, and must pass a final oral examination before a committee of the faculty composed of the professors in charge of the major and minor subjects respectively, and three other members of the faculty appointed by the President of the College. A majority vote of this committee is required for favorable recommendation to the faculty. This examination will be held only when notification of the intention to appear for examination is given to the Dean on or before the first of April of the year in which the candidate desires to receive the degree. The thesis must be presented on or before May 25th of the year in which the candidate desires to receive the degree, and a bound copy of the thesis must be deposited in the college library by July following.

Every resident candidate shall pay the regular tuition for each year of residence and a diploma fee of $5. Every non-resident candidate shall pay a registration fee of $5 and an additional fee of $20 when the degree is conferred.

ADVANCED DEGREES IN CIVIL, MECHANICAL, AND ELECTRICAL ENGINEERING

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

1. The candidate must have been connected with practical engineering work for three 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. After this application is made he will receive an outlined course of study to pursue during the year.

4. The thesis must be submitted for approval, and satisfactory evidence given that the reading requirement has been met 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.

DEPARTMENTS AND COURSES OF INSTRUCTION

English

The instruction in this department is under the direction of Professor Harold Clarke Goddard. Philip M. Hicks and Roy Petran Lingle are Assistant Professors, Esther Elizabeth Baldwin, Raymond Morse Herrick, and Kate W. Tibbals are Instructors.

The purpose of the work in English is to impart the ability to write clear, forceful, idiomatic English, and to arouse and foster love of good literature. A special effort is made to keep in view, at all times, the application of the works studied to the life and problems of the present day.

The requirements and electives in Composition may be seen below. Of the courses in English Literature, Course 4 fulfills the prescription in English Literature, and is a prerequisite to all other courses in English; Courses 8, 10, and 12 are open to all students who have completed Course 4; Courses 6, 7, 9, and 11 are open to all students who have completed six additional hours elected from Courses 8, 10, and 12, and also, with the consent of the instructor, to Juniors and Seniors whose major subject is not English; Course 14 is open as stated under that course.

1. Composition. Assistant Professor Lingle, Miss Baldwin, Mr. Herrick, and Dr. Tibbals.

Two hours a week throughout the year. Offered annually.

Prescribed, in the Freshman year, for all candidates for graduation. Short and long themes and regular conferences throughout the year, together with assigned collateral reading.

2. Second Year Composition. Dr. Tibbals.

Two hours a week throughout the year. Offered annually.

Prerequisite, Course 1. This course continues, along more advanced lines, the work of the Freshman year, emphasis being placed upon expository writing.

3. Narrative Writing. Professor Goddard.

Two hours a week throughout the year. Offered annually.

Open only to those who have attained a grade of A or B in Courses 1, or 2. The chief emphasis of this course is on the short story; the analysis of its structure and practice in writing it. In the second semester some time is devoted to the writing of one-act plays. (See, also, under Course 14.)

ENGLISH LANGUAGE AND LITERATURE

4. General Introduction to English Literature. Assistant Professor Lingle, Miss Baldwin, Mr. Herrick, and Dr. Tibbals.

Three hours a week throughout the year. Offered annually.

The first semester of Course 4 is devoted, in the main, to a study of various literary types. Representative examples of lyric and narrative poetry, of the drama, novel, and essay are discussed and criticised in the classroom. The second semester is given to a rapid survey of the history of English literature from the Anglo-Saxon to the Victorian period. A large amount of collateral reading and frequent written reports are required during both semesters.

Course 4 is prescribed in the Freshman year, for all candidates for graduation, and is prerequisite to all other courses in English.

6. Chaucer. Professor Goddard.

Three hours a week throughout the year. Offered in 1920-1921

After an introductory study of Middle English grammar and phonology, Course 6 is devoted to a careful reading of a number of the *Canterbury Tales,* several of the Minor Poems, and the *Troilus and Criseyde.* Brief selections are read from the works of Langland and other writers of the period.

Course 6 must be continued throughout the year.

7. The English Drama. Assistant Professor Lingle.

Three hours a week throughout the year. Offered annually.

Course 7 deals with a selected period or aspect of the English drama. Subject for 1919-20: The Development of the Drama.

Course 7 must be continued throughout the year.

8. Shakespeare. Mr. Herrick.

Three hours a week throughout the year. Offered annually.

A critical study of several selected plays of Shakespeare and more rapid reading of the rest of his works.

Course 8 must be continued throughout the year.

9. Prose Fiction. Professor Goddard.

Three hours a week during the first semester. Offered in 1919-20.

Course 9 deals with a selected period or aspect of English fiction, or takes up in more detail the works of a single author.

10. English Poetry. Assistant Professor Lingle.

Three hours a week throughout the year. Offered annually.

The work of this course is devoted to the English poets of a selected period, the emphasis being placed on the interpretation of individual masterpieces rather than on the study of literary movements. Subject for 1919-20: Victorian Poetry.

Course 10 must be continued throughout the year.

11. English Prose. Professor Goddard and Dr. Tibbals.

Three hours a week throughout the year. Offered annually.

The purpose of Course 11 is to present the development of English thought and of the religious, social and political ideals of the English people, as embodied in the prose literature of a selected period.

In 1919-20 two courses in English Prose are offered: 11 (*a*) Social Ideals in Contemporary Prose, by Professor Goddard; and 11 (*b*) Victorian Prose, by Dr. Tibbals.

Course 11 must be continued throughout the year.

12. American Literature. Miss Baldwin.

Three hours a week throughout the year. Offered in 1919-20.

A survey of the history of American literature, emphasis being placed upon the nineteenth century and upon leading writers.

14. Special Topics. Professor Goddard.

Two hours a week throughout the year. Offered in 1919-20.

The purpose of Course 14 is to cover periods and topics not fully treated in the other courses of the department, and to offer, also, opportunity for the detailed study of selected authors.

Course 14 is conducted on the seminary plan and is intended primarily for Seniors majoring in English; it is open to others only by special permission. In 1919-20 a course in Advanced Composition, open to those who have had Course 3, will be offered in connection with Course 14.

The Philadelphia libraries of particular value in connection with work in the department of English are the following: the Library of the University of Pennsylvania; the Philadelphia Library; the Mercantile Library; the Free Library of Philadelphia.

Public Speaking

The instruction in Public Speaking, given by Assistant Professor Philip M. Hicks, is designed to develop and train the voice as an efficient instrument of self-expression and literary interpretation, and to give training in the principles and practice of effective public speaking.

In the belief that frequent practice in speaking is the requisite for the best results, the work is arranged mainly in one hour courses to meet the needs of students who may desire to continue this practice throughout their college term.

The classes meet in small sections in order that each student may receive the personal criticism of the instructor.

15. The Voice. Assistant Professor Hicks.

Two hours a week throughout the year. Offered in 1919-20.

The aim of this course is to develop and strengthen the voice according to the individual needs of the students, to make it a serviceable instrument for speaking and for the interpretation of literature. Students are required to read and to deliver memorized selections before the class. *Cumnock's Choice Readings.*

16. Interpretation. Assistant Professor Hicks.

Two hours a week throughout the year. Offered in 1919-20.

A further study of the expression of literary forms for students who have completed Course 15. Lyric and dramatic verse, prose drama and narratives are given special emphasis. A considerable portion of the time is devoted to the study and presentation of one-act plays.

17. Extempore Speaking. Assistant Professor Hicks.

One hour a week throughout the year. Offered in 1919-20.

This course is designed to help students acquire the ability to present their own ideas clearly and effectively. Representative speeches of business and professional men are studied, and students present short speeches before the class each week. *Extemporaneous Speaking*, Pearson and Hicks.

18. Argument. Assistant Professor Hicks.

One hour a week throughout the year. Offered in 1919-20.

This course continues the weekly practice in speaking, but is confined to the field of informal debate. Foster's *Argumentation and Debating* furnishes the ground work for the course and the speeches take the form of discussions of questions of current interest.

19. Persuasion. Assistant Professor Hicks.

One hour a week throughout the year. Offered in 1919-20.

This course aims to familiarize students with the employment of the various methods of persuasion used in appealing to an audience. Scott, *Psychology of Public Speaking*. Among the topics treated are mental imagery, suggestion, the emotions, the crowd, and memory. Weekly practice in speaking is continued.

20. History of Oratory. Assistant Professor Hicks.

One hour a week throughout the year. Offered in 1919-20.

A survey of the development and practice of the art of Public Speaking, including the lives and works of the great masters of oratory, presented in lectures by the instructor and supplemented by research by the students.

INTERCOLLEGIATE DEBATE

Students enrolling for Intercollegiate Debate may receive from one to three hours' credit at the discretion of the instructor, depending upon the quality of the work done. Candidates for the debate squad must complete all required reading and attend weekly practice during the debating season.

The debates are held under the supervision of the Debate Board, an undergraduate body including all students who have represented the college in forensic contests, and the coach of the debate teams. Teams are chosen to defend both sides of the question, which is selected soon after the opening of college.

Public Speaking Contests and Prizes

The Swarthmore Chapter of Delta Sigma Rho, the national honorary forensic society, elects to membership each spring students who have done distinguished work in debate and other public speaking contests. To be eligible students must have engaged in forensic activities for two years and must have represented the college in an intercollegiate contest.

The public speaking contests, which are conducted by the Debate Board, are designed to bring out the ability of the students and to stimulate interest in forensic events.

The Oratorical Contest, open to all students, is held in January to select Swarthmore's representative for the annual meeting of the Pennsylvania Oratorical Union, in which contest Lafayette, Lehigh, Ursinus, Muhlenberg, and Franklin and Marshall colleges are competitors.

The *Delta Upsilon Prize* of $25 is also awarded to the winner of the local contest. The sum of $500 has been given to the College by Owen Moon, Jr., Class of 1894, the interest from which is to be used for this purpose.

The *Ella Frances Bunting Prizes for the Extemporaneous Speaking Contests* are provided by a gift of $1,000 from E. M. Bunting, of New York. Two prizes of $25 are offered, one contested for by the men and one by the women students.

The *Phi Kappa Psi Prizes* in oratory, offered by the local chapter of that fraternity, are open to competition among preparatory schools. The contest is held at the College annually on the first Saturday in May.

The *Potter Prize Contest* for Extemporaneous Debate is open to all students and prizes of $12, $8 and $5 are offered for the best individual speeches. This contest was founded by the late Justice Wm. P. Potter, and is continued as a memorial to him by his family.

French and Spanish

The instruction in this department is under the direction of Professor Isabelle Bronk. Dr. Lander MacClintock is Assistant Professor, Mercedes C. Iribas is Assistant, and Marcelle H. Achard and Geneviève M. E. L. Tarby are Student Assistants.

The courses of study in French are designed to afford a high degree of literary culture, as well as to impart thorough training in the grammar and linguistics of the language. Until the end of the second year, the authors studied are all selected from those of modern times, and the greatest attention is given to colloquial French. The student is then ready to be brought into contact with the more artificial (rhetorical) forms of ex-

pression constantly occurring in the higher grades of literature. The fact that French is a living tongue is kept ever in view. For this reason but little English is used in the classroom. Free composition, dictation, memorizing, and conversation are required throughout the courses. Much attention is given to pronunciation, and the relations of modern French to classical, popular, and low Latin are brought often before the students.

The course in Spanish is arranged with a view to giving, as far as possible, a practical knowledge of this language, and also some idea of the modern literature of Spain.

From eleven to fourteen courses in French are given each year. The class in Course 21 is divided into three sections, the class in Course 22 into four.

Students who are prepared in Elementary French (see page 64) enter Course 22; those who are prepared in Advanced French (see page 65) enter Courses 23 and 24.

Students who elect French as a major study are required to complete the work of five full years, or thirty "hours," and to take Course 30.

The first semester's work in Elementary French and Elementary Spanish will not be accepted toward a degree unless followed by the work of the second semester in the same language.

Some of the lists of works studied, as given below, are subject to a slight modification.

21. Elementary French. Professor Bronk and Assistant Professor MacClintock.

Three hours a week throughout the year. Offered annually.

This course is intended for those who begin French in college. Its aim is to enable the students to read ordinary French with ease, to understand to some extent the language when spoken, and to form simple sentences, both oral and written.

Fraser and Squair, *French Grammar,* Part I, and Allen and Schoell, *French Life;* or De Sauzé, *Cours Pratique.*

Open to all students.

22. Reading of Ninetenth Century Prose and Poetry, Grammar, and Composition. Professor Bronk, Assistant Professor MacClintock, and Mademoiselle Achard.

Three hours a week throughout the year. Offered annually.

This course is designed to supplement and extend Course 21. Prose composition and drill upon the essential principles of the grammar are continued; much attention is given to idioms and synoynms; the reading becomes more rapid; and French is made almost exclusively the language of the classroom. A survey is also taken of the different literary movements which prevailed in France during the nineteenth century, and of their causes and effects.

Fraser and Squair, *French Grammar*, Part II. A standard *Prose Composition.* Selected works of Balzac, Bazin, Claretie (Vol. VI, Magill's series), Coppée, Erckmann-Chatrian, Daudet, France (Vol. III, Magill's series), Hugo, Maupassant, Mérimée, or others.

Prerequisite, Course 21.

23. Seventeenth Century History and Literature. Professor Bronk.

Two hours a week throughout the year. Offered annually.

This course is conducted mainly in French. Particular attention is given to the social as well as to the literary tendencies of the time, and the students present reports upon pertinent topics, as well as abstracts of the works read.

Lectures on the history and society of the seventeenth century. Corneille, *Le Cid* and *Horace;* Molière, *Les Précieuses ridicules* and *Le Bourgeois Gentilhomme;* Racine, *Andromaque* and *Athalie;* La Fontaine, *Fables* (ed. Hachette).

Prerequisite, Course 22.

24. Advanced Prose Composition. Assistant Professor MacClintock.

Two hours a week during the year. Offered annually.

The aim of this course is to give increased facility in the writing and speaking of the French language, by means of intensive study of chosen models and translation and paraphrase of English into French. Much free composition is also required. Frequent conference periods care for the students' individual needs.

Koren, *French Composition;* Hill and Smith, *Advanced French Composition.*

25. Seventeenth Century Prose. Assistant Professor MacClintock.

Two hours a week during one semester. Offered in 1919-20.

This course is conducted in French. Informal lectures are given and these are accompanied by discussions of the works studied, by collateral reading, and by reports.

Selections from Descartes, *Discours de la Méthode;* from Pascal, *Les Provinciales* and *Pensées;* from La Rochefoucauld, *Maximes;* from Bossuet, *Oraisons funèbres;* from Madame de Sévigné, *Lettres;* and from La Bruyère, *Les Caractères.*

Prerequisites, Courses 23 and 24.

26. Modern French Comedy. Assistant Professor MacClintock.

Two hours a week during one semester. Offered in 1919-20.

The masterpieces of about fifteen representative dramatists are studied, attention being fixed particularly upon the different manners in which they reflect contemporary life. A comparison is also made of their various styles. The work is in French.

27. Modern France. Assistant Professor MacClintock.

Two hours a week during one semester. Offered in 1919-20.

This course is intended to acquaint the student with France as that country is today, and especially with its intellectual, artistic, and political life. Modern French history is outlined, the organization of French society is considered, music and painting are discussed, and the great social movements studied. Free discussion is encouraged. The classroom work is mainly in French.

28. Victor Hugo. Professor Bronk.

One hour a week during one semester. Offered in 1919-20.

A study of his life and works, by means of selected readings, lectures, and reference work. The course is given in French.

29. Lyric Poetry and Versification. Professor Bronk.

One hour a week throughout the year. Offered in 1918-19

A study of lyric poetry from Villon to the end of the nineteenth century. An examination of French verse-structure from its origin to the present. The work is given in French. Canfield's *Lyrics* is used as a textbook and is supplemented by further reading from the poets studied.

Prerequisite, Courses 23 and 24.

30. Outline Course in French Literature. Professor Bronk.

Two hours a week throughout the year. Offered in 1919-20

This course is designed as a review and extension of the courses in literature already pursued. Much attention is devoted to the literary monuments of the Old French period, these being read as far as possible in Modern French translations. The literature of the Renaissance is then taken up, after which consideration is given to the movements and tendencies of later times, the different writers and their works. The outside reading is both wide and varied. This course is conducted in French, by means of lectures, collateral reading, reports, and research work. Pellissier. *Litterature française,* is used as a handbook.

Open to advanced students who are able to speak and understand the French language. Credit for three hours is given.

31. History of the Novel. Professor Bronk.

Two hours a week throughout the year. Offered in 1918-19

The French novel is here considered both in its origins and development and in its portraiture of life. Morillot's *Le Roman en France depuis 1610 jusqu'à nos jours* is used as a textbook, and about fifteen representative novels are read by the students outside of the class. The course is conducted in French and on the seminary plan.

Open to advanced students with a fairly good command of French.

32. Balzac. Professor Bronk.

One hour a week during one semester. Offered in 1919-20.

A survey of the novel in France and a study of Balzac's representative works. In French.

33. Voltaire and Jean-Jacques Rousseau. Professor Bronk.

One hour a week throughout the year. Offered in 1919-20.

A thorough study of the lives and works of these two writers.

34. Practical Phonetics. Assistant Professor MacClintock.

One hour a week throughout the year. Offered in 1917-18.

A study of French pronunciation, based upon Matzke's *A Primer of French Pronunciation.* This course is especially designed for those preparing to teach French.

35. Elementary French Conversation. Assistant Professor MacClintock.

One hour a week throughout the year. Offered annually.

36. Advanced French Conversation. Mademoiselle Tarby.

Two hours a week throughout the year. Offered in 1919-20.

37. French Conversation and Letter Writing. Mademoiselle Tarby.

Two hours a week throughout the year. Offered in 1919-20.

38. Advanced French Reading and Pronunciation. Mademoiselle Achard.

One hour a week throughout the year. Offered in 1919-20.

39. Elementary Spanish. Miss Iribas.

Three hours a week throughout the year. Offered annually.

This course aims to give a knowledge of the essentials of Spanish grammar, the ability to read ordinary Spanish with ease, and some practice in conversation.

Hills and Ford, *First Spanish Course*; Wilkins and Luria, *Lecturas Fáciles;* Valera, *El Pájaro verde.*

The French Library is supplied with the treatises and books of reference necessary to illustrate the courses given. It is enriched annually by important additions.

Occasional public lectures are given by French scholars or men and women of note.

The *Cercle Français* meets from time to time during the academic year.

German Language and Literature

The instruction in this department is under the direction of Professor Clara Price Newport. Edna Harriet Richards is Instructor.

The elementary courses of study in this department are designed primarily to equip the student with a working knowledge of the German language as a key to the treasures of German science, philosophy, and literature, and the more advanced courses are intended to impart a knowledge of the development of German literature and to foster appreciation of its masterpieces.

In the classroom, translation into English is discontinued as soon as possible and expressive reading of the German text is substituted, and German is made the classroom language as early as possible. The idiomatic sentence and modern colloquial language form the basis of the work in composition. Reading and translation at sight are cultivated. The attainment of a correct literary understanding and of genuine appreciation of some of the best things in German literature is regarded as the highest aim.

Other texts may at times be substituted for some of those indicated.

The first semester's work in Courses 41, 42, 42½, 43, and 49 will not be accepted toward a degree unless followed by the work of the second semester.

41. Elementary German. Professor Newport.

Three hours a week throughout the year. Offered annually.

Schrakamp, *Ernestes und Heiteres;* Vos, *Essentials of German;* Bierwirth and Herrick, *Ährenlese;* Leander, *Träumerien;* Storm, *Immensee;* Baumbach, *Der Schwiegersohn.* Persistent training in composition, conversation, and expressive reading.

42. Advanced German. Miss Richards.

Three hours a week throughout the year. Offered annually.

Review of grammar, practice in composition, conversation, and expressive reading, and, principally, reading of some recent short stories, of a representative modern play, of lyrics and ballads, and of one of Schiller's masterpieces.

Prerequisite, Course 41 or equivalent.

42½. Nineteenth Century Prose and Drama. Professor Newport.

This course covers work equivalent to that of the second semester of Course 42 and an additional semester which includes prose and drama of the nineteenth century.

Prerequisite, Three years of German in high school.

43. Lessing—Schiller. Miss Richards.

Three hours a week throughout the year. Offered annually.

A survey of the lives and work of these authors with special attention to Lessing's *Minna von Barnhelm, Emilia Galotti,* and *Nathan der Weise, Die Erziehung des Menschengesehlechts,* and to Schiller's ballads and poems, selected prose writings, and five of the dramas.

Prerequisite, Course 42 or equivalent.

44. Goethe. Professor Newport.

Three hours a week throughout the year. Offered annually.

Goethe's *Werke, Goldene Klassiker-Bibliothek.* A careful study of Goethe's life and works. Conducted in German.

Prerequisite, Course 43 or equivalent.

45. Middle High German. Professor Newport.

Three hours a week, first semester.

Survey of the origin and development of German, and translation into modern German of such Middle High German masterpieces as *Nibelungenlied, Der arme Heinrich, and Parzival.*

Prerequisite, fluency in reading modern German.

46. Outline Course in German Literature. Professor Newport.

Three hours a week throughout the year. Offered in 1920-21.

A general historical survey of German literature.

Prerequisite, ability to read rapidly and accurately and to comprehend lectures in German.

47. Teachers' Course. Miss Richards.

Two hours a week, second semester.

Phonetics and the American teacher's standard in German pronunciation and syntax. Advanced grammar, study of idioms and synonyms, and advanced composition. Classroom German, textbooks and other teaching material, and methods of modern language teaching.

48. Exhaustive Study of Some Author. Miss Richards.

One hour a week, second semester. Offered in 1920-21.

Conducted in German and intended for students majoring in German.

49. Scientific German. Professor Newport.

Three hours a week throughout the year. Offered annually.

Wallentin, *Grundzüge der Naturlehre;* Scholz, *German Science Reader;* Wait, *German Science Reader;* Dippold, *A Scientific German Reader.* For students majoring in pure and applied science. This course prepares the student to read the new material along scientific lines which is continually coming out in German books and periodicals.

Prerequisite, Course 42 or equivalent.

50. German Composition and Conversation. Miss Richards.

Two hours a week, first semester.

The work consists first of composition based on a text, and later of letter and theme writing. It is supplemented by dictation, oral or written reproduction of short stories read or told to the class, memorizing of practical literary selections, and of reading and discussion of items in German newspapers.

Prerequisite, Course 42 or equivalent.

51. German Poetry in the Eighteenth and Nineteenth Centuries. Miss Richards.

Two hours a week, second semester.

This course is intended for the rapid reading of the best German lyrics and ballads of the period covered.

Prerequisite, Course 42 or equivalent.

52. Recent German Literature. Professor Newport.

One hour a week, second semester. Offered in 1919-20.

A rapid reading course in important modern authors.

Not open to students who have taken German courses beyond Course 44.

53. German Literature in the Eighteenth Century. Professor Newport.

Two hours a week throughout the year.

A careful study of the life, thought, art, and literature, and of the literary relations of Germany to England and France, during this century. In the first semester the work will center around the "Storm and Stress Period" and in the second semester around the "Romantic Movement."

54. The German Novel. Professor Newport.

Three hours a week, second semester.

History and development of the German novel, with extensive reading and the presentation of theses and discussions.

Prerequisite, fluency in reading and speaking German.

55. The German Drama in the Nineteenth Century. Professor Newport.

Three hours a week, first semester.

The development of the drama in Germany since the plays of Goethe and Schiller, with special attention to Kleist, Grillparzer, Hebbel, Ludwig, Anzengruber, Hauptmann, and Sudermann.

Prerequisite, fluency in reading and speaking German.

56. German "Kultur." Professor Newport.

One hour a week throughout the year.

This course aims to give a clear conception of the economic, political, and intellectual history of Central Europe. The nineteenth century, as a period of rapid changes, engages the main part of the attention of the class. For this course a reading knowledge of German is desirable, but not necessary.

A German club known as *Deutscher Verein* exists as a student organization under guidance of the department, and meets regularly for instructive and entertaining literary and musical programs, for practice in conversation, and for social enjoyment.

Students who desire it are given an opportunity to carry on, under direction, correspondence with students in Germany.

Facilities in Philadelphia and vicinity of especial value to work in the department of German are as follows: the general and special libraries of Swarthmore College, University of Pennsylvania, Haverford, Bryn Mawr, Drexel Institute, Philadelphia Public Library; Germanic collections of the museums in Memorial Hall, Drexel Institute, University of Pennsylvania Museum; services in German at several churches; several daily and weekly newspapers; lectures at the German Society.

Greek and Latin

The instruction in this department is under the direction of Professor Henrietta Josephine Meeteer. Ethel Hampson Brewster is Assistant Professor of Greek and Latin.

The aim of the department is primarily to create an appreciation of the masterpieces of Greek and Latin literature and to trace their influence upon modern thought and letters; attention is given to the political institutions of both Greece and Rome and their survival in present times, to philosophy and religion, to private and social life, and to art and architecture as exemplified by existing remains in sculpture and painting and in private and public buildings. Use is made of illustrative material belonging to the College, and of the collections in the University Museum in Philadelphia. In connection with Courses 70 and 76 a visit is made each year to the Metropolitan Museum of New York.

Special attention is called to Courses 61 and 62 in Greek and 71 in Latin, which are provided for those who, previous to entering college, have not been able to complete the preparatory work required for admission to the Freshman courses.

Students who enter College with four years of Latin will elect Course 72; those who enter with two or three years of Greek will elect Course 64.

The attention of all students is called to Course 69b in Greek Literature in English, to Course 70 in the Art of the Greeks, to Course 73c in Roman Literature in English, and to Course 76 in the Topography and Monuments of Ancient Rome; for these courses a knowledge of Greek or Latin is not required.

A Teachers' Course in Latin (78) is offered for Seniors who expect to take positions as teachers of Latin and Greek in public and preparatory schools. Those who elect this course must before the end of the Senior year have pursued at least Courses 72a, 72b, 73a, 73b, 73c, 75, and 76; the head of the department will recommend as teachers of Latin only those who have completed these courses satisfactorily. Such students are expected also to take at least Course 61 in Greek.

Students desiring detailed information concerning the courses in Greek and Latin are invited to consult with the instructors.

GREEK

61. Beginners' Course, Grammar; reading of Xenophon, *Anabasis,* Book I. Professor Meeteer.

Three hours a week throughout the year. Offered annually.

This course is provided for those who have not had an opportunity of studying elementary Greek in the preparatory school.

62. Xenophon, *Anabasis,* Books II-IV, and selected readings. Professor Meeteer.

Three hours a week during the first semester. Offered annually.

A continuation of Course 61. Students who complete this course are admitted in the second semester to Course 63.

63. Homer, *Odyssey.* Professor Meeteer.

Three hours a week during the second semester. Offered annually.

The earlier books will be read entire and portions of the later books.

64. (*a*) Selected Dialogues of Plato, including the *Crito, Apology,* and *Phædo.* Lectures on the doctrines of the various schools of Greek philosophy. Professor Meeteer.

Three hours a week during the first semester. Offered annually.

Students who enter college with at least two years of Greek elect this course.

64. (b) Greek tragedy, Æschylus, *Prometheus;* Sophocles, *Antigone;* Euripides, *Alcestis.* Some time will be devoted to a study of the Greek theatre. Professor Meeteer.

Three hours a week during the second semester. Offered annually.

[The following works will be read in 1920-21: Æschylus, *Setpem;* Sophocles, *Oedipus Tyrannus; Euripides, Iphigeneia in Tauris.*]

65. (*a*) Historical Prose; selected books of Herodotus and Thucydides; some account of the early Greek historians. Professor Meeteer.

Two hours a week during the first semester. Offered in 1919-20.

65. (*b*) Theocritus and Bucolic Poetry. Professor Meeteer.

Two hours a week during the second semester. Offered in 1919-20.

66. (*a*) Demosthenes and the Attic Orators. Professor Meeteer.

Two hours a week during the first semester. Offered in 1920-21.

66. (*b*) Selections from the Lyric Poets. Professor Meeteer.

Two hours a week during the second semester. Offered in 1920-21.

68. Greek Prose Composition. Professor Meeteer.

Two hours a week during the second semester. Offered in 1920-21.

The purpose of this course is to give facility in the writing of simple Greek prose.

69. (*a*) The New Testament. Professor Meeteer.

Two hours a week during the first semester. Offered as required.

The peculiarities of Hellenistic Greek will be pointed out. The class will read from a "harmony" of the gospels, and will study selections from the epistles descriptive of the primitive church.

69. (*b*) Greek Literature in English. Professor Meeteer.

Two hours a week during the second semester. Offered annually.

A study, through the medium of translations, of the rise and development of Greek literature in its various forms—the epic, the lyric, the drama, history, philosophy, pastoral poetry, etc. No knowledge of Greek is required. The course is designed to be of suggestive value, especially to advanced students in the modern languages and literatures.

70. The Art of the Greeks. Professor Meeteer.

Two hours a week throughout the year. Offered in 1920-21

A course of lectures giving an introduction to the various departments of Greek art, especially architecture, sculpture, and painting; the purpose of the course, in part, is to give some preparation for future visits to the great museum collections of Europe and America. A knowledge of Greek is not required. Open to all students except Freshmen. This course is given in alternate years only.

90. The History of Greece. Professor Meeteer.

Two hours a week throughout the year. Offered in 1919-20.

The history of Greece, from the earliest times to the death of Alexander the Great. The course aims to give, through lectures, collateral reading, and reports, a history of Greek civilization. Much attention is paid to art, literature, religion, private life, etc.

LATIN

71. Practical Latin. Assistant Professor Brewster.

Three hours a week throughout the year. Offered as required.

This course is arranged for those who are not prepared to take the regular Freshman elective. It includes a study of grammar, etymology, technical terms, mythology, and selected readings.

72. (*a*) Livy, Book I, and selections from Books II-X; exercises in Latin writing. Assistant Professor Brewster.

Three hours a week during the first semester. Offered annually.

See note under Course 72 *b*.

72. (b) Plautus, *Menaechmi;* Cicero, Essays on *Old Age* and *Friendship;* miscellaneous selections. Assistant Professor Brewster.

Three hours a week during the second semester. Offered annually.

Courses 72 *a* and 72 *b* form the regular Freshman elective.

73. (*a*) Horace, *Odes* and *Epodes;* studies in the private and social life of the Romans. Assistant Professor Brewster.

Three hours a week during the first semester. Offered annually.

See note under Course 73 *c*.

73. (*b*) The Letters of Pliny the Younger; selections from Catullus. Assistant Professor Brewster.

Two hours a week during the second semester. Offered annually.

See note under Course 73 *c*.

73. (*c*) Roman Literature in English. Lectures and collateral reading. Elective for Sophomores, Juniors, and Seniors. Assistant Professor Brewster.

One hour a week during the second semester. Offered annually.

For this course a knowledge of Latin is not required.

Courses 73 *a*, 73 *b*, and 73 *c*, form the regular Sophomore elective.

75. Latin Prose Composition. Assistant Professor Brewster.

Two hours a week during the second semester. Offered in 1920-21.

Opportunity is afforded in this course for constant practice in writing and speaking Latin. Attention will be given also to the refinements of Latin style.

76. Topography and Monuments of Ancient Rome. Assistant Professor Brewster.

Two hours a week throughout the year. Offered in 1921-22.

Lectures, illustrated with the stereopticon, and assigned readings. The different departments of Roman art will be treated briefly, both independently and in their relation to Greek and to modern art, in particular the appearance of the ancient city will be discussed and the extant monuments described. No knowledge of Latin is required for this course; it is hoped it will prove of interest to those who expect some time to visit Rome. Open to all students except Freshmen. This course is given in alternate years only.

77. (*a*) Martial and Petronius. Assistant Professor Brewster.

Two hours a week during the first semester. Offered in 1920-21.

77. (*b*) Tacitus, *Germania* and *Agricola.* Assistant Professor Brewster.

Two hours a week during the second semester. Offered in 1920-21.

77. (*c*) The Letters of Cicero. Assistant Professor Brewster.

Two hours a week during the first semester. Offered in 1921-22.

77. (*d*) Roman Satire. Assistant Professor Brewster.
Two hours a week during the second semester. Offered in 1921-22

78. Teachers' Course. Assistant Professor Brewster.
Two hours a week throughout the year. Offered annually.
Lectures and reports upon the text of Caesar, Cicero, Virgil, and other Latin authors commonly read in the preparatory schools. For admission to the course see the introductory announcement above (p. 71).

79. Latin Sight Reading. Assistant Professor Brewster.
Two hours a week throughout the year, one hour credit. Offered annually.
The work of this course is almost exclusively confined to the classroom and requires no outside preparation except for an occasional report upon the life and works of the author studied. Selections from Ovid and from a variety of prose and verse writers will be read in 1920-21. Sight reading tends to make the student rely upon his own memory and ingenuity rather than upon lexicon and grammar, thereby making the study more natural and less difficult.

80. Christian Art and Archæology. Assistant Professor Brewster.
One hour a week throughout the year. Offered in 1920-21.
Lectures illustrated with the stereopticon. The aim of the course is to give an introduction to Christian Archæology, and study early Christian architecture, sculpture, painting, and mosaic in their relation to classical art and to the art of the Renaissance.

91. The History of Rome. Assistant Professor Brewster.
Two hours a week throughout the year. Offered in 1920-21
The history of Rome, from the earliest times to the beginning of the Barbaric Invasions. The course stresses the Roman genius for organization and administration and the significance of "Romanization" in the civilization of the past and the present. Special attention is given to problems that are common to the "Two Great Republics, Rome and the United States."

History and International Relations

The instruction in this department is under the direction of Professor William I. Hull. Senior students majoring in History are the departmental assistants. Professor H. J. Meeteer and Dr. E. H. Brewster, of the Department of Greek and Latin, conduct Courses 90 and 91, on the History of Ancient Greece and Rome.

The courses are conducted by means of classroom lectures and library work, which are coördinated by the students in written outlines and reports. The purpose of the department is to afford training in the discriminating use of historical materials; to cultivate the historical and international habit of mind; and to develop a general knowledge of European, English, and United States history, as a whole, together with a more detailed knowl-

edge of certain great epochs, institutions, and personages in the history of western civilization.

90. The History of Greece. Professor Meeteer.

Two hours a week throughout the year. Offered in 1919-20.

The history of Greece, from the earliest times to the death of Alexander the Great. The course aims to give, through lectures, collateral reading, and reports, a history of Greek civilization. Much attention is paid to art, literature, religion, private life, etc.

91. The History of Rome. Assistant Professor Brewster.

Two hours a week throughout the year. Offered in 1920-21.

The history of Rome, from the earliest times to the beginning of the Barbaric Invasions, supplemented by *Munro's Source Book of Roman History* and by selected passages from Roman historians.

92. The History of Mediæval and Modern Europe. Professor Hull.

Three hours a week throughout the year. Offered annually.

This course is divided into two parts, which are offered alternately as follows:

92 (*a*) England to 1814. *Offered in* 1920-21.

92 (*b*) France and Germany, to 1814. *Offered in* 1921-22.

93. The History of Europe During the Nineteenth Century, of the Great War, and of European Imperialism. Professor Hull.

Three hours a week throughout the year. Offered annually.

This course is divided into two parts, which are offered alternately as follows:

93 (*a*) Europe from 1814 to 1919, with special reference to the causes and results of the Great War. *Offered in* 1919-20 *and* 1921-22.

93 (*b*) Modern Imperialism, preceded by a preliminary study of two score imperialistic experiments in ancient and mediaeval times. *Offered in* 1919-20 *and* 1920-21.

94. American History and Diplomacy. Professor Hull.

Three hours a week throughout the year. Offered annually.

This course is divided into two parts, which are offered alternately, as follows:

94 (*a*) The general history of the Colonies and States down to the formation of the Union, together with the diplomatic relations of the United States with the Old World. *Offered in* 1920-21.

94 (*b*) The general history of the United States from 1789 to 1919, with special reference to Pan-America and the Monroe Doctrine. *Offered in* 1919-20.

95. International Law and the League of Nations. Professor Hull.

Three hours a week throughout the year. Offered annually.

This course is divided into two parts, which are offered alternately, as follows:

95 (*a*) The international law of peace, including a careful study of the programmes for world government adopted by the two Hague Conferences and the Conference of Paris. *Offered in* 1919-20.

95 (*b*) The international law of war and neutrality, particularly as exemplified in the conventions of the two Hague Conferences and in the warfare of the twentieth century. *Offered in* 1920-21.

96. History Teachers' Course. Professor Hull.

One or two hours' credit for each semester. Offered annually.

This course is designed for senior majors in the Department of History, and is intended to give the theory and practice of aids, methods, and aims in the teaching of history. The practical work of the course is done in neighboring schools, and in connection with Courses 92 to 95.

Political Science

The instruction in this department is under the direction of Professor Robert C. Brooks.

The primary aim of the courses offered in political science is to prepare students for intelligent and effective citizenship.

To this end an effort is made to interpret the political life and movements of our time in city, state, and nation. Particular attention is given to criticisms of existing institutions and proposals for their reform. Governments and parties in the leading foreign nations of the world are considered not only because of their intrinsic importance, but also for the valuable suggestions they may yield for the solution of our American problems.

Though the courses in political science are designed primarily to produce intelligent and effective citizenship, they should also prove more immediately helpful to those who intend to enter politics, law, public service, journalism, business, or the teaching of civics. Students who expect to devote themselves to advanced study and research in political science should be able to lay the foundations for such work in the undergraduate courses offered by this department.

Unsupported by collateral study in economics and history much of the significance of political science will be lost. Psychology, philosophy, and anthropology are also valuable aids. A reading knowledge of German or French should be acquired as soon as possible by students of political science, and both of these are essential for graduate study in this field. Training in English and public speaking are highly desirable.

Changes in advanced courses to be made from year to year will enable students to take more work in political science than is here scheduled.

101. American Political Parties and Party Problems. Professor Brooks.

Three hours a week during first semester. Offered annually.

A study of the growth, organization, aims, and methods of political parties in the United States, with particular reference to the primary and convention system, financing of parties, and the charges of corruption in American politics and life.

Open to all students except Freshmen.

102. American Federal Government. Professor Brooks.

Three hours a week during second semester. Offered annually.

A study of the present structure and functions of the Federal Government of the United States. Designed as a continuation of Course 101.

Open to all students except Freshmen.

103. Government and Parties in England and Continental Europe. Professor Brooks.

Three hours a week throughout the year. Offered annually.

An outline study of the framework of government and the organization, methods, and aims of the leading political parties of England, France, Switzerland, and Germany. Particular attention is given to the constitutional documents of the countries studied and to the more accessible sources of official information regarding them. Wherever possible, comparisons are drawn between the political institutions and problems of the countries studied and those of the United States.

Open to all students.

105. Municipal Government in the United States. Professor Brooks.

Two hours a week during second semester. Offered annually.

A somewhat detailed study of municipal organization and functions in the United States. Particular attention will be given to the city of Philadelphia. Reform proposals, such as the commission plan, the city manager plan, short ballot, and the work of bureaus of municipal research, will be discussed.

Prerequisite, Courses 101, 102, or 103, or the equivalent of one of these.

106. American State Government. Professor Brooks.

Two hours a week during first semester. Offered annually.

A study of the organization and functions of state government in the United States, with particular reference to Pennsylvania. The legislative branch will be given special attention in this course for the present.

Prerequisite, Courses 101, 102, or 103, or the equivalent of one of these.

107. Political Motives. Professor Brooks.

Two hours a week throughout the year. Offered in 1920-21.

A study of the motives influencing men in their political activities, particularly as revealed in biographies and autobiographies of American leaders of recent date.

Open only to Juniors and Seniors.

108. History of Political Ideas. Professor Brooks.

One hour a week throughout the year. Offered in 1920-21.

A study of the development of political thought. The first part of the course is devoted to a series of lectures on Oriental, Greek, Roman and mediæval political ideas, students being assigned collateral reading in Plato, Aristotle, Polybius, St. Augustine, Thomas Aquinas, Dante, and others. Political philosophers of later date are studied principally from their writings, particular attention being given to Machiavelli, Bodin, Hobbes, Locke, Montesquieu, Rousseau, Burke, Bentham, Mill, Maine, and Seeley.

Open only to Juniors and Seniors.

109. Special Readings in Political Science. Professor Brooks.

One hour a week throughout the year. Offered annually.

Assigned readings, reports and conferences designed to prepare students along detailed lines in which they are specially interested or to correct deficiencies in their earlier preparation. Required of all students majoring in the Department of Political Science preferably in their Senior year, but may also be taken during their Junior year. Open by special permission also to Seniors in cognate departments.

Economics

The instruction in this department is under the direction of Professor Thomas K. Urdahl. Claude Carrol Smith is Instructor, and Isabel Briggs Myers is Assistant.

Good citizenship implies intelligent citizenship. The broadest purpose of college instruction in Economics is to contribute to the former by the cultivation of the latter. From this point of view the study of Economics should appeal to all students. In a narrower way, work in Economics should prove useful to those who intend to devote themselves to law, business, journalism, philanthropy, or the public service. Finally, for those who wish to prepare for investigation or teaching in this field, college instruction, with its closer personal relation between student and teacher, should provide suitable preparation for graduate study and research in larger institutions.

The courses in law are designed to give to the student an insight into legal reasoning and a general knowledge of the fundamental legal relations which govern our society. It is expected that these courses will serve as a helpful introduction to professional study for those who aim to prepare themselves for the life of the lawyer; that those students who desire to equip themselves for active business life will be aided by an intelligent study of the principles which lie at the basis of commercial life; and that in the systematic study of the science of the law all will acquire not merely an understanding of legal rules, but also an appreciation of their justice, wisdom, and harmony.

Collateral work in Political Science, History, German, and French is strongly recommended for all who intend to devote much time to Economics. A knowledge of general biological theory, of psychology, and of philosophy would add greatly to the value of work done in this department.

No credit will be given in courses which run throughout the year, unless the work of the entire year is taken.

The advanced courses will be changed from year to year, thus enabling students to take more work in the department than is here scheduled.

111. Principles of Economics. Professor Urdahl.

Three hours a week throughout the year. Offered annually.

The first part of this course consists of a study of the fundamental laws and prin-

ciples of economics; the second part deals with the application of these laws to the public questions of the day, such as those connected with the tariff, taxation, currency, trusts, trade unions, strikes, socialism, and the railroads.

Not open to Freshmen.

112. Money, Credit, and Banking. Professor Urdahl.

Three hours a week during the first semester. Offered in 1920-21.

The work of this course will be divided into three parts: (a) a study of the principles of money, credit, and banking; (b) a study of the exemplification of those principles in the monetary and banking history of certain countries; (c) a study of present-day currency and banking problems in the United States. As a supplement to the classroom work, visits will be made to the mint and to banking institutions in Philadelphia.

Prerequisite, Course 111 or its equivalent.

113. Public Finance. Professor Urdahl.

Three hours a week during the second semester. Offered in 1919-20.

The subject-matter of this course will be the nature of governmental wants, public expenditures, budgets, and budgetary legislation, the development of tax systems, the different kinds of taxes, the theory of incidence, the problem of distribution, practical ideals for a tax system in the United States, and the theory and extent of public debts.

Prerequisite, Course 111 or its equivalent.

114. Corporation Finance, and Problems of Business. Professor Urdahl.

Three hours a week during the second semester. Offered annually.

The historical development, the changes in structure, the organizing, the financing, the management, the economic and social problems of business are considered in detail.

Open to all students.

115. Criminology. Professor Urdahl.

Three hours a week during the second semester. Offered in 1920-21.

Three general subjects are treated in this course. The first has to do with the theory and data of criminality. The second subject deals with criminal law and criminal procedure. The third relates to penology. Visits are made to the various penal and reformatory institutions in Philadelphia and vicinity.

Open to all students.

116. Modern Philanthropy. Professor Urdahl.

Three hours a week during the first semester. Offered annually.

The large public questions involved in the relief of the indigent and in the care of the insane, the feeble-minded, and other dependents. Visits are made to representative institutions in Philadelphia and vicinity.

Open to all students.

117. Resources and Industries. Professor Urdahl.

Three hours a week throughout the year. Offered annually.

This course consists of a study of the mineral, water, forest, and land resources of the United States with special emphasis on their conservation. Following this the principal agricultural and manufacturing industries of the United States will be studied and discussed. Attention will also be given to the main continental and oceanic routes of travel. The first semester will be devoted to a study of the economic history of the United States. The class will visit some of the leading industrial establishments of the vicinity.

Open to all students.

118. The Development of Economic Theory. Professor Urdahl.

Three hours a week during the first semester. Offered in 1921-22.

The evolution of economic thought from the writings of the mercantilists and physiocrats down to the present day. Especial attention will be given to the various schools of thought and to their influence in shaping public policy.

Prerequisite, Course 111 or its equivalent.

119. The Labor Problems. Professor Urdahl.

Three hours a week during the second semester. Offered in 1920-21.

A study of the history, activities, and structure of labor organizations, and the influence of economic and political theories upon them.

Prerequisite, Course 111 or its equivalent.

120. Economic Problems of War and Reconstruction. Professor Urdahl.

Three hours a week during the second semester. Offered in 1919-20.

126. Business Law. Mr. Smith.

Three hours a week throughout the year. Offered in 1919-20.

This course is based on Sullivan's *Business Law,* and is designed to give the student a working knowledge of the law of contracts and negotiable instruments, agency, partnerships, corporations and property. Classroom discussion of cases illustrating the principles underlying the law covering these topics is the chief work.

History of Religion and Philosophy

The instruction in this department is under the direction of Professor Jesse H. Holmes.

The object of the courses is to give the student an introduction to the principal religious and philosophical systems of the world, together with a study more in detail of a few of them. The courses offered as electives cover three years. All students are required to take a course of three hours in the study of the Bible.

The work will be varied by lectures, recitations, and preparation of special themes. Several hundreds of lantern slides illustrating various phases of the subject-matter are available, as are also charts, maps, pictures, and a carefully selected library.

131. Bible Study. Professor Holmes.

Two hours a week in first semester, one hour a week in second semester. Offered annually.

Intended to give such general knowledge of the Bible, its origin, contents, and qualities as literature, as should be possessed by all intelligent people. The work of the student will consist largely of indicated readings in the Old and New Testaments. Kent, *Historical Bible,* will be used as a supplementary textbook.

The class work will include lectures, recitations, study of maps, pictures, etc.

132. History of Religion. Professor Holmes.

Two hours a week during the first semester. Offered annually.

A brief study of the principal religious systems of the world. Menzies, *History of Religion,* is followed as textbook, but a large part of the work of the course is carried on in the library.

133. The Religion of the Hebrews. Professor Holmes.

Three hours a week during the first semester. Offered annually.

A study of the Hebrew people, their social and religious customs, their prophets and their literature. It is based upon the study of the books of the Old Testament, Kent, *Historical Bible,* being also used. In the early part of the course attention is given to the origin of the Semites and their early movements, Babylonia, Assyria, and other allied topics.

Open to students who have completed Course 131, and to others who, in the judgment of the instructor, can profitably carry on the work of the class.

134. Life and Times of Jesus. Professor Holmes.

Three hours a week during the second semester. Offered annually.

A study of the social, political, and religious conditions prevailing at the beginning of the Christian era, followed by the life, work, and teachings of Jesus, and the Apostolic age of the Christian Church. Stevens and Burton, *Harmony of the Gospels,* the *Acts of the Apostles,* and the other books of the New Testament, together with Pfleiderer, *Christian Origins,* are made the basis of the work.

Open to students who have completed Course 131, and to others who, in the judgment of the instructor, can profitably carry on the work of the class. Courses 133 and 134 may be substituted for the required course in the Bible Study (131) by Juniors and Seniors.

135. History of Christianity. Professor Holmes.

Two hours a week during the second semester. Offered in 1919-20.

A study of the principal events in the history of the Christian church, and especially in the development of Christian doctrines. Some attention will be given to the history of various Christian sects. Allen, *Continuity of Christian Thought,* Pfleiderer, *Development of Christianity,* have been used as textbooks.

Open to students who have completed Course 131, and to others who, in the judgment of the instructor, can profitably carry on the work of the class.

136. Ethics. Professor Holmes.

Three hours a week, second semester. Offered annually.

An introduction to the various types of ethical theory, with discussion of some applications of ethical principles. Drake, *Problems of Conduct,* has been used as a textbook.

137. History of Philosophy. Professor Holmes.

Three hours a week throughout the year. Offered annually.

After a brief introductory glance at the early Greek philosophies, especial attention is given to Socrates and to the systems of Plato and Aristotle. Some time is devoted to the development of philosophical systems in the period centering about the beginning of the Christian era; the growth, culmination, and decline of scholasticism, are studied, and the appearance of the modern critical spirit. In the second semester the work is directed to the modern systems. Especial attention is given to the philosophy of evolution. Thilly, *History of Philosophy,* is used as a textbook.

Open to Juniors and Seniors.

138. Introduction to Philosophy. Professor Holmes.

One hour a week in second semester. Offered annually.

Lectures and recitations on the theory of knowledge, fundamental ideas, the meaning of natural law, the theory of evolution in the inorganic and in the organic world. Russell, *First Course in Philosophy* has been used as a textbook.

Some of the greatest archæological collections of the world are near enough to be made use of by Swarthmore students, and

visits to museums, exhibitions, etc., are frequently possible. Especially to be noted is the Archæological Museum of the University of Pennsylvania, with its remarkable collections illustrating the civilizations of Babylonia, Assyria, and Egypt; its display of amulets, charms, etc., from many parts of the world; its Buddhist Temple, and collections of similar materials from among the American Indians, the Esquimaux, and many other peoples.

A Museum of Religions has been started at Swarthmore, which has already a valuable collection of religious curios from China, Japan, India, and elsewhere. Additions to this collection will be welcomed.

Mention should be also made of the great libraries of Philadelphia, and of the lecture courses, often by the great scholars of the world, at Drexel, Franklin, and Wagner Institutes, and at the University of Pennsylvania, in addition to those offered at Swarthmore. The most famous preachers, statesmen, and orators are frequently to be heard in Philadelphia, and the opportunities thus afforded are brought to the attention of students.

Psychology and Education

The work of this department is temporarily cared for by Professor Jesse H. Holmes, and Charles H. Fisher, Professor of Education, State Normal School, West Chester, Pa.

TEACHERS' APPOINTMENT COMMITTEE

A Teachers' Appointment Committee, of which Dean Alexander is the Chairman, was instituted in 1912. The duty of this committee is to assist the graduates of the College in their effort to secure satisfactory teaching positions. This assistance is to be rendered not only to members of each year's graduating class, but also to earlier graduates who have been teaching meanwhile, and having acquired experience, desire more responsible positions than the ones they now have.

THE STATE COLLEGE CERTIFICATE

Students graduating from College and completing the required number of courses in Psychology and Education, includ-

ing the required observation and teaching, will be recommended by the department for the State College Certificate, which carries exemption from all examinations for positions in the public schools of Pennsylvania, and becomes permanent after three years of teaching. This certificate is accepted by a number of other states.

COURSE OF STUDY

No course in this department should be taken before the Sophomore year. The courses designed for the Sophomore year are Ethics (136), and General Psychology (139); for the Junior year, Educational Psychology (141), History of Education (144), Educational Administration and Management(147); for the Senior year, Principles of Secondary Education (142), Principles of Teaching (143), Observation of Teaching (145), Supervised Teaching (146).

COURSES OF INSTRUCTION

136. Ethics—Theory, Practice, and Teaching. Professor Holmes.

Two hours a week during first semester. Offered annually.

This course aims to present the principal theories as to the basis of right and wrong, to discuss practical questions such as comes before men and women in business and social life, and in citizenship. The latter part of the year will be devoted to a consideration of methods of developing morals in schools, uses and abuses of self-government, the work of the church and the Sunday schools, boys' and girls' clubs, and other institutions which affect ideals and conduct. Opportunity will be given for observation of such institutions, and in case of those taking the teachers' course, for practice teaching when possible.

139. General Psychology. Professor Holmes.

Three hours a week during the first semester. Offered annually.

This course aims to introduce the student to the science of psychology through modern experimental methods together with lectures, demonstrations, and clinical observations. It also aims to lay the foundations for more advanced work in psychology and courses in other departments that demand a knowledge of the fundamental principles of mental activity. Texts, Pillsbury, Langfeld.

141. Educational Psychology. Professor Fisher.

Two hours a week during second semester. Offered in 1919-20.

This course emphasizes such topics in psychology as are closely related to the work of teaching. Consideration will be given to psychological experiments bearing upon the topics treated.

The observation of pupils and teaching in the public schools of Swarthmore is a necessary part of the course. Text-book, assigned readings, discussions, and reports.

142. Principles of Secondary Education. Professor Fisher.

Two hours a week during second semester. Offered in 1919-20.

A study of the secondary school in the light of the meaning and the aims of education in a democracy. The purpose and the value of the subjects of the curriculum will be discussed from the standpoint of the main objectives of education. The necessary reorganization of secondary education will be considered. Assigned readings, discussions, and reports.

143. Principles of Teaching. Professor Fisher.

Two hours a week during first semester. Offered in 1919-20.

This course deals with the principles of instruction common to the teaching of all subjects in the secondary schools. Consideration will be given to such topics as types of lessons, the recitation, the assignment, the question, lesson plans, supervised and independent study, the use of educational tests and scales, problems in discipline, economy in classroom management.

The work of this course is closely correlated with the observation of teaching. Assigned readings, discussions, and reports.

144. History of Education. Professor Fisher.

Two hours a week throughout the year. Offered in 1919-20.

This course aims to trace the development of educational institutions, practices and theories of the past as a necessary background to an understanding of the problems of the present day. An effort is made to trace the evolution of democracy in education so that the individual may become a conscious participant in that evolution. Educational progress in the United States is especially noted. The course is both cultural and professional. Text-book, assigned readings, discussions and reports.

145. Observation of Teaching. Professor Fisher.

One hour a week during first semester. Offered in 1919-20.

Only those students may take this course who enroll for Course 143. Students will observe in all grades, elementary and secondary, of the public school system of Swarthmore, in order to get a general survey of the whole. Toward the end of the semester students will concentrate their observation upon the subject or subjects that they expect to teach. The course will be conducted by means of individual and group conferences.

146. Supervised Teaching. Professor Fisher.

One to three hours a week during the first or the second semester. Offered in 1919-20.

The teaching will be done in secondary schools in the vicinity of the College. Substitute teaching when done under favorable conditions and approved by the supervisor of teaching may count as credit toward this course. At least one hour credit should be taken by those who intend to teach. The students whose schedules permit it are urged to take additional credit. The course will be conducted by means of individual conferences.

147. School Administration and Management. Professor Fisher

Two hours a week during first semester. Offered in 1919-20.

This course deals with the organization, legal status, and administrative control of education in the nation, state, county, and local school districts.

Practical problems of school management will be considered. The chief aim of the course is to acquaint the prospective teacher with the various relations that an individual teacher has to an organized system of education. Text-book, assigned readings, and discussions.

TEACHERS' COURSES GIVEN BY OTHER DEPARTMENTS

78. Teachers' Course in Latin. Assistant Professor Brewster.

Two hours a week throughout the year. Offered annually.

Lectures and reports upon the text of Cæsar, Cicero, Virgil, and other Latin authors commonly read in preparatory schools.

Observation and practice teaching.

Prerequisites, Latin 72a, 72b, 73a, 73b, 75, 76; two courses in Education or Psychology for those who wish credit in Education.

98. Teachers' Course in History. Professor Hull.

One or two hours' credit for each semester. Offered annually.

This course is designed for Senior majors in the Department of History, and is intended to give the theory and practice of aids, methods, and aims in the teaching of history.

Art

The instruction in this subject is under the direction of the Department of Greek and Latin. Courses are given by Professor Meeteer and Assistant Professor Brewster.

The aim of the courses offered is to study the historical development of architecture, sculpture, painting, and the allied arts, as a part of the history of Western civilization, in order to show the share that these arts have had in the creating and fixing of ideals, and in the development of craftsmanship. The principal types and examples of these arts are studied as masterpieces of achievement, especially for their cultural enjoyment.

The work consists of illustrated lectures and indicated reading.

70. The Art of the Greeks. Professor Meeteer.

Two hours a week throughout the year. Offered in 1920-21.

A course of lectures giving an introduction to the various departments of Greek art, especially architecture, sculpture, and painting; the purpose of the course, in part, is to give some preparation for future visits to the great museum collections of Europe and America. A knowledge of Greek is not required. Open to all students except Freshmen. This course is given in alternate years only.

76. Topography and Monuments of Ancient Rome. Assistant Professor Brewster.

Two hours a week throughout the year. Offered in 1921-22.

Lectures, illustrated with the stereopticon, and assigned readings. The different departments of Roman art will be treated briefly, both independently and in their relation to Greek and to modern art; in particular the appearance of the ancient city will be discussed and the extant monuments described. No knowledge of Latin is required for this course; it is hoped it will prove of interest to those who expect some time to visit Rome. Open to all students except Freshmen. This course is given in alternate years only.

80. Christian Art and Archæology. Assistant Professor Brewster.

One hour a week throughout the year. Offered in 1920-21.

Lectures illustrated with the stereopticon. The aim of the course is to give an introduction to Christian Archæology, and to study early Christian architecture, sculpture, painting, and mosaic in their relation to Classical art and to the art of the Renaissance.

152. Renaissance Painting in Italy. Professor Meeteer.

Two hours a week throughout the year. Offered annually.

Italy's definite contribution to the development of Western Art from 1300 to 1580.

Biology

The instruction in this department is under the direction of Professor Spencer Trotter. Samuel Copeland Palmer is Assistant Professor.

The courses in Biology are designed to give a broad and liberal view of the facts of life as a part of the general system of culture. The successful completion of the several courses as part of the general work for the degree of A.B. is preparatory to the study of Advanced Biology, Medicine, Forestry, or of Agriculture. Students are thus enabled to enter the technical schools of the leading universities in the above-named branches.

Special work in the dissection of the human body is likewise afforded students who are preparing for the study of Medicine.

Courses in both Physics and Chemistry are required as entrance by the medical schools.

The courses are arranged so as to present a logical sequence throughout the four years of college work for students making Biology their major subject.

Students making Biology their major will be required to take one year each in Chemistry or Physics, and the equivalent of two college years in a modern language.

The requirement by the foremost medical schools of the country of two years' preparation in Biology is fulfilled by these courses in Swarthmore College.

These courses likewise lead to the post-graduate work of the university.

The Museum of Biology and Geology is an adjunct to the department of Biology. The Academy of Natural Sciences, Logan Square, Philadelphia, affords valuable matter for study and reference both in its collections and library. The museum of

the Wagner Free Institute of Science, Seventeenth Street and Montgomery Avenue, Philadelphia, contains valuable aids to study. The library of the University of Pennsylvania, and the Philadelphia Library, corner Locust and Juniper Streets, are available for consultation and research. The Wistar Institute of Anatomy, Thirty-sixth Street and Woodland Avenue, contains valuable material for study in connection with the pre-medical courses.

155. General Biology. Professor Trotter and Assistant Professor Palmer.

Three hours a week throughout the year. Offered annually.

Open to Freshmen only. Class limited.

(*a*) Zoölogy. Professor Trotter.

First Semester.—This is an outline study of the structure, classification, distribution, and general natural history of animals. Two lectures a week. Two hours laboratory.

(*b*) Botany. Assistant Professor Palmer.

Second Semester.—A course in botany designed to give the student a broad view of the whole field of plant growth, structure, development, distribution, and classification. Two lectures a week, two hours' laboratory work, including field work in May and June.

156. Animal Morphology. Professor Trotter and Assistant Professor Palmer.

Three hours a week throughout the year. Offered annually.

A careful and detailed study of the animal types with laboratory study of the more important groups. Two lectures a week, three hours laboratory.

Open to students above Freshman Class. Class limited.

Prerequisite, 155 or its equivalent.

(*a*) Vertebrates. Professor Trotter.

First Semester.

(*b*) Invertebrates. Assistant Professor Palmer.

Second Semester.

157. Mammalian Anatomy and Physiology. Professor Trotter.

Three hours a week during Second Semester. Offered annually

Two lectures on anatomy and physiology with special reference to the human mechanism. Three hours laboratory.

Open to Students above Freshman Class. Class limited. Students not majoring in Biology may at their option omit the laboratory work—receiving two hours' credit.

Prerequisites, 155 and 156 or their equivalents.

158. Human Anatomy. Professor Trotter.

Three hours a week throughout the year. Offered annually.

Advanced work in osteology, the dissection of the cadaver, and a study and dissection of the human brain. Standard textbooks on anatomy. A laboratory course of six hours a week throughout the year.

Open only to Students preparing for the study of Medicine.

Prerequisites, 155, 156 and 157.

A minimum of six hours a week is required in this course.

159. Advanced Zoölogy. Professor Trotter.

Three hours a week throughout the year. Offered annually.

Systematic work on the collections in the Museum.

160. Anthropology. Professor Trotter.

Three hours a week during Second Semester. Offered annually

A course of lectures on the zoölogical relations of man, his history as a species, and a review of the natural history of mankind (race, culture, and geographical distribution) professor's "notes," consultation of various authors, written reports on assigned subjects.

Open to Seniors and Juniors.

Prerequisite, 155 or its equivalent.

162. Embryology. Assistant Professor Palmer.

Three hours a week throughout the year. Offered annually.

Study of the development of a vertebrate with special reference to the chick. The growth of the chick is followed closely from the primitive streak stage to four days. Drawings are required showing the various stages of growth in whole mounts and in selected sections along both transverse and sagittal planes. In connection with this course students are instructed in the proper methods of fixation, staining, and sectioning of tissues and in the use of the camera lucida. A minimum of six hours a week laboratory work is required for this course.

Open to Juniors and Seniors.

Prerequisite, 155, 156.

163. Fundamental Problems in Biology. Assistant Professor Palmer.

Two hours a week throughout the year. Offered annually.

(*a*) *First Semester.* Evolution and Related Subjects.

(*b*) *Second Semester.* Genetics and Eugenics.

A lecture course devoted to the discussion of the principles of plant and animal breeding. There will be given also a review of the history of our domesticated animals.

Prerequisite, 155 or its equivalent.

164. Advanced Botany. Assistant Professor Palmer.

Three hours a week throughout the year. Offered annually.

(*a*) *First Semester.* Cryptogamic Botany.

In this course the development of sex in plants is the keynote of study. Carefully selected forms are secured to bring out this feature in the laboratory. Sach's classification of the Thallophytes is used as the basis of this course.

(*b*) *Second Semester.* Systematic Botany.

A course in field work devoted entirely to the classification of the local flora. Trees, shrubs, ferns, and the spring flowers are carefully studied.

166. Biology in Relation to Disease. Assistant Professor Palmer.

Two hours a week throughout First Semester. Offered annually.

Open to Students above Freshman Class.

Prerequisite, 155 or its equivalent.

170. Geology. Professor Trotter.

Two hours a week during First Semester. Offered annually.

Lecture course on the fundamental principles of geology and physiography.

Open to Students above Freshman Class.

Chemistry and Chemical Engineering

The instruction in this department is under the direction of Professor Gellert Alleman. H. Jermain Creighton is Assistant Professor of Chemistry, and Allen I. Myers is Instructor in Chemistry.

This department does not aim to develop specialists in any particular branch of chemistry, but presents opportunities for a comprehensive general training in this science.

The successful completion of the courses in Chemistry will enable the student to enter upon graduate work at any leading university, or will be of material assistance to him in various technical pursuits in which he may be engaged. Those intending to prepare for the medical profession will find it advantageous to follow several of the elementary courses here offered.

The new and commodious chemical laboratory, with its splendid equipment, lends every advantage to thorough and modern instruction in this department.

Students who major in Chemistry and Chemical Engineering must have a reading knowledge of German before entering upon the chemical work pursued during the third year. They should also be thoroughly familiar with elementary mathematics.

The course in Chemistry, as Applied Science, is prescribed for the first and second years. The course in Chemical Engineering is prescribed for four years.

Students may major in Chemistry, in a course in Arts, requiring 124 hours for graduation; in Chemistry, as Applied Science, requiring 132 hours for graduation; in Chemical Engineering, requiring 140 hours for graduation.

171. General Inorganic Chemistry. Professor Alleman, Assistant Professor Creighton, and Mr. Myers.

Three hours a week throughout the year. Offered annually.

Lectures, demonstrations, written exercises, individual laboratory practice, and weekly conferences on the general principles involved in elementary chemistry. This course includes work similar to that outlined in Smith, *General Chemistry for Colleges.*

In the laboratory each student performs about two hundred experiments which are selected from Smith and Hale, *Laboratory Outline of General Chemistry.* Credit in this course is not assigned until the completion of the entire course at the end of the year.

172. Qualitative Analysis. Assistant Professor Creighton.

Three hours a week throughout the year. Offered annually.

The theory and practice involved in the detection of the chemical elements. Special attention is paid to the application of the electrolytic dissociation theory to analysis,

and the metallic and nonmetallic elements are studied more fully than in Course 171. Demonstrations, conferences, and individual laboratory work. The textbooks used are A. A. Noyes, *Qualitative Analysis,* and Talbot and Blanchard, *Electrolytic Dissociation Theory;* Baskerville and Curtman, *Qualitative Analysis,* is also recommended. During the second semester, students make Quantitative determinations of a number of typical ions and become familiar with the elementary principles of Quantitative Analysis.

The equivalent of nine hours of laboratory work per week through the year, carrying a credit of three hours for each semester. Credit in this course is not assigned until the completion of the entire course at the end of the year. Prerequisite, 171.

173. Elementary Quantitative Analysis. Professor Alleman and Mr. Myers.

Three hours a week during one semester. Offered annually.

Complete analysis of potassium chloride, copper sulphate, calcite, haematite, apatite, sphalerite, clay, Portland cement, and coal.

For students taking Engineering as their major subject. Nine hours of laboratory work per week throughout one semester, carrying a credit of three hours. The time is arranged to suit individual requirements. Prerequisite, 172.

174. Quantitative Analysis. Professor Alleman.

Three hours a week throughout the year. Offered annually.

Demonstrations and laboratory work involving methods in gravimetric and volumetric analysis.

Required of students who select Chemistry as their major subject; open as an elective to all others who have taken Courses 171 and 172 at this institution, or their equivalent elsewhere. The equivalent of nine hours of laboratory work per week throughout the year, carrying a credit of three hours for each semester. The time is arranged to suit individual requirements. Prerequisite, 172.

175. Advanced Quantitative Analysis. Professor Alleman.

Three hours a week during the second semester. Offered annually.

Examination of foods and food products, and their adulterants. Work in toxicology, analysis of sewage, and the sanitary analysis of water.

Required of students who select Chemistry as their major subject; open as an elective to all other students who have had sufficient knowledge of chemistry to follow the course. The work on sewage and water analysis is particularly adapted to students in engineering. The equivalent of nine hours of laboratory work per week during the second semester, carrying a credit of three hours. The time is arranged to suit individual requirements. Prerequisite, 174.

176. Physical Chemistry. Assistant Professor Creighton.

Three hours a week during the second semester. Offered annually.

Lectures and laboratory work. The work covered in the lecture course includes the thermodynamic laws; the gaseous, liquid, and solid states of matter; physical mixtures; the theory of dilute solutions; the kinetic theory of gases; the relation between chemical structure and physical properties; chemical statics and dynamics; and thermochemistry. Stress is laid on the applications of thermodynamics to chemical processes. In the laboratory students make observations on the behavior of solutions, determine molecular weights by physical methods, measure velocities of reactions and familiarize themselves with the use of the refractometer, the spectroscope, and the polariscope. The following books are recommended: Nernst, *Theoretical Chemistry;* Jones, *Elements of Physical Chemistry;* Young, *Stoichiometry;* Washburn, *Principles of Physical Chemistry.*

Two lectures and three hours per week of laboratory work. Required of students who select chemistry as their major study. Prerequisites, 174 and 272.

177. Organic Chemistry. Professor Alleman and Mr. Myers.

Three hours a week throughout the year. Offered annually.

Lectures, demonstrations, written exercises, and laboratory work. This course includes the work as outlined in Remsen, *Organic Chemistry.* In the laboratory, students make and study the various organic preparations as given in Remsen, *Organic Chemistry.*

Required of all students who select Chemistry as their major subject.

178. Organic Chemistry (Advanced Course). Professor Alleman and Mr. Myers.

A continuation of Course 177. Lectures and laboratory work. In the laboratory, students make all the preparations (not previously made in Course 177), as given in Gattermann, *Praxis des Organischen Chemikers.* A knowledge of German is required.

Required of all students who select Chemistry as their major subject.

180. Electro-Chemistry. Assistant Professor Creighton.

Three hours a week during the first semester. Offered annually.

Lectures and laboratory work. The laboratory work in this course is arranged so that the student may obtain exact practical information regarding the application of electricity to chemical manufacture, and become proficient in the measurement of electrical conductivities and electromotive forces, and in making electro-chemical analyses. The laboratory course also includes the testing of Faraday's laws and the measurement of transport numbers, the absolute migration velocity of ions, decomposition voltage and heat of neutralization. The following textbooks are recommended: Abegg, *Electrolytic Dissociation;* Le Blanc, *Textbook of Electro-Chemistry;* Oettel, *Electro-Chemical Experiments and Exercises in Electro-Chemistry;* Fisher, *Praktikum der Elektrochemie,* and Smith, *Electro-Chemical Analysis.*

Required of all students who select Chemistry as their major subject; open as an elective to all other students who have a sufficient knowledge of chemistry and of physics to follow the course. Prerequisite, 174 and 176.

The number of students in this course is limited to six.

181. Assaying. Professor Alleman.

One hour a week during the first semester. Offered annually.

Fire assays of ores of gold, silver, lead, zinc, copper, and of numerous metallurgical products. The textbook used is Furnam, *Practical Assaying.*

Three hours of laboratory work per week during the first semester, carrying a credit of one hour.

182. Mineralogy. Professor Alleman.

Two hours a week during the second semester. Offered annually.

This course consists of lectures on crystallography and descriptive mineralogy; and the determination of minerals by the blow-pipe. Moses and Parsons, *Mineralogy. Crystallography and Blow-pipe Analysis,* is used as a guide. Prerequisite, 170.

183. Physical Chemistry (Advanced Course). Assistant Professor Creighton.

One hour a week during the first semester. Offered annually.

A continuation of Course 176.

Chemical Engineering

The extensive demand made on the part of various industries for men trained both in Engineering and Chemistry, has influenced the establishment of a course which will afford preparation

along these special lines. The course, as arranged, includes all the prescribed work required for the degree of A.B. Ample opportunity is also afforded the student in the choice of elective studies. The course, faithfully followed, will give the student a liberal education, and, in addition, special training in Chemical Engineering. The course as outlined follows:

FRESHMAN YEAR

Thirty-five "hours" of prescribed work.
See Uniform Curriculum on page 50.

SOPHOMORE YEAR

Thirty-seven "hours" of prescribed work.
See Uniform Curriculum on page 51.

JUNIOR YEAR

	First Semester		Hours per Week		
See Page			Class	Lab'y	Credits
116	Physics 272	Advanced Physics	2	3	3
67	German		3	—	3
	or				
63	French		—	—	—
90	Chemistry 174	Quantitative Analysis	—	9	3
91	Chemistry 177	Organic Chemistry	2	3	3
74	History		—	—	—
	or				
78	Economics 111	Elementary Economics and Railroad Transportation	3	—	3
110	Electrical Engineering 237	Direct Current Theory	2	—	2
110	Electrical Engineering 238	D. C. Lab	—	3	1
		Totals	12	18	18

Second Semester

110	Electrical Engineering 238	Direct Current Laboratory	—	3	1
110	Electrical Engineering 237	Direct Current Theory	2	—	2
67	German		3	—	—
	or				
63	French		—	—	3
90	Chemistry 174	Quantitative Analysis	—	9	3
91	Chemistry 177	Organic Chemistry	2	3	3
74	History		—	—	—
	or				
78	Economics 111		—	—	3
	Elective		—	—	2
		Totals	7	15	17

SENIOR YEAR

See Page	*First Semester*		Hours per Week: Class	Lab'y	Credits
91	Chemistry 180	Electro Chemistry	2	3	1
91	Chemistry 181	Assaying	—	3	3
78	Economics 111 or 112 or 113		3	—	3
	or				
74	History		—	—	—
91	Chemistry 178	Adv. Organic Chemistry	2	3	3
69	German 49 or Elective	Scientific German	2	—	2
	Elective		1	—	1
	Elective		3	—	3
80	Religion and Philosophy 131	Bible Study	2	—	2
		Totals	15	9	18

Second Semester

109	Engineering 232	Experimental Laboratory	—	4	2
78	Economics 111 or 112 or 113		3	—	3
	or				
74	History		—	—	—
91	Chemistry 178	Adv. Organic Chemistry	2	3	3
80	Religion and Philosophy 131	Bible Study	1	—	1
	Thesis (Chemical)	Laboratory Research	—	12	4
	Elective		2	—	2
		Totals	8	19	15

Engineering

CIVIL, MECHANICAL, AND ELECTRICAL

The instruction in this department is under the direction of Professor George F. Blessing. Lewis Fussell is Assistant Professor of Electrical Engineering, Charles G. Thatcher is Assistant Professor of Mechanical Engineering, Ernest C. White is Assistant Professor of Civil Engineering and E. Shannon Bradfield is Instructor in charge of Shop Work.

The courses in Engineering are designed to train men in the fundamental principles that underlie the branch in which they are majoring, and to give such engineering and practical work as time and equipment will permit.

The location of the College near Philadelphia and the important manufacturing centers in its vicinity enables students to visit a great variety of industrial and engineering works.

A man must supplement a technical course by experience in practice and contact with real engineering work before he can attain his power as an engineer, and it is hoped that these visits will prove of value to the student when he begins practical engineering work.

The success of an engineer has come more and more to depend upon his ability to meet men of education and culture on equal terms; hence, courses in liberal arts are carried throughout the four years in the belief that they will ultimately benefit the students. The technical courses of study are arranged and conducted with the purpose of imparting a liberal preparation for immediate usefulness in the office, drafting room, or field. When circumstances permit, undergraduates are encouraged to engage in engineering work during the summer vacation. The experience and maturity so gained are of great value in subsequent collegiate and professional work.

The instruction in this department is given both by lectures and recitations; in the drafting room, the field work, the laboratory, and shop the aim is to adapt the instruction to the individual needs of the student.

THE EQUIPMENT

The Field Equipment for practice in surveying includes transits, levels, plane tables, compasses and other auxiliary apparatus of the best makes and latest designs.

Engineering Library and Club Room. This is a large, beautifully furnished room on the second floor of Beardsley Hall. It is equipped with electrical connections for stereopticon lantern or motion picture machine. The book shelves in this room contain about one thousand volumes of technical works in which is included transactions of engineering societies and bound volumes of the most important technical papers and journals. Current issues of all the leading engineering magazines are also to be found on the reading tables.

Drafting Rooms. The drafting rooms are equipped with drawing tables, stools and cabinets. In addition to the above equipment this department has a ten-inch Sibley wood turning lathe, with many extra parts, and a duplex power driven pump for

the use of Freshmen in sketching. The Junior and Senior drawing rooms are also equipped with filing cabinets containing blue prints and other data to aid the student in the design courses.

The Engineering Laboratories. The Materials Laboratory contains a 15,000-pound Olsen testing machine, and a larger one having a capacity of 100,000 pounds. Both machines are fitted for tests in tension, compression and deflection. In addition, there is a 50,000-pound Olsen torsional testing machine, and micrometers for measuring elongation, compression and deflection; a Fairbank's cement testing machine with a complete equipment for making tests on cement; a White-Souther endurance testing machine, a Shore scleroscope, an Upton-Lewis endurance testing machine and a complete equipment for the heat treatment of metals.

For tests in mechanical engineering the equipment consists of steam and gas engine indicators, plainimeters, tachometers, steam and coal calorimeters, pyrometers, gauge and indicator testing apparatus. This laboratory also contains oil and grease testing apparatus, a Junker calorimeter for gas and liquid fuel tests and gas analysis apparatus.

In the Gas Engine Laboratory the apparatus consists of a five-horse-power Otto gas engine, a ten-horse-power Quincy gasoline and kerosene engine, a four-cylinder twenty-horse-power Rutenber automobile engine direct connected to a Tracy fan dynamometer, a ten-horse-power Mietz and Weiss fuel oil engine and a vertical fifty-horse power two-cylinder Bruce-Macbeth gas engine. The above engines are fitted for testing with Prony brakes, indicating apparatus, etc. This laboratory also contains a "Recco" Rider-Ericsson hot-air engine.

The Steam Engine Laboratory contains a fifty-horse power 8 in. x 13 in. x 10 in. Ideal tandem-compound high-speed engine, a 10 in. x 24 in. Wetherell-Corliss engine, a seven-kilowatt horizontal Curtis turbine direct connected to a direct-current dynamo installed with a separate switchboard. This laboratory also contains a 5 in. x 8 in. vertical slide-valve engine. The above engines can be run condensing or non-condensing. The condensing apparatus consists of a Wheeler surface condenser. The steam engine equipment in the College power plant consists of

two one-hundred-horse-power and one sixty-five-horse-power Harrisburg high-speed engines.

The boiler room contains four one-hundred-and-twenty-five horse-power horizontal return tubular boilers fitted with turbo blowers and automatic damper regulator. For testing the boilers the plant is equipped with a Wilcox automatic feed water weigher, coal weighing apparatus, flue gas analysis apparatus, etc.

The equipment of the Hydraulic Laboratory consists of a D'Olier centrifugal pump direct connected with a ten-horse-power direct current motor and fitted with necessary apparatus for conducting a complete test such as weirs, nozzles, gauges, etc. A fifteen-horse-power Christiana turbine water wheel fitted with Prony brake, hook gauges, weirs, etc. A small impulse water wheel of the Pelton type.

The Direct Current Laboratory contains a plug type switchboard supplied with direct current power and connected with the alternating switchboard so that the equipment in both laboratories may be used in either. It makes possible the rapid connection in parallel or series of all the apparatus. The mechanical power for this room is derived from a twenty-five-horse-power variable speed induction motor, and the direct current power from the substation located in the adjoining room. This is equipped with two twenty-five-kilowatt one-hundred-and-ten-volt direct current generators of Westinghouse make driven by two thirty-five-horse-power three-phase General Electric induction motors; and one fifty-kilowatt General Electric induction motor-generator set. In addition to the usual control apparatus there is installed a Tirrill automatic voltage regulator, giving very steady voltage. The apparatus includes shunt, series and compound wound motors and generators, motor-generators and variable speed motors of various types, together with the necessary starting, field and load rheostats. The meters are of the most accurate type, the range being from .001 to 500 amperes and from .001 to 750 volts.

The Alternating Current Laboratory has a switchboard similar to but larger than the one in the direct-current laboratory. It is supplied with direct current and with twelve different alternating voltages, the latter being obtained from a bank of three

twenty-KV-A step-down transformers. In addition to this single- and three-phase supply a pair of Scott transformers of four-KV-A rating deliver two-phase power, and a 7.5-KV-A synchronous generator in the laboratory supplies one, two, three, six or twelve phases. The main power supply comes from the power plant, where two seventy-five KV-A and one fifty-KV-A revolving field alternator develop three-phase power at twenty-three hundred volts. A good modern switchboard is rendered doubly useful for teaching purposes, since there are more than the usual number of switchboard meters which make checking and comparison more effective. Here also there is a Tirrill voltage regulator. In the laboratory in addition to the resistances, inductances, and condensers (one hundred and forty microfarads) there are transformers, single- and three-phase induction motors of several types, a repulsion motor, an inductor generator, two synchronous converters, a synchronous motor, synchronous generator and a variable frequency motor generator set giving from twenty to seventy cycles per second.

Single-phase and three-phase induction potential regulators give close voltage control. There are a number of high-grade ammeters, voltmeters, and wattmeters which make it possible to read closely any current from .1 to 400 amperes and any pressure from 10 to 3,000 volts. A vibrating reed frequency meter, a synchroscope, a contact device for wave form, a power factor meter, recording and integrating meters are available. A fully equipped General Electric oscillograph is freely used to show wave shape and phase relations.

For the work in illumination there are a Bunsen photometer of semi-portable type, a three-meter Queen photometer with Lummer-Brodhun screen, revolving head, etc,; a portable Sharp-Millar illuminometer. Many types of lamps and types of glassware are at hand and a study is made of the various types of lighting around the college to determine where each would be best applied for interior or outdoor work.

SHOP WORK

This work extends through two years for all engineering students, and may be continued if desired.

The Machine Shop occupies a large portion of the second floor

of Beardsley Hall and it has a floor area of 3,300 square feet. It is well lighted and is arranged so that the machine and bench work are entirely separated. A large tool room is centrally located and is in charge of an assistant, who supplies individual tools on a check system, as is done in commercial shops.

The machine shop contains an excellent assortment of tools, including screw-cutting engine lathes; speed lathes, simple and back-geared; a planer; a complete universal milling machine with milling cutters; a shaper; a twist-drill grinder, and two vertical drill presses; a lathe-center grinder; plain and swivel vises; lathe chucks, universal and independent, also drill chucks; chucks for milling machine and vises for planing; surface plates; standard gauges and a complete equipment of small tools.

The equipment of the machine shop includes two Hamilton engine lathes, 16 in. x 6 ft.; a Lodge and Shipley lathe of similar size, a Whitney wet tool grinder, and a 16 in. x 8 ft. Champion engine lathe of rugged design for the demonstration of high speed cutting tools. This lathe is double back geared, has taper turning attachment, compound rest and quick change gear device giving forty changes of threads without removing a gear. The gearing on all lathes is covered by guards or casings to prevent accidents.

The Woodworking Shop extends through the entire length of the third floor of Beardsley Hall, and has a floor area of more than 3,300 square feet. The work benches are fitted with quick-acting vises and other accessories and are provided with drawers and tool cabinets in sufficient number to assign each student a container for his tools and exercises. The plan of individual assignment of tools and supplies is followed here, and each student is provided with a complete set of tools.

All of the woodworking machinery is of the latest design and each unit has a direct motor drive, and is equipped with approved safety devices. The equipment includes the following machines:

24-inch Oliver Hand Planer and Jointer.
36-inch Oliver Single Surfaces.
38-inch Oliver Band Saw.
Oliver Universal Wood Trimmer.
Colburn Universal Circular Saw.
Mummert, Wolf, and Dixon Oil Tool Grinder.

6-inch Bench type Oliver Hand Jointer.
Post Drill Press and Boring Machine.
24-inch Oliver Wood Turning Lathe.
8 12-inch Oliver Motor Head Wood Turning Lathes.

The tool room is equipped with all small tools and necessary stock for a complete course in elementary pattern making and wood working.

The Forge Shop. This equipment consists of ten fires, and one additional master fire. These forges are operated on the down-draft principle, and were designed and constructed for this shop by the Buffalo Forge Company. The forge shop is situated on the ground floor of the building and covers an area of more than 1,000 square feet.

The Foundry is also located on the first floor, and has a floor space of more than 1,500 square feet. A gas heated cupola or furnace is in use for melting metals in crucibles. The additional equipment consists of moulding benches, flasks and other accessory apparatus.

Fees. A fee of five dollars for each semester will be charged for each course in woodworking, forging and machine practice. A fee of two dollars for each semester will be charged for each course in field practice and surveying. An additional fee of two dollars will be charged for the annual survey.

A *Deposit* of five dollars will be required of each student enrolling for a course in shop work or founding. This deposit will be retained to cover breakage and loss of tools or supplies, and, after deducting for such items, the balance will be refunded upon the completion of the course.

BEARDSLEY HALL

This building is of concrete block construction with reinforced concrete floors, columns, and stairs. It is three stories high. In architectural design it is simple and effective, representing the latest and best type of factory building construction.

The ground floor contains the forge shop, the foundry, a tool room, a room used for experimental and research work on the heat treatment of metals, a store room for stock, a vault for records, a lavatory, and a locker room equipped with steel lockers.

On the second floor is located the main machine shop, equipped with high grade metal working machines, tool room and departmental offices. This floor also contains a class room and an engineering library, where the student will find a large collection of technical books and periodicals.

The third floor, which is similar in plan and dimensions to the second floor, contains the woodworking department. It also contains a tool room, a stock room, offices and a safety museum.

THE MAJOR IN ENGINEERING

The engineering courses extend through four years; and, in this respect, differ from the other major courses offered in the College, which are elected at the beginning of the second year and extend through the three subsequent years. The students in Engineering have thus their entire course arranged with the advice and consent of their course adviser in Engineering.

The major in Engineering may be taken in one of three courses: Mechanical, Electrical, or Civil Engineering. The courses of study constituting the major in Engineering are given in detail below.

The work for the first two years is common to all students in Mechanical, Electrical, and Civil Engineering and includes work in English, Pure Mathematics, Physics, Chemistry, Drawing and Shop Work.

The work offered in the shops throughout the several courses is intended to teach the principles of manufacturing and to familiarize the student with methods and processes of the mechanic arts. The student works in the various shops of the department, and completes in each a series of practical exercises. He thus obtains some knowledge of the nature and properties of the various materials he employs, and becomes familiar with the use and care of the more important hand and machine tools.

A complete checking, cost, and time-keeping system is in operation throughout the shops. The system is in charge of a shop clerk, and each student is required to spend a part of his time in the office to familiarize himself with the system. The object is to make the shop courses not only a means of developing the powers of observation and judgment, together with the acquisi-

tion of mechanical skill, but to familiarize the student with business methods and make the shops serve as a laboratory for work in Industrial Organization.

During the third year the Mechanical Engineering students take up work in Kinematics of Machinery and Drawing, while those in Civil Engineering are assigned Field Practice, and Elementary Structural Design. During the fourth year, opportunity is offered for more definite specialization in the branches of Mechanical, Electrical, and Civil Engineering as indicated in the courses outlined.

ADVANCED DEGREES IN CIVIL, MECHANICAL, AND ELECTRICAL ENGINEERING

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

1. The candidate must have been connected with practical engineering work for three 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. After this application is made he will receive an outline course of study to pursue during the year.

4. The thesis must be submitted for approval, and satisfactory evidence given that the reading requirement has been met 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.

Courses of Study

I. *Civil Engineering.*

Freshman year. See page 50.

Sophomore year. See page 51.

JUNIOR YEAR

See Page	*First Semester*		Hours per Week: Class	Lab'y	Credits
107	Mechanical Engineering 215	Mechanics of Materials	3	—	3
113	Mathematics 256	Integral Calculus	3	—	3
46	Group 2		3	—	3
116	Physics 272	Advanced Physics	2	3	3
110	Electrical Engineering 237	Direct Current Theory	2	—	2
108	Surveying 224	Field Practice	—	6	2
110	Electrical Engineering 238	Direct Current Laboratory	—	3	1
		Totals	13	12	17

Second Semester

107	Engineering 215	Mechanics of Materials	3	—	3
114	Mathematics 257	Analytical Mechanics	3	—	3
46	Group 2		3	—	3
110	Electrical Engineering 237	Direct Current Theory	2	—	2
110	Electrical Engineering 238	Direct Current Laboratory	—	3	1
106	Civil Engineering 196	Structural Design	—	6	2
109	Mechanical Engineering 232	Experimental Laboratory	—	4	2
116	Physics 272 or Elective	Advanced Physics	2	3	3
		Totals	13	16	19

SENIOR YEAR

See Page	*First Semester*		Hours per Week: Class	Lab'y	Credits
108	Civil Engineering 226	Railroads	2	6	4
106	Civil Engineering 198	Structural Design	2	3	3
46	Group 3		3	—	3
108	Engineering 225	Hydraulics	3	—	3
107	M. E. 216 or Elective	Steam Machinery	3	—	3
80	Religion and Philosophy 131	Bible Study	2	—	2
		Totals	15	9	18

Second Semester

108	Civil Engineering 226	Railroads	3	—	3
46	Group 3		3	—	3
	Elective		3	—	3
109	Civil Engineering 228	Concrete Construction	3	—	3
106	Civil Engineering 198	Structural Design	—	9	3
	Thesis or Elective	Laboratory Research	—	6	2
80	Religion and Philosophy 131	Bible Study	1	—	
		Totals	13	15	18

II. *Mechanical Engineering.*

Freshman year. See page 50.

Sophomore year. See page 51.

JUNIOR YEAR

See Page	First Semester		Hours per Week: Class	Lab'y	Credits
107	Engineering 215	Mechanics of Materials	3	—	3
113	Mathematics 256	Integral Calculus	3	—	3
46	Group 2		3	—	3
116	Physics 272	Advanced Physics	2	2	3
110	Electrical Engineering 237	Direct Current Theory	2	—	2
105	Mechanical Engineering 195	Kinematic Drawing	—	6	2
107	Mechanical Engineering 214	Kinematics	2	—	2
110	Electrical Engineering 238	Direct Current Laboratory	—	3	1
		Totals	15	11	19

Second Semester

107	Engineering 215	Mechanics of Materials	3	—	3
114	Mathematics 257	Analytic Mechanics	3	—	3
46	Group 2		3	—	3
110	Electrical Engineering 237	Direct Current Theory	2	—	2
110	Electrical Engineering 238	Direct Current Laboratory	—	3	1
109	Mechanical Engineering 232	Experimental Laboratory	—	4	2
105	Mechanical Engineering 195	Kinematic Drawing	—	3	1
116	Physics 272 or Elective	Advanced Physics	2	3	3
		Totals	13	13	18

SENIOR YEAR

See Page	First Semester		Hours per Week: Class	Lab'y	Credits
107	Mechanical Engineering 217	Machine Design	3	—	3
106	Mechanical Engineering 197	Machine Design Drawing	—	6	2
46	Group 3		3	—	3
108	Engineering 225	Hydraulics	3	—	3
109	Mechanical Engineering 233	Experimental Laboratory	—	4	2
107	Mechanical Engineering 216	Steam Machinery	3	—	3
80	Religion and Philosophy 131	Bible Study	2	—	2
		Totals	14	10	18

Second Semester

107	Mechanical Engineering 217	Machine Design	2	—	2
106	Mechanical Engineering 197	Machine Design Drawing	—	6	2
46	Group 3		3	—	3
	Elective		2	—	2
109	Mechanical Engineering 233	Experimental Laboratory	—	4	2
108	Mechanical Engineering 219	Power Plants	3	—	3
111	Mechanical Engineering 249	Principles of Manufacturing	1	—	1
	Thesis or Elective	Laboratory Research	—	6	2
80	Religion and Philosophy 131	Bible Study	1	—	1
		Totals	12	16	18

III. *Electrical Engineering.*

Freshman year. See page 50.
Sophomore year. See page 51.

JUNIOR YEAR

First Semester			Hours per Week		
See Page			Class	Lab'y	Credits
113	Mathematics 256	Integral Calculus	3	—	3
46	Group 2		3	—	3
116	Physics 272	Advanced Physics	2	3	3
107	Engineering 215	Mechanics of Materials	3	—	3
110	Electrical Engineering 237	Direct Current Theory	2	—	2
	Elective		—	—	2
110	Electrical Engineering 239	Illumination	1	2	2
110	Electrical Engineering 238	Direct Current Laboratory	—	3	1
		Totals	14	8	19

Second Semester					
114	Mathematics 257	Analytical Mechanics	3	—	3
46	Group 2		3	—	3
110	Electrical Engineering 237	Direct Current Theory	2	—	2
110	Electrical Engineering 238	Direct Current Laboratory	—	3	1
107	Engineering 215	Mechanics of Materials	3	—	3
109	Mechanical Engineering 232	Experimental Laboratory	—	6	2
	Elective		—	—	2
116	Physics 272 or Elective	Advanced Physics	2	3	3
		Totals	13	12	19

SENIOR YEAR

First Semester			Hours per Week		
See Page			Class	Lab'y	Credits
110	Electrical Engineering 240	Alternating Current Theory	3	—	3
110	Electrical Engineering 241	Alternating Current Laboratory	—	3	1
	Elective		—	—	2
46	Group 3		3	—	3
108	Civil Engineering 225	Hydraulics	3	—	3
110	Electrical Engineering 242	Central Stations and Power Transmission	3	—	3
111	Electrical Engineering 246	Conferences	1	—	1
107	Mechanical Engineering 216	Steam Machinery	3	—	3
		Totals	16	3	19

Second Semester			Hours per Week		
See Page			Class	Lab'y	Credits
110	Electrical Engineering 243	Polyphase Currents	3	—	3
111	Electrical Engineering 244	Polyphase Laboratory	—	3	1
111	Electrical Engineering 245	Electric Railways	3	—	3
49	Group 3		3	—	3
	Elective		—	—	3
108	Mechanical Engineering 219	Power Plants	3	—	3
111	Electrical Engineering 246	Conferences	1	—	1
	Thesis or Elective		—	—	2
		Totals	13	3	19

191. Engineering Drawing.

Six hours a week during the first semester. Two hours' credit

Linear drawing, lettering, model and object sketching of machine parts.

Open to Freshmen.

192. Engineering Drawing.

Six hours a week during the second semester. Two hours' credit.

This work is intended to instruct the student in the making and reading of commercial working drawings. The character of the work is such as is followed in the best modern drafting rooms, and attention is given to standard conventions, tabulations, titling, etc.

Open to Freshmen.

193. Descriptive Geometry.

Six hours a week during the first semester. Two hours' credit

This work consists of lectures, recitations, and drawing-board work upon the presentation of lines, planes, and solids; tangencies, intersections, sections, developments and isometric projection. It is intended to give the student an understanding of the theory of projection and the principles necessary to the proper delineation and interpretation of constructive drawings. Work is done in all quadrants, but the practical problems, introduced to illustrate the application of the subject to subsequent work in design, are shown in the third quadrant.

Open to Sophomores: prerequisites, Courses 192 and 251.

194. Empirical Design and Machine Drawing.

Six hours a week during the second semester. Two hours' credit.

Machine drawing and empirical designing, an extension of the work in 192. Proportioning of machine details as fixed by practice and empirical methods. Making and using standard data sheets. Making of assembly drawings. The general aim of the course is to give the beginner a drill in the proportioning of such parts as are fixed by common practice, empirical formulae, rather than by mathematical theory and to apply the work of 192.

Open to Sophomores; prerequisites, Courses 192 and 193.

195. Kinematic Drawing.

Six hours a week during the first semester and three during the second. Three hours' credit.

Drawing-board application of Course 214. Solution of mechanism by means of instant centers, designing of cams, gears, linkages, etc. Drawing of velocity and acceleration diagrams.

Open to Juniors in M. E.; prerequisite, Course 194, and must be taken with Course 215.

196. Elements of Structural Design.

Six hours a week during the second semester. Two hours' credit.

Computation of stresses in trusses, mainly by graphic methods. The forms and strength of joints and fastenings used in heavy framing. Besides the graphic analysis of simple beams and roof trusses, complete detail designs and working drawings of joints to resist large tensile stresses, and of a wooden roof truss for given specifications. Elements of designing in structural steels.

Required of Civil Engineering students only. Open to Juniors; prerequisites, Courses 193 and 194, and must be taken with Course 215.

197. Drawing and Design.

Six hours a week during each semester. Two hours' credit for each semester.

Drawing-room problems in elementary machine design illustrating the work as given in 195. In this course the student for the first time undertakes the design of a complete machine, laying out the general outlines, proportioning the details theoretically, and modifying his results by practical considerations. All computations necessary for the complete design must be carefully and systematically made and kept. Working drawings of the most important details and a finished assembly drawing of the machine are completed.

Open to Seniors in M. E.; prerequisites, Courses 193 and 194, and must be taken with 217.

198. Structural Design.

Six hours during first semester. Three hours' credit. Six hours during second semester. Three hours' credit.

Computation of stresses; types and details of bridge and roof trusses; reports, drawings; complete design of a plate girder and a through Pratt railway bridge.

Open to Seniors in C. E.; prerequisite, Course 196.

199. Topographical Drawing.

Three hours a week during first semester. One hour's credit.

A topographic map will be drawn from the field notes of the annual survey.

Open to Seniors in C. E.; prerequisite, the annual survey.

203. Pattern Making.

Six hours a week during first semester and alternates with 204 during second semester. Two hours' credit for first semester and one hour's credit for second semester.

A preliminary course of instruction in the use of hand and machine tools for woodworking, followed by graded instruction in pattern-making, construction of core boxes, etc.

Open to Freshmen.

204. Foundry Work.

Three hours a week during the second semester. One hour's credit.

Moulding, mixing, and casting of metals and core-making, etc. The student is required to produce castings from the complete set of patterns made in Course 203.

Open to Freshmen.

205. Forge Work.

Three hours a week during the first semester. One hour's credit.

Forging, welding, tool-dressing, tempering, etc., and a study of press and die work and "drop forgings."

Open to Sophomores.

206. Machine Work.

Three hours a week during the first semester and six during the second. One hour's credit for first semester and two for the second.

Use of measuring tools, hand and machine tools, fitting and assembling. Operation and use of jigs and other manufacturing fixtures.

Open to Sophomores.

207. Machine Work.

One week preceding the opening of college.

Open to Juniors and Seniors. A continuation of 206.

213. Materials of Construction.

Two hours a week during the first semester.

This course consists of a study of the physical properties and methods of manufacture of the various materials used in engineering construction. It does not treat of the strength of materials as given in the course on Mechanics of Materials. [215.]

Open to Sophomores; prerequisite, Course 171.

214. Kinematics.

Two recitations a week during the first semester. Two hours' credit.

Theory of mechanism, instant centers, cams, gears, linkages, etc. Velocity and acceleration diagrams.

Open to Juniors; prerequisite, Course 194.

215. Mechanics of Materials.

Three recitations a week during first semester. Three hours' credit. Two recitations and one lecture a week during second semester. Three hours' credit.

This course continues throughout the year and credit will not be given for a single semester.

This course treats of the resistance of materials, center of gravity, moment of inertia, riveted joints, mechanics of beams, columns, shafts; combined stresses, temperature stresses, impact and resilience.

Open to Juniors; prerequisites, Courses 256 and 213.

216. Steam Machinery.

Three hours a week during the first semester. Three hours' credit.

The course covers the elementary consideration of the behavior of gases and vapors; theoretical heat engines; application of theory to steam engines; principles governing the transfer of heat from hot gases to water; principles of combustion; boiler furnaces and grates; types of boilers; feed-water heaters, economizers, super heaters, advantages of condensing; types of condensers, condenser pumps, etc.

Open to Seniors; prerequisites, Courses 171, 256, 272, and 273.

217. Machine Design.

One lecture and two recitations a week during the first semester. Three hours' credit One lecture and one recitation during the second semester. Two hours' credit.

Analysis of complete machines. Selection of mechanism for specified work and study of practical considerations involved. Analysis of energy and force problems in machines. Determination of driving devices as based on work to be done. Proportioning of detailed parts as dictated by stress and practical considerations. Application of the laws of Mechanics and Kinematics to the design of machines and a discussion of empirical design and modifications due to practical considerations.

Open to Seniors; prerequisites, Courses 214 and 195, and must be taken with 197.

218. Pumping Machinery.

Two hours a week during second semester. Lectures, recitations and problems. Two hours' credit.

This course consists of the theory of air compressors, design of distributing systems and compressed air plants; study of machines for pumping liquid, with a description of types, together with a description of pumping plants to meet given conditions. Special attention will be given to centrifugal and turbine pumps, and the complete calculations and part design of a high-pressure, multi-stage turbine pump will be included.

Open to Seniors; prerequisites, Courses 216 and 225.

219. Power Plants.

Two hours a week during second semester. Lectures, recitations and problems. Two hours' credit.

This course consists of the description, function and operating combinations of boilers, engines, heaters, condensers, economizers, piping systems, etc.

Open to Seniors.

223. Surveying.

Six hours a week during the second semester. Two hours' credit.

Theory and field work; land surveying; leveling; laying out of buildings; study of construction and adjustment of surveying instruments; drawing of a map from the field notes.

Open to Sophomores; prerequisite, Course 253.

224. Surveying.

Six hours a week during the second semester. Two hours' credit.

Theory and field work. Problems involving the accurate use of chain, tape, transit and level; city surveying.

The field work includes the use of the stadia for both traverse and topography.

Open to Juniors; prerequisite, Course 223.

225. Hydraulics.

Three hours a week during the first semester. Three hours' credit.

Fluids at rest. Hydrostatic pressure. Pressure of water against walls and dams. Steady flow of liquids through pipes and orifices and over weirs. Fluid friction. Loss of head. Steady flow of water in open channels. Kutter's formula and diagrams based thereon. Theory of various kinds of hydraulic motors, etc.

Open to Seniors; prerequisites, Courses 256 and 257.

226. Railroads.

Recitations and field work during the first semester. Four hours' credit. Lectures, recitations and problems during the second semester. Three hours' credit.

First Semester.—Circular curves; transition curves, turnouts, cross-sections. Complete surveys will be made for the location of a section of railway; cross-sections will be taken and structure surveys made. Each student will make a map and profile of the entire line with an estimate of the qualities and cost, including grading, track and structures.

Second Semester.—Lectures, recitations, and problems. The construction, maintenance and operation of railroads.

Open to Seniors; prerequisite, Course 223.

227. Municipal Engineering.

Two hours of recitations, lectures and problems per week, during second semester, two hours' credit.

(a) Study of the design, construction, and operation of municipal waterworks and

sewerage systems; water and sewerage purification; garbage disposal; (b) Roads and pavements.

Open to Seniors; prerequisites, Courses 223 and 225.

228. Concrete Construction.

Three hours' lectures and recitation during the second semester. Three hours' credit.

Study of reinforced construction and design; properties of the material; general theory; tests of beams and columns; working stresses; use of diagrams and tables, in building construction. Complete design of one bay of a reinforced concrete factory building.

229. Engineering Problems.

One hour's credit each semester.

Problems such as occur in ordinary engineering practice, chosen to show the application of the principles of both mechanics and hydraulics to practical design. These problems cover a wide range of subjects and afford opportunity for both analytical and graphical solutions. Computations and reports.

230. The Annual Survey.

One week preceding the opening of college. One hour's credit.

Topographic surveying.

Open to Sophomores and required with Course 223.

231. The Annual Survey.

One week preceding the opening of college.

Topographic surveying; precise measurement; triangulation.

Open to Juniors and required with Course 224.

232. Experimental Laboratory.

Four hours a week during second semester. Two hours' credit.

Use of engineering computing devices. Experiments involving the parallelogram of forces, center of gravity of plates, systems of levers; the mechanical strength of materials, tension, torsion, transverse and compression tests. The study of the variation of mechanical strength with differences in composition or heat treatment applied to steel and cast irons, demonstration of modern methods of tempering, annealing, heat treating, etc. Reports are required to be written up neatly and fully, and must include all the data and results of tests, together with conclusions. The preparation of the report is considered an important part of the course.

Open to Juniors; prerequisites, Courses 171, 215, 256, 272, 273.

233. Experimental Laboratory.

Four hours each semester. Two hours' credit each semester.

This course covers laboratory work, recitations and written reports. The course covers calibration of indicator springs, steam gauges, thermometers, dynamometers, viscosity and friction tests of lubricants, tests and heating values of coals, tests of various forms of Calorimeters, measurements of water, valve setting, efficiency tests of steam boilers, Corliss simple engine, Ideal compound engine, steam heaters and condensers, pump and water wheels, gas engines, etc.

Open to Seniors; prerequisites, Courses 216 and 232.

234. Gas Machinery Design.

Two lectures a week and one three-hour drawing period. During first and second semester. Three hours' credit.

The course consists of the rational and empirical design of internal combustion engines and gas producers. The drawing period to cover the practical application of principles discussed in the lectures.

Open to Seniors; prerequisites, Courses 214, 215 and 232.

235. Gas Power Machinery.

Two lectures a week, second semester. Two hours' credit.

General theory and important points in the design and operation of internal combustion engines and gas producers. Description of existing commercial types, study of relative advantages and consideration of questions of economy.

Open to Seniors.

236. Steam Turbines.

One lecture a week during second semester. One hour's credit.

Classification of turbines and description of leading features of various types. Calculations involved in turbine design. Adaptability to special conditions of service and discussion of building, erecting and testing.

Open to Seniors; prerequisite, Course 216.

237. Direct Current Theory.

Two hours a week throughout the year.

A detailed study of the theory of direct currents, direct-current generators, motors and their applications.

238. Direct Current Laboratory.

One hour a week throughout the year.

The testing of direct-current generators, motors and apparatus.

To accompany Course 237.

239. Illumination.

Two hours a week for the first semester.

Photometrical measurements of light sources, with the theory of light distribution.

Open to Juniors taking Engineering and Science Courses.

240. Alternating Current Theory.

Three hours a week for the first semester.

The theory of alternating currents with especial reference to single-phase generators, motors, and transformers.

Prerequisites, Courses 237 and 238.

241. Alternating Current Laboratory.

One hour a week for the first semester.

A laboratory course including the testing of single-phase generators, motors, transformers, meters, etc.

To accompany Course 240.

242. Central Stations and Power Transmission.

Three hours a week for the first semester.

A study of the electrical design, installation, equipment and economic operation of central stations with the theory of transmission and of the lines used in the distribution of electric power.

Prerequisites, Courses 237 and 238.

243. Polyphase Currents.

Three hours a week for the second semester.

An elementary course in the theory and application of polyphase machinery and appliances.

Prerequisites, Courses 240 and 241.

244. Polyphase Laboratory.

One hour a week for the second semester.

A laboratory course in the testing of polyphase machinery and appliances.
To accompany Course 243.

245. Electric Railways.

Three hours a week for the second semester.

A study of the equipment and operation of trolley lines and the electrification of steam roads.
Prerequisites, Courses 237 and 240.

246. Conferences.

One hour a week throughout the year.

A seminary course in which papers are presented on definite problems in electrical engineering, with a discussion of methods of solution. This course is supplemented by trips to electric stations in which an opportunity is afforded to observe practical solutions of the problems considered.

247. Social Engineering.

One hour a week throughout the year.

A study of betterment work in the industries. Safety, hygiene, coöperation, profit-sharing, pensions, social insurance, housing, education, recreation and affiliated questions are considered.

248. Efficiency.

Three hours a week during the second semester. One hour's credit.

This work consists of a study of the principles of efficiency. Records, plans, schedules, dispatching, standardized conditions and operations, etc., are considered and applied both to the individual and the shop organizations.

249. Contracts.

Two hours' credit, first semester.

A brief study of the laws of contracts and their application to engineering construction and to contracting. Problems are assigned in "Calls for Bid," proposals, contract agreements, specification writing and estimates for cost.

Mathematics and Astronomy

The instruction of this department is under the direction of Professor John A. Miller. Ross W. Marriott and John H. Pitman are Assistant Professors. Margaret E. Powell is Assistant in the Observatory. Elizabeth N. Frorer is an Assistant. Rev. Walter A. Mátos is Voluntary Observer. Murat Louis Johnson is Non-resident Lecturer in the Mathematics of Insurance.

The courses in Mathematics are designed to meet the wants of students desiring later to do graduate work in the best universities; to teach mathematics in the preparatory schools; to pursue engineering or other technical courses; to enter professions requiring a knoweldge of Mathematics, such as actuarial

work, expert accounting, ballistic engineering, etc. The college requirement of six hours of Mathematics for all candidates for graduation may be satisfied by passing three hours of Course 252 and Course 253, or by passing Courses 251 and 253, or by passing six hours of Astronomy. The first of these three alternatives is recommended. Students majoring in Mathematics will take the first year Courses 252 and 253.

A description of the instrumental equipment for astronomy may be found on pp. 21-22. The teaching staff is at present devoting as much time as is consistent with their teaching duties to studies in stellar parallax with the twenty-four-inch telescope, and in comet photography with the photographic telescope. Results of these studies are published in the Sproul Observatory publications, and various scientific journals. Students interested in either of these problems may work with advantage in conjunction with one of the professors.

The 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. This affords an opportunity of seeing in the course of a year, many celestial objects of various types.

The Mathematical and Astronomical Club, an association of students in Mathematics and allied subjects, and instructors in Mathematics, meets on the first and third Tuesday of each month in the lecture room of the Sproul Observatory. At these meetings, reports are given by students on subjects usually not presented in the classroom. Active participation in the club by students majoring in the department is urged.

A departmental library is located on the first floor of the Observatory. It contains about two thousand volumes and is sufficiently complete to make it a good working library. It is reasonably supplied with standard treatises, particularly those published in the last two decades. It contains complete sets of nearly all the American Mathematical and Astronomical periodicals, and sets, some of which are complete, some of which are not, of the leading English, German, and French periodicals. This library receives in exchange for the publications of the observatory, the publications of many of the leading observatories of the world.

The departmental library has been repeatedly enriched through

the benefactions of Professor S. J. Cunningham. Upon her retirement in 1906, she donated her private library. In 1908 she gave a fund which is being spent for the library, and in 1910 she gave a fund the income of which will be devoted to the purchase of books and periodicals. A fund given by Governor William C. Sproul has made possible the purchase of complete files of various astronomical periodicals and other astronomical publications.

COURSES IN MATHEMATICS

251. Solid Geometry. Assistant Professor Pitman and Miss Frorer.

Three hours a week during first semester. Offered annually.

Wells and Hart, *Solid Geometry.*

252. Algebra. Assistant Professors Marriott and Pitman.

Three hours a week during first semester, and two hours a week during second semester. Offered annually.

The fundamental operations and their laws of combination. A short review of factoring and simultaneous equations. The transformation theorems; remainder theorem; symmetric functions; differences; permutations and combinations; binominal theorem; series; theory of equations; determinants and elimination. Fine, *College Algebra.*

253. Trigonometry. Assistant Professors Marriott and Pitman and Miss Frorer.

Three hours a week during second semester. Offered annually.

The trigonometric ratios; reduction of trigonometric identities; solution of trigonometric equations; inverse functions; solution of triangles and use of tables. Palmer and Leigh, *Trigonometry.*

254. Analytic Geometry. Professor Miller.

Three hours a week during the first semester. Offered annually.

Theory of Cartesian and Polar coördinates; the straight line; the conic sections; the general equation of the second degree; an introduction to the Analytic Geometry of three dimensions. Fine and Thompson, *Analytic Geometry.*

Prerequisites, Courses 252 and 253.

255. Differential Calculus. Assistant Professor Marriott.

Three hours a week during second semester. Offered annually.

A study of text, supplemented by an occasional lecture. Granville, *Differential and Integral Calculus.*

Prerequisite, Course 254.

256. Integral Calculus. Assistant Professor Marriott.

Three hours a week during the first semester. Offered annually.

A study of text, supplemented by lectures. Granville, *Differential and Integral Calculus.*

Prerequisite, Course 255.

257. Analytical Mechanics. Professor Miller.

Three hours a week during second semester. Offered annually.

Composition and resolution of forces; center of gravity; moments; velocity; acceleration; collision of bodies; the integration of simple equations of motion. One of the purposes of the course is to develop facility in applying mathematical formulæ and methods to the investigation of physical phenomena. Miller and Lilly, *Analytic Mechanics.*

Open to students who have credit in Course 256.

258. Theory of Equations and Determinants. Assistant Professor Marriott.

Two hours a week during first semester. Offered annually.

Cajori, *Theory of Equations.*

Prerequisite, Course 254.

259. Solid Analytic Geometry. Professor Miller.

Two hours a week during second semester. Offered annually.

Fine and Thompson, *Coördinate Geometry,* supplemented by lectures.

Prerequisite, Course 255.

260. Advanced Calculus. Professor Miller.

Three hours a week during first semester. Offered annually.

Total and partial derivatives; theory of infinitessimals; development of series; definite integrals; approximations. The aim of the course is three-fold; to ground the student in the elementary work which has preceded it; to afford the merest introduction to the theory of functions; and to develop skill in the application of the principles of the Calculus to Geometry, and Mechanics. Osgood, *Calculus.*

Open to students having credit in 257, 258, and 259.

261. (*a*) The Mathematics of Investment and Insurance. Professor Miller and Mr. Johnson.

Two hours a week during second semester. Offered annually.

The theory of compound interest; annuities; sinking funds; interest rates; theory of Probability; mortality tables. Completion of this course, Courses 251-256, and an introduction to the theory of Finite Differences should enable the student to proceed with the examinations for admission to the Actuarial Society of America. Skinner, *Mathematical Theory of Investment.*

Prerequisite, Course 252.

261. (*b*) Vector Analysis. Assistant Professor Marriott.

Three hours a week during first semester. Given in 1919-20.

The method of Gibbs and Heaviside. The operations with Vectors, illustrated by applications to physical problems.

265. Differential Equations. Assistant Professor Marriott.

Three hours a week during second semester. Offered annually.

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

Prerequisite, Course 256.

266. Mathematical Analysis. Assistant Professor Marriott.

Three hours a week during first semester, and two hours a week during second semester. Given in 1919-20.

An introduction to higher mathematical analysis, including the number concept from a standpoint of regular sequences; number fields and domains; properties of func-

tions of real and complex variables, linear transformations and collineations; matrices and invariants. The course is intended as a transition from the elementary to the higher mathematics.

Open to Seniors and Graduates majoring in Mathematics.

COURSES IN ASTRONOMY

262. Descriptive Astronomy. Professor Miller.

Three hours a week during second semester. Offered annually.

A study of the fundamental facts and laws of Astronomy, and of the methods and instruments of modern astronomical research. The course is designed to give information rather than to train scientists. A study of the textbook will be supplemented by lectures illustrated by lantern slides from photographs made at various observatories. The class will learn the more conspicuous constellations and have an opportunity to see the various types of celestial objects through the telescope. The treatment is non-mathematical. Moulton, *Introduction to Astronomy.*

Prerequisite, *Solid Geometry.*

263. Practical Astronomy. Assistant Professor Pitman.

Hour to be arranged.

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

Prerequisites, Courses 255 and 262.

264. Orbit Computation. Assistant Professor Pitman.

Three hours a week during second semester. Given in 1918-19.

Central orbits; computation of the orbit of a comet or an asteroid. Leuschner's *Short Method.*

Open to Juniors and Seniors having credit in 267.

267. Method of Least Squares. Assistant Professor Pitman.

Three hours a week during first semester. Given in 1917-18.

The law of errors; the probability curve; adjustment of observations; weights and probable errors. The theory will be applied to practical problems in astronomy. A few supplementary lectures will be given on the methods of interpolation and mechanical quadratures.

Merriman, *Least Squares.*

Open to Juniors and Seniors.

268. Special Courses.

Graduate students may work in conjunction with one of the professors on any problem upon which a professor is working. The student is encouraged to familiarize himself with the literature of the problem in hand and to ground himself in its fundamental principles.

Undergraduate students are directed in the preparation of papers for which it is necessary to make a rather extensive examination of the accessible literature touching a given subject.

269. Celestial Mechanics. Professor Marriott.

Three hours a week during the second semester. Given in 1918-19.

Moulton, *Introduction to Celestial Mechanics.*

Physics

The instruction in this department is under the direction of Assistant Professor Winthrop R. Wright.

The department aims to give a general course in the subject setting forth the fundamental principles of the science in their relation to the other sciences and to general experience. In the more advanced course, a more rigorous and mathematical treatment is offered to those primarily interested in physics and to those majoring in chemistry, engineering, and mathematics. The lecture and recitation work in these courses is supplemented by laboratory experiments.

Advanced courses are offered in special branches of the subject and such changes will be made in these courses from year to year that a student may obtain a comprehensive, though necessarily elementary, view of the domain of modern physics. The department aims to prepare students through these courses for post-graduate study, for research work in industrial laboratories, or for the teaching of physics in secondary schools. Certain of the courses will be especially designed to meet the needs of those majoring in the allied sciences.

Students who plan to major in physics should realize that a thorough grounding in mathematics and chemistry must be acquired at the same time. An elementary knowledge of Greek, Latin, French, and German will be found of practical value and a reading knowledge of scientific French and German should be obtained early.

THE COURSES IN PHYSICS

271. General Physics.

Three hours throughout the year. Offered annually.

Two hours of lecture and three hours of laboratory work each week. The solution of practical problems involving the various laws which are studied forms a regular and important part of the student's work.

Open to Freshmen.

272. Advanced General Physics.

Three hours throughout the year. Offered annually.

Two hours of lecture and three hours of laboratory work each week. Problem work will be assigned throughout the year.

Open to students who have passed Course 271, or who, in the opinion of the instructor, are prepared for this more advanced work.

273. Electrical Measurements.

Three hours for the first semester. Offered annually.

One or two hours of lecture at the pleasure of the instructor and from three to five hours of laboratory each week. The course should familiarize the student with the use of modern electrical measuring instruments. Attention is given to the theory and precision of the methods employed and the general underlying principles are emphasized. The experiments include the measurement of resistance, potential difference, current, quantity, capacity, inductance, and power.

Open to students who have passed Course 272.

276. The Conduction of Electricity Through Gases.

One hour a week during second semester. Offered annually.

One hour of lecture each week. The subject is developed historically and deals with the Cathode Ray, the Canal Rays, and the X-rays, and their relation to the α, β, and γ radiations given out by radium and other radio-active substances. The purpose of the course is to familiarize the student with some of the modern views concerning the constitution of matter.

Open to students who have passed Course 272.

277. Light.

Two hours a week during second semester. Offered in 1919-20.

One hour of lecture and three hours of laboratory work each week. The subject is developed, and the various phenomena explained, in accordance with the wave theory.

Open to students who have passed Course 272.

Physical Education

The Physical Education of the college is under the direction of E. LeRoy Mercer, M.D., Assistant Professor of Physical Education. He is assisted in the courses for women by Miss Helen Culin, Miss Elizabeth Lanning, and Dr. Mary R. Hadley Lewis.

The aim of the department of Physical Education is to promote the general physical well being of the students, and to assist them to gain the hygienic, corrective, and educative effect of rightly regulated exercise.

In order that this object may be better attained, and to assist the director in gaining a definite knowledge of the strength and weakness of the individual, a careful physical examination and medical inspection (eye, nose, and throat) is required, which serves as a basis for the work.

All students must take the prescribed work in Physical Education. It is strongly recommended that, before entering College, each student undergo a thorough visual examination and be fitted with glasses, if there is a need for them.

For a general statement in regard to the facilities for physical training at Swarthmore see p. 23.

REQUIREMENTS FOR MEN

Two hours a week of regular prescribed work are required of all men in the first and second year classes.

Intercollegiate contests in various athletic and aquatic sports are conducted by the Athletic Association, but under the oversight of the Athletic Committee and the Director of Physical Education, who may at any time forbid any man entering a contest whose physical condition is not satisfactory.

COURSES FOR MEN

1. Physical Education. Dr. Mercer.

Two hours a week throughout the year (two sections).

This course is required of all first-year men, who may elect from the following during the fall months, opening of college to Thanksgiving recess: Football, lacrosse, cross-country, track and tennis.

Ending of Thanksgiving recess to spring recess: The classes meet in the gymnasium and the work consists of gymnastics and athletics so fitted to the student's life that it will be both beneficial and pleasant.

Ending of spring recess to Commencement, election may be made from the following: Baseball, lacrosse, track, and tennis.

Freshmen will be required to attend one swimming period weekly.

2. Physical Education. Dr. Mercer.

Two hours a week throughout the year (two sections).

This course is required of all second-year men. The plan and nature of the work is similar to Course 1, but more advanced.

3. Physical Education. Dr. Mercer.

Juniors and Seniors, one hour each week (optional).

From Thanksgiving recess to the spring recess, gymnastic exercises and recreative games.

4. Hygiene. Dr. Mercer.

One hour a week from Thanksgiving Recess to Spring Recess.

This course is required of all first-year men. Offered annually.

REQUIREMENTS FOR WOMEN

One hour of exercise each day except Sunday is required of all resident and non-resident women students throughout their college course. Two of these periods of each week must be spent in supervised classwork—field hockey in the fall, classwork and basketball in the gymnasium in the winter, tennis, and track

athletics in the spring. On the other four days of the week some form of outdoor exercise must be taken. This may be tennis, riding, cross-country tramps, or swimming. Exceptions to these requirements are made only for physical disability and at the discretion of the physician in charge, in which case suitable work is prescribed. Exercise in the gymnasium, swimming and all athletic sports are under the personal supervision of the instructor.

First-year students are required to attend a course of lectures in Hygiene, given once a week during the first and second semester.

Application for information in regard to the regulation dress for athletics and gymnastics should be made to the Dean.

COURSES FOR WOMEN

1. First Year Gymnastics. Miss Culin.

Two hours a week from Thanksgiving to the Spring Recess. Offered annually.

Required of first-year students.

Elementary educational gymnastic games, and folk-dancing.

In addition, one hour of swimming a week is required of first-year students.

2. Second Year Gymnastics. Miss Culin.

Two hours a week from Thanksgiving to the Spring Recess. Offered annually.

Required of second-year students.

Educational gymnastics (more advanced than Course 1), gymnastic games, and folk-dancing.

One period a week of swimming is required, in addition.

3. Third Year Gymnastics. Miss Culin.

Two hours a week from Thanksgiving to the Spring Recess. Offered annually.

Required of third-year resident students.

Educational gymnastics (more advanced than Course 2), gymnastic games, and folk-dancing.

One period a week of swimming is required, in addition.

4. Fourth Year Gymnastics. Miss Culin.

Two hours a week from Thanksgiving to the Spring Recess. Offered annually.

Required of fourth-year resident students.

Educational gymnastics (more advanced than Course 3), gymnastic games, and folk-dancing.

5. Advanced Elective Gymnastics. Miss Culin.

One hour a week from Thanksgiving to the Spring Recess. Offered annually.

Open only to members of the class gymnastic squads in addition to the two required hours a week.

Advanced apparatus work, advanced marching, and gymnastic games.

6. Beginners' Elective Gymnastics. Miss Culin.

One hour a week from Thanksgiving to May.

7. Beginners' Elective Dancing. Miss Lanning.

One hour a week from Thanksgiving to May. Offered annually.

Open to all students as an elective in addition to the two required hours a week. Æsthetic dancing and advanced folk dancing.

8. Advanced Elective Dancing. Miss Lanning.

One hour a week from Thanksgiving to May.

Open to students who have an elementary knowledge of dancing.
Æsthetic dancing and advanced folk dancing.

9. Special Corrective Gymnastics. Dr. Mercer and Miss Culin.

Advised for students who need special attention because of poor carriage, slight curvatures, or weak arches.

Daily work on the part of the student in addition to a period once a week with the instructor.

10. Swimming.

Ability to swim is a part of the requirement in Physical Education.

11. Varsity Hockey. Miss Culin.

Three hours each week from September to Thanksgiving.

12. Varsity Basketball. Miss Culin.

Three hours a week from Thanksgiving to Spring Vacation.

STUDENTS, 1919-20

Graduate Students

Name.	Major Subject.	Residence.
Powell, Margaret Elgar,	*Astronomy,*	Lansdowne.
	A.B., Swarthmore College, 1919.	
Frorer, Elizabeth Neumann,	*Mathematics,*	Philadelphia.
	A.B., Swarthmore College, 1919.	

Undergraduate Students

Abell, Walter Halsey,	*English,*	Folsom.
Achard, Marcelle Marie,	*English,*	Lyon, France.
Albertson, Edwin Russell,	*Mech. Engin.,*	Hillsdale, N. J.
Albertson, John Gilbert,	*Mech. Engin.,*	Hillsdale, N. J.
Alexander, Julia Alice,		Swarthmore.
Allen, Augusta,	*Economics,*	Plainfield, N. J.
Anderson, Dorothy Florence,	*English,*	Glenside.
Anderson, Elizabeth Jarrett,		Ardmore.
Anthony, Joseph Garner,	*Chem. Engin.,*	Philadelphia.
Armstrong, Mary Rhoda,	*English,*	Bala.
Arthur, Doris Aylmer,	*Mathematics,*	Rosemont.
Asplundh, Lester,	*Mech. Engin.,*	Bryn Athyn.
Atherholt, Eleanor Roselynd,		Philadelphia.
Atherholt, Elizabeth Middleton,	*Chemistry,*	West Chester.
Atkins, Frank Edward, Jr.,	*Mech. Engin.,*	Merchantville, N. J.
Atkinson, Thomas Howard,	*Elec. Engin.,*	Trenton, N. J.
Aulenback, William Hamilton,	*English,*	Philadelphia.
Ayars, Lewis Sims, Jr.,	*Mech. Engin.,*	Alloway, N. J.
Bailey, Emma Louise,		Charleston, S. C.
Baker, Edwin Scobie,	*Mech. Engin.,*	Sewickley.
Barnard, Julian Wilson,	*Economics,*	Bryn Mawr.
Barr, Constance Eleanor,	*English,*	Kansas City, Mo.
Barrett, Bodine Brinton,	*Chem. Engin.,*	Norwood.
Barth, Elizabeth Fredrikke,	*Biology,*	Buffalo, N. Y.
Bartleson, Edward Evans, 3rd,	*Mech. Engin.,*	Chester.
Baumgartner, Mary Isabel,	*English,*	Philadelphia.
Baxter, Albert Laurence,	*Economics,*	Chester.
Baxter, Harry Raymond,	*Mech. Engin.,*	Chester.
Beatty, Anna Jemina,	*Latin,*	Chester.
Benjamin, Grant Emerson,	*Economics,*	Philadelphia.
Beury, Susannah George,		Philadelphia.
Bew, Walter Thewlis,	*Mech. Engin.,*	Ventnor, N. J.
Bitler, Henry Halliwell, Jr.,	*Chem. Engin.,*	Rutledge.
Bitler, Sara Elizabeth,	*Biology,*	Rutledge.
Blackburn, Dorothy Sellers,	*English,*	Lock Haven.
Blackburn, Jackson Miller,	*Chem. Engin.,*	Philadelphia.
Blair, Francis Caton,		Springfield, Ill.
Blaisdell, William Morse,	*Chemistry,*	State College.
Bliss, Ernest Mason,	*Chem. Engin.,*	Philadelphia.
Bockius, Anne Guisse,	*English,*	West Chester.
Bogardus, James Furnas,	*Pol. Science,*	Swarthmore.
Bond, Jean Elizabeth,		Swarthmore.

Name.	Major Subject.	Residence.
Bonner, Bernice Gordon,		Philadelphia.
Bonsall, Thomas Frederick,	*Economics,*	Glenolden.
Bope, Julia Thurston,	*Mathematics,*	Akron, Ohio.
Boyd, Eleanor Esther,		Ardmore.
Braunworth, Carolyn Genevieve,	*Latin,*	Hopewell, N. J.
Briegel, Katherine Wescott,	*Biology,*	Philadelphia.
Bronk, Detlev Wulf,	*Elect Engin.,*	Stoneham, Mass.
Brosius, William Brinton,	*Economics,*	Avondale.
Brown, Boyd Janney,	*Mathematics,*	Washington, D. C.
Brown, Elsie Palmer,	*French,*	Washington, D. C.
Brown, Paul Evan,	*Chemistry,*	Pendleton, Ind.
Brunenmiller, Juanita Alberta,	*French,*	Swarthmore.
Buckman, Franklin Preston,	*Pol. Science,*	Trenton, N. J.
Bunting, Charlotte Andrews,	*Economics,*	Swarthmore.
Bunting, Stephen Clarence,	*Elect. Engin.,*	Philadelphia.
Burnett, George Leslie,	*Elect. Engin.,*	Philadelphia.
Burris, Elizabeth,		Cincinnati, Ohio.
Bush, Edwin Monroe,	*Mech. Engin.,*	Lebanon, Ind.
Butler, Eleanore A.,	*English,*	Narberth.
Butterworth, Harold Lurcott,	*Economics,*	Cheltenham.
Byrd, Margaret E.,		Philadelphia.
Campbell, Mary A.,	*Economics,*	Hopkinsville, Ky.
Carman, Louise,	*English,*	Washington, D. C.
Carris, Edward Clayton,	*Elect. Engin.,*	Haddonfield, N. J.
Carter, Frances Sarah,		Haddonfield, N. J.
Carter, William Porter,	*Economics,*	Philadelphia.
Casey, George Whitman, Jr.,	*Mathematics,*	Swarthmore.
Chandler, Paul William,	*Economics,*	Kennett Square.
Chase, Henry Sherman, Jr.,	*Economics.*	Elkins Park.
Chesnut, Thomas Frederic,	*Economics,*	Ridley Park.
Chrisman, Charlotte Stevens,	*French,*	West Chester.
Christensen, Alfred,	*Mech. Engin.,*	Philadelphia.
Christie, Lorna Beatrice,	*English,*	NewBrunswick, N.J.
Cisney, William Rufus,	*Economics,*	Richmond Hill, N.Y.
Clancey, James Dawson,	*Chemistry,*	Merchantville, N. J.
Clark, Allen Gray,	*Mech. Engin.,*	Philadelphia.
Clark, Herschel Leroy,	*Economics,*	Jamestown, Ind.
Clark, Janet,	*Biology,*	Media.
Clark, Lena Caroline,	*Mathematics,*	Southwest Harbor, Me.
Clark, Paul LaForge,	*Biology,*	Media.
Clendenning, Dorothy,	*Mathematics,*	Philadelphia.
Clyde, John Edward,	*Mech. Engin.,*	Chester.
Cochrane, James Alexander, Jr.,	*English,*	Chester.
Coleman, Virginia Laws,	*French,*	Swarthmore.
Coles, Charles Benjamin,	*Economics,*	Moorestown, N. J.
Coles, Charlesanna Benajah,	*Chemistry,*	Moorestown, N. J.
Coles, Marguerite,	*History,*	Moorestown, N. J.
Collins, Leon Howard, Jr.,	*Biology,*	Merchantville, N. J.
Conahey, George, Jr.,	*Civil Engin.,*	Port Norris, N. J.
Conrad, William West,		Norristown.
Cook, Sarah Long,	*French,*	Hopkinsville, Ky.
Cooper, David Evans,	*Engineering,*	Marlton, N. J.
Cornell, Richard Janney,	*Elect. Engin.,*	Lawrenceville, N. J
Courtney, George Julian,	*Chem. Engin.,*	Chester.
Cox, Hope,	*Economics,*	Chappaqua, N. Y.
Coy, Cornelia Duntley,		Glencoe, Ill.
Crenshaw, Delma G. Poindexter,	*French,*	Wallingford.

Name.	Major Subject.	Residence.
Crocker, Margaret Ruth,		Sheboygan, Wis.
Cugley, Edith Gihon,	*English,*	Philadelphia.
Daller, George Morton,	*Mathematics,*	Chester.
Darlington, Caroline Shortlidge,	*English,*	Darling.
Darlington, Hannah Mary,	*English,*	Pocopson.
Darlington, Richard Arment,	*Chemistry,*	Chadd's Ford Jct.
Davenport, LaMar Hay,	*Biology,*	DuBois.
Davies, Edna May,	*English,*	Philadelphia.
Deakyne, Elwood Staats,	*Civil Engin.,*	Ridley Park.
Dell, Jeannette,	*English,*	Woodbury, N. J.
Dennison, David Mathias,	*Mathematics,*	Swarthmore.
Deputy, Marion Estelle,	*English,*	Glenolden.
Dewees, Clara Knerr,	*Mathematics,*	Birchrunville.
Dickinson, Walter Carroll,	*Mech. Engin.,*	Montclair, N. J.
Dickson, Pemberton Morris,	*Economics,*	Philadelphia.
Diggins, George Joseph, Jr.,	*Elect. Engin.,*	Chester.
Donovan, Mary Natalie,	*History,*	Wilmington, Del.
Dotterer, Mary,	*Latin,*	Wayne.
Downing, William Kirk,	*Economics,*	Locust Valley, N. Y.
Doyle, John,	*Greek,*	Philadelphia.
Drew, Marguerite Pendleton,	*English,*	Maplewood, N. J.
Dudley, Frank Sidebotham,	*Economics,*	Philadelphia.
Dudley, John Woolman,	*Chemistry,*	Washington, D. C.
Dungan, Emily Louise,		Fort Washington.
Dunning, Irma Lucille,	*Education and Psychology,*	Indianola, Iowa.
Eagan, Thomas Leggett,	*Mech. Engin.,*	Washington, D. C.
Earnshaw, George Livingston,	*Mech. Engin.,*	Upper Montclair, N. J.
Earp, John Evanson,	*Elect. Engin.,*	New Castle, Del.
Eavenson, Hannah Tomlinson,	*Biology,*	Masonville, N. J.
Elsbree, Wayland Hoyt,	*Pol. Science,*	Preston Hollow, N.Y.
Elsbree, Willard Slingerland,	*Pol. Science,*	Preston Hollow, N.Y.
Embery, Margaret Wilson,	*Pol. Science,*	Philadelphia.
Enslin, Louis Robert,	*Economics,*	Philadelphia.
Esrey, Alexander Johnson,	*Economics,*	Llanerch.
Evans, Edith Anna,	*French,*	Indianapolis, Ind.
Evans, Henry Turner,	*Mech. Engin.,*	Manhasset, N. Y.
Evans, Virginia Haynes,	*English,*	Miami, Fla.
Eyre, George Washington, Jr.,	*Engineering,*	Swarthmore.
Falck, Ella Hansell,	*Mathematics,*	Philadelphia.
Farquharson, Evalyn Frances,	*French,*	Media.
Fell, Marjorie Lawrence,	*English,*	Philadelphia.
Ferris, Walton Canby,	*Pol. Science,*	Milwaukee, Wis.
Fetter, Frank Whitson,	*Pol. Science,*	Princeton, N. J.
Firmin, Louise Goldsborough,	*Mathematics,*	Glenside.
Fisher, Elizabeth Agnes,	*Biology,*	Glen Ridge, N. J.
Fletcher, Vera Shearer,	*Latin,*	Bedford.
Francis, Tench,	*Economics,*	Pelham, N. Y.
Fussell, Isabelle Shaw,		Philadelphia.
Gardner, Andrew Arthur,	*English,*	Paterson, N. J.
Gardiner, Arthur Wilfred,	*Civil Engin.,*	West Chester.
Garrett, Marion Baker,	*English,*	Philadelphia.
Gault, Anne Mary,	*Mathematics,*	Philadelphia.
Gaumer, Samuel Brecht,	*Pol. Science,*	Lansdale.
Gawthrop, Helen,	*French,*	Wilmington, Del.
Geiges, Carl Joseph,	*Economics,*	Camden, N. J.
Gephart, Tom M. Jr.,	*Elect. Engin.,*	Bedford.

Name.	Major Subject.	Residence.
Gibbs, Grace Carol,	*English,*	New York, N. Y.
Gillam, Clifford Riggs,	*Mech. Engin.,*	Langhorne.
Gillespie, Edward Armstrong,	*Mech. Engin.,*	Swarthmore.
Gillespie, Frances Elizabeth,		Swarthmore.
Girdwood, Eugene Nelson.	*Economics,*	Swarthmore.
Gourley, Grace Edel,	*Mathematics,*	Melrose Park.
Green, Eleanor Wickersham,	*Biology,*	Philadelphia.
Griffen, Charlotte Hand,	*Chemistry,*	Brooklyn, N. Y.
Grim, Mildred Elizabeth,	*English,*	Perkasie.
Griscom, Elizabeth Bradway,	*Biology,*	Salem, N. J.
Griscom, Helen Lydia,	*Biology,*	Salem, N. J.
Grobert, Norman Bird,	*Chemistry,*	East Orange, N. J.
Groff, Benjamin Engle,	*Chem. Engin.,*	Elizabethtown.
Gundlack, Alfred Baynard,	*Economics,*	Philadelphia.
Haines, Dorothy Frances,	*French,*	Swarthmore.
Haldeman, Anna Elizabeth,	*English,*	Malvern.
Haldeman, Charles Waldo,	*Economics,*	Malvern.
Hallauer, Emily Elizabeth,	*Biology,*	Philadelphia.
Hammond, Dorothy McClellan,	*English,*	West Chester.
Hammond, Gladys Bower,	*English,*	Boonton, N. J.
Hampson, Ormsby Duvall,	*Chem. Engin.,*	Govans, Md.
Hankins, Ned Sherry,	*Pol. Science,*	Millville, N. J.
Harper, John Clarke, Jr.,	*Civil Engin.,*	Swarthmore.
Harrington, Avery Draper, Jr.,	*Biology,*	Philadelphia.
Harris, George Thompson,	*Mech. Engin.,*	Chester Heights.
Hartwell, Ralf Lee,	*Chemistry,*	Burlington, Vt.
Harvey, William Minton,	*Chemistry,*	Chester.
Hastings, Lanta Corrine,	*Mech. Engin.,*	Danville, Ill.
Hayes, Ellen Russell,	*English,*	West Chester.
Hayes, Katharine Russell,		Swarthmore.
Hayes, Margaret Laurie,		West Chester.
Hayes, William Waldo,	*Chem. Engin.,*	West Chester.
Hays, Doris Maria,	*English,*	West Chester.
Headings, Donald Moore,	*Biology,*	McAlisterville.
Heck, Joshua Holland,	*Elect. Engin.,*	West Chester.
Heafford, Anne Frances,		Philadelphia.
Henderson, Leon,	*Economics,*	Millville, N. J.
Hess, Paul Mitchell,	*Elect. Engin.,*	Dallastown.
Hettinger, Bertha Campf,		Bridgeton, N. J.
Hewett, William Wallace,	*Economics,*	Philadelphia.
Hexamer, Hildegarde Marie,	*History,*	Philadelphia.
Hinds, Ethel,	*English,*	Washington, D. C.
Hinebaugh, Mahlon Carleton,	*Biology,*	Oakland, Md.
Hoagland, Alice Rebecca,		Woodbridge, N. J.
Hoff, Henry Boyer,	*Biology,*	Lykens.
Hoke, Frank,	*Mech. Engin.,*	Indianpolis, Ind.
Hoke, Mary,	*French,*	Indianapolis, Ind.
Holden, J. Minshall,	*Civil Engin.,*	Chester.
Hollingsworth, Howard John,	*Economics,*	Marshallton, Del.
Holman, Frank Hazen, Jr.,	*Mech. Engin.,*	Swarthmore.
Hoot, Henry Irvin,	*Mech. Engin.,*	Philadelphia.
Horner, Helen Elizabeth,	*English,*	Moorestown, N. J.
Horowitz, Morris Herman,	*Chemistry,*	East Orange, N. J.
Howarth, Helen Ethel,	*Mathematics,*	Philadelphia.
Howell, Henry Manly,	*Chem. Engin.,*	Millville, N. J.
Hoyt, Ella Roberts,	*French,*	Camden, N. J.
Huey, William Ronald,	*Chemistry,*	Kennett Square.
Huff, Louise Buhler,		New York, N. Y.

Name.	Major Subject.	Residence.
Humphreys, Collwyn Kennedy,	*Economics,*	Narberth.
Hutchinson, Halbert Conrow,	*Elect. Engin.,*	Plainfield, N. J.
Hutchinson, Herbert Lucius,		Reading.
Irwin, William Yates, Jr.,	*Chem. Engin.,*	Norwood.
Jackson, Frank Hand,	*Economics,*	Philadelphia.
Jackson, George Bement,	*Chem. Engin.,*	Brooklyn. N. Y.
Jacobs, Isabel Sutton,	*Pub. Speaking,*	Philadelphia.
Jenkins, Howard Malcolm,	*Elect. Engin.,*	Swarthmore.
Jenkins, Miriam Atkinson,	*English,*	Swarthmore.
Jenkins, Wilmer Atkinson,	*Mathematics,*	Chicago, Ill.
Johnson, Ann Elizabeth,		Bridgeton, N. J.
Johnson, Charles Irwin,	*Chem. Engin.,*	Swarthmore.
Johnston, Emily Fawcett,	*French,*	Lansdowne.
Johnston, Howard Leroy,	*Chem. Engin.,*	Coatesville.
Jones, Elizabeth Catherine,	*Biology,*	Ebensburg.
Jones, Elizabeth Gest,	*English.*	Pottstown.
Jones, Florence Alline,	*French,*	Conshohocken.
Joseph, Edwin Morris,	*Pol. Science,*	Cleveland, Ohio.
Joyce, William West,	*Chemistry,*	Swarthmore.
Judd, Preston Henry,	*Latin,*	Elkland.
Judge, Mary Eleanor,	*French,*	Mansfield.
Kaplan, Ethel Johanna,	*Pol. Science,*	Philadelphia.
Kaplan, Gabriel Louis,	*Chemistry,*	East Orange, N. J.
Katzenbach, Howard Bleasdale,	*Mech. Engin.,*	Philadelphia.
Keene, Edith Eleanor.	*History,*	Lansdowne.
Keighton, Walter Barker, Jr.,	*Chem. Engin.,*	Swarthmore.
Keller, Henrietta Ida,	*English,*	Philadelphia.
Kemp, William Powell,	*Pol. Science,*	Easton, Md.
Kinsley, Dorothy Armstrong,	*English,*	Philadelphia.
Kinsman, Richard Louis,	*Chemistry,*	Philadelphia.
Kistler, Clarence Philip,	*Biology,*	Nanticoke.
Kistler, Marjorie Estelle,	*Biology,*	Wilkes-Barre.
Klauder, David Streeper, Jr.,	*Chemistry,*	Philadelphia.
Klein, John Norman,	*Pol. Science,*	Reading.
Klopp, John William,	*Biology,*	Philadelphia.
Knabe, Elizabeth,	*Chemistry,*	Philadelphia.
Knapp, Gertrude Paula,		Palmyra, N. J.
Knight, Helen Cooper,	*French,*	Philadelphia.
Knowles, Jean Bertram,	*Chemistry,*	Flushing, N. Y.
Kolb, George Henry,	*Mech. Engin.,*	Philadelphia.
Kreemer, Sarah Elizabeth,	*French,*	West Chester.
Landis, Harry Hartman, Jr.,	*Economics,*	East Petersburg.
Landis, William Newton,	*Engineering,*	Swarthmore.
Landon, Frederick Norton,	*Mech. Engin.,*	Toronto, Canada.
Lanning, Elizabeth Frederica,		Merchantville, N. J.
Larimore, Bettie Carlisle,		Washington, D. C.
Larkin, Charles Plummer, Jr.,	*Economics,*	Chester.
Latshaw, Christine Langham,	*Latin,*	Royersford.
Lemke. Frank Henry,	*Civil Engin.,*	Chester.
Lewis, Lawrence Bosler,	*Civil Engin.,*	Ogontz.
Lewis, William Sproul,	*Economics,*	Chester.
Limberger, William Atherton,	*Biology,*	West Chester.
Linton, Wallace Ross,	*Mech. Engin.,*	Philadelphia.
Lippincott, Lucy,	*Economics,*	Riverton, N. J.
Lippincott, Martha Pancoast.		Salem, N. J.
Long, Frank Clark,	*Mech. Engin.,*	Lewistown.
Longstreth, John Clampitt,	*Mech. Engin.,*	Philadelphia.
Lottridge, Dorothy,	*Biology,*	East Orange, N. J.

Name.	Major Subject.	Residence.
LOVE, EMMA ELEANOR,		Lansdowne.
LOWDEN, WILLIAM PETER,	*Chem. Engin.*,	Paulsboro, N. J.
LUKENS, ARTHUR THACHER,	*Elect. Engin.*,	Plymouth Meeting.
LUKENS, CHARLES WILDEY,	*Civil Engin.*,	Moore.
MCALLISTER, TOWNSEND SHERMAN,	*Elect. Engin.*,	Denver, Colo.
MCCABE, GERTRUDE,	*English*,	Selbyville, Del.
MCCAIN, JOHN RAYMOND,	*Economics*,	Chester.
MCCALL, MARY ANN TODD,	*English*,	Wilmington, Del.
MCCLELLAN, BESS,	*French*,	Arden, N. Y.
MCCLINTOCK, MARGARET,	*English*,	Media.
MCCONNELL, SAMUEL HAROLD,	*Mech. Engin.*,	Honey Brook.
MCCULLOUGH, CAMPBELL ROGERS,	*Chemistry*,	East Orange, N. J.
MCEVOY, LAWRENCE JOSEPH,	*Economics*,	Philadelphia.
MCGINLEY, EDWARD FRANCIS, JR.,	*Civil Engin.*,	Chester.
MCMULLEN, MARY BLANCHE,	*English*,	West Chester.
MCNEEL, LETITIA TYLER,	*English*,	Birmingham, Ala.
MACARTNEY, HELEN VODGES,	*Latin*,	Philadelphia.
MACHEMER, FRANK KRICK,	*Elect. Engin.*,	Royersford.
MALZ, GERTRUDE,	*Latin*,	Williamson School.
MAMMEL, ALBERT CONARD,	*Elect. Engin.*,	North Wales.
MANLEY, BARBARA,	*Chemistry*,	Philadelphia.
MARTIN, HELEN MOORE,	*English*,	West Chester.
MAYHEW, SARA JANE,	*History*,	Bridgeton, N. J.
MEANS, ETHEL GIBBONS,	*Latin*,	Swarthmore.
MEARS, CHARLES SINGLETON,	*Chemistry*,	Philadelphia.
MEIGS, IDA ELIZABETH,	*Economics*,	Forest Hills Gardens, N. Y.
MERION, HOWARD DAVIS,	*Chemistry*,	Ward.
MILLER, ELIZABETH ROBERTS,	*English*,	Newtown.
MILLER, FRANCES KATHARINE,	*History*,	Philadelphia.
MOORE, CHARLOTTE EMMA,	*Mathematics*,	Coatesville.
MOORE, EDYTHE ESTELLE,	*Biology*,	Riverton, N. J.
MOORE, GRACE EDNA,	*English*,	Philadelphia.
MOORE, HAROLD EARL,	*Chem. Engin.*,	Elizabeth, N. J.
MOORE, JESSE ROGER,	*Chem. Engin.*,	West Chester.
MOORHEAD, JOSEPHINE LAWYER,	*French*,	Rutledge.
MORGAN, DONALD SWAIN,	*Mech. Engin.*,	Knightstown, Ind.
MORSE, CARLISLE,	*Mathematics*,	Princeton, Ky.
MOYLAN, WILLIAM STAUNTON,	*Mech. Engin.*,	Swarthmore.
MULLIN, LOUIS ELY,	*Mech. Engin.*,	Maple Glen.
MUNCE, JAMES GORDON,	*Pol. Science*,	Media.
MUSANTE, AUGUSTINE F. S.,	*Chem. Engin.*,	West Chester.
MYERS, CHARLES LOUIS REED, JR.,	*Biology*,	Moore.
MYRICK, GEORGE, JR.,	*Mech. Engin.*,	Philadelphia.
NAGLE, ALICE MOWRER,		Philadelphia.
NAGLE, MARY,	*English*,	Philadelphia.
NASSAU, DOROTHY PATTEN,		Philadelphia.
NEVYAS, JESSE,	*Economics*,	West Chester.
NEWTON, EDNA RUTH,	*Mathematics*,	Wawa.
NEWTON, MABEL GLADYS,	*English*,	Lake Ronkonkoma, N. Y.
NICHOLLS, WILLIAM,	*Chemistry*,	Bryn Mawr.
NOFER, FERDINAND LESLIE,	*Chemistry*,	Philadelphia.
OGDEN, SAMUEL ROBINSON, JR.,	*English*,	Elizabeth, N. J.
OGDEN, WARREN HARVEY,	*Chemistry*,	Boothwyn.
ONDERDONK, MARJORIE,	*Chemistry*,	Brooklyn, N. Y.
OSLER, HELEN COWPERTHWAITE,	*Latin*,	Merchantville, N. J.
PAGELOW, PAULA,	*English*,	Media.

Name.	Major Subject.	Residence.
PALMER, ELIZABETH COMLY,	*Mathematics,*	Primos.
PALMER, ELSA,	*Elect. Engin.,*	Fanwood, N. J.
PALMER, MARY DARLINGTON,	*Latin,*	Lansdowne.
PARK, PUM KOO,	*Biology,*	Wahiawa,Oahu,T.H.
PARROTT, HELEN,		Philadelphia.
PAXSON, ELEANOR MARY,	*Biology,*	Swarthmore.
PAXSON, MARY DOROTHY,	*Latin,*	Parkesburg.
PAXSON, WILLIAM HALL,	*Chem. Engin.,*	Swarthmore.
PEARSON, LEON MORRIS,	*English,*	Swarthmore.
PELL. GLADYS SEAMAN,	*Economics,*	Saddle River, N. J.
PENNOCK, MARGARET,	*Economics,*	Chatham.
PENROSE, LUCY MARIE,	*Pol. Science,*	Philadelphia.
PERKINS, LILLIAN WHITE BACKES,	*Mech. Engin.,*	Langhorne.
PFLAUM, KATHRYN,	*Chemistry,*	Philadelphia.
PLACE, GEORGE WILLIAM,	*Mech. Engin.,*	Swarthmore.
POLLARD, ROBERT SPOTSWOOD,	*Mech. Engin.,*	Swarthmore.
PORTER, HELEN,	*History,*	Worcester, Mass.
POSTLETHWAITE, CLARENCE GAYTON,	*Chem. Engin.,*	New Rochelle, N. Y.
POWELL, GEORGE ALFRED,	*Mech. Engin.,*	Glen Head, N. Y.
POWELL, JOSEPH HARLAN,	*Mech. Engin.,*	Downingtown.
POWELL, WILLIAM,		Philadelphia.
POWNALL, RUTH ELIZABETH,	*History,*	Swarthmore.
POWNALL, WILLIAM JOSEPH,	*Elect. Engin.,*	Coatesville.
PRATT, JOHN MALCOLM,	*Chem. Engin.,*	West Chester.
PRESTON, ALBERT WELDING, JR.,	*Civil Engin.,*	Swarthmore.
PUGH, JOSEPH JANVIER,	*Mathematics,*	Lansdowne.
PUSEY, WALTER CARROLL, JR.,	*Chem. Engin.,*	Philadelphia.
RAINIER, LUCY AYRES,	*French,*	Cedarville, N. J.
RAMSEY, HELEN ALEXANDER,	*French,*	Swarthmore.
RAUH, EDGAR MEYER,		Cleveland, Ohio.
REDFIELD, HORACE,	*Chem. Engin.,*	Center Bridge.
REMS, IRENE ELIZABETH,	*German,*	Philadelphia.
RENSHAW, HARRIET HALE,	*English,*	Philadelphia.
RENTSCHLER, HENRY DEIHL,	*Biology,*	Ringtown.
REYNOLDS, GREGG DAVID,	*Economics,*	West Chester.
RHOADS, CATHARINE OTT,	*History,*	Lansdowne.
RICHARDSON, ELIZABETH HOPE,	*Pol. Science,*	Philadelphia.
RICHMOND, FLORENCE DUNLAP,	*History,*	Philadelphia.
RIGBY, HELEN MAE,		Media.
RILEY, AILEEN,	*Latin,*	Indianapolis, Ind.
RITCHIE, CHARLES ARCHIBALD, JR.,	*Biology,*	Wilmington, Del.
RITTER, ANDREW BICKLEY,	*Chem. Engin.,*	Philadelphia.
ROBERTS, ANNA SATTERTHWAITE,		Wallingford.
ROBERTS, MARY THOMAS,	*English,*	Swarthmore.
RODENBOH, RUTH PRATT,	*English,*	West Chester.
ROGERS, ALBAN EAVENSON,	*Elect. Engin.,*	Asheville, N. C.
ROSE, DAVID,	*Chem. Engin.,*	Chester.
ROWLEY, JOSEPH DANIEL,	*Elect. Engin.,*	Chincoteaque, Va.
RUCKMAN, JOHN FELL,		Lahaska.
RUMBLE, WALTER SCOTT,	*Mech. Engin.,*	Rutledge.
RUSSELL, CHARLES REGNIER,	*Mech. Engin.,*	Arden, Del.
RYAN, LOIS,	*Latin,*	Forest Grove.
SAMUEL, HELEN ETHEL,	*English,*	South Orange, N. J.
SATTERTHWAITE, MARIAN WILLIS,		Trenton, N. J.
SATTERTHWAITE, RUTH,	*English,*	South Langhorne.
SAWYER, THEODORE KREMER,	*Mech. Engin.,*	Swarthmore.
SCHELLINGER, ELIZABETH NORBURY,	*Latin,*	Green Creek, N. J.
SCHELLINGER, MARY NORBURY,	*Latin,*	Green Creek, N. J.

Name.	Major Subject.	Residence.
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SCHULZ, WALTER ANDREW,	*Elect. Engin.*,	Elberfeld, Ind.
SCOTT, ELIZABETH KATHARINE,		Philadelphia.
SEABER, EMILY LOUISE,		Wellesley, Mass.
SELLERS, ELIZABETH TAYLOR,	*English*,	Swarthmore.
SELLERS, HARRY MCKINLEY.	*Chem. Engin.*,	Pottsville.
SHANNON, ANNA ELIZABETH,	*French*,	Norfolk, Va.
SHARPLES, RENA SPRAGUE,	*English*,	West Chester.
SHARPLESS, PAUL,	*Chem. Engin.*,	Westbury, N. Y.
SHAW, HOWARD KNOTT,	*Mech. Engin.*,	Trenton, N. J.
SHAW, THOMAS WILLARD,	*Chem. Engin.*,	Trenton, N. J.
SHEETZ, RACHAEL MAE,	*English*,	Hagerstown, Md.
SHELMERDINE, EDWARD KIRKLAND, 3RD,	*Mech. Engin.*,	Swarthmore.
SHEPPARD, EDITH HARRIET,		Charlotte, N. C.
SHIBE, JANE ELIZABETH,	*Biology*,	Philadelphia.
SHINN, ELEANOR ANNA,	*Chemistry*,	Swarthmore.
SHORT, MARY VALLIANT,	*English*,	Seaford, Del.
SHORT, THOMAS ALBERT, JR.,	*Mech. Engin.*,	Swarthmore.
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SMITH, EDWARD RICHARD,	*Civil Engin.*,	Glen Cove, N. Y.
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SMITH, GORDON,	*Mech. Engin.*,	Philadelphia.
SMITH, HENRIETTA ALBERT,	*English*,	Swarthmore.
SMITH, JOHN COLBOURNE,	*Chem. Engin.*,	Chester.
SMITH, JAMES ELLISTON,	*Civil Engin.*,	Media.
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SPEAKMAN, CHARLOTTE PRICE,	*English*,	Mt. Vernon, N. Y.
STABLER, CHARLES NORMAN,	*Pol. Science*,	Swarthmore.
STABLER, CORNELIA MILLER,	*Pub. Speaking*,	Swarthmore.
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STAINTON, JOHN LEECH,	*Economics*,	Chester.
STETTLER, MARIE JULIA,	*Latin*,	Slatington.
STEWART, GEORGE WOODBRIDGE,	*Economics*,	Ozone Park, N. Y.
STILES, ARTHUR LIPPINCOTT,	*Elect. Engin.*,	Moorestown, N. J.
STOUT, MILDRED CARMANY,	*History*,	Philadelphia.
STOW, WILLIAM HINCHMAN, JR.,	*Mathematics*,	Camden, N. J.
STRAWN, CLAIRE KATHLEEN,	*Mathematics*,	Bethlehem.
STRAWN, EVELYN MARTHA,	*Mathematics*,	Bethlehem.
STRONG, EMILY BOORMAN,	*Chem. Engin.*,	Hillburn, N. Y.
SUTCH, IONA GENEVIEVE,	*French*,	Philadelphia.
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TAYLOR, THELMA MARGUERITE,	*History*,	Jenkintown.
TAYLOR, WILLIAM THOMSON,	*Mech. Engin.*,	Ogontz.
THOENEN, EARL RUSSELL,	*Chem. Engin.*,	Sisterville, W. Va.
THOMPSON, RUTH MARTHA,	*French*,	Kennett Square.
THORNE, HELEN MARIA,	*English*,	Moorestown, N. J.
TOMLINSON, DOROTHY,		Swarthmore.
TOURNY, EMMA ELOISE,	*English*,	Camden, N. J.

Name.	Major Subject.	Residence.
TOWNSEND, ERIC BERESFORD,	*Chemistry,*	Baltimore, Md.
TURNER, HENRIETTA JACKSON,		Belvidere, N. J.
TURNER, HENRY CHANDLEE, JR.,	*Civil Engin.,*	Brooklyn, N. Y.
TWINING, FLORENCE WOOD,	*English,*	Ivyland.
TYLER, MARY ELIZABETH,	*Mathematics,*	Philadelphia.
TYSON, JOSEPHINE ELIZABETH,	*Latin,*	Philadelphia.
UNDERWOOD, JOHN HARVEY,	*Civil Engin.,*	Indianapolis, Ind.
VALENTINE, ALAN C.,	*Economics,*	Glen Cove, N. Y.
VARIAN, DOROTHY REID,	*Biology,*	Bridgeport.
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WARE, WILLIAM PETTIT,	*Mathematics,*	Salem, N. J.
WAPLES, JAMES EDWARD,	*Chemistry,*	Hammonton, N. J.
WARNER, MARION SHOEMAKER,	*Psychology and Education,*	Horsham.
WARNER, SILAS MARION,	*Pol. Science,*	Warsaw, Ind.
WASHBURN, CHARLOTTE GRAVES,	*French,*	Washington, D. C.
WASHBURN, RUTH MEKEEL,	*English,*	Chappaqua, N. Y.
WATSON, DOROTHY MOORE,	*English,*	Philadelphia.
WATTERS, RUTH,	*Biology,*	Swarthmore.
WEBB, SAMUEL BENTLEY,	*Elect. Engin.,*	Philadelphia.
WEBER. ELEANOR,	*Biology,*	Norristown.
WEIDLER, JAY BENOIR,	*Mech. Engin.,*	Philadelphia.
WEIHENMAYER, WINNIE MILLER,	*Biology,*	Philadelphia.
WEISS, LENA AMELIA,	*Pol. Science,*	Newton Falls, Ohio.
WELLINGTON, FRANCES,	*History,*	Roland Park, Md.
WEST, GEORGE MALCOLM,	*Mech. Engin.,*	Sayre.
WETZEL, HARRIET ELIZABETH,	*French,*	Trenton, N. J.
WHITE, CAROLIEN HAYES,	*English,*	Atlantic City, N. J.
WHITE, CHARLES MCCREA,	*Civil Engin.,*	Wilmington, Del.
WHITE, EMILIE HINDS,	*Chemistry,*	Plainfield, N. J.
WHITE, RUSSELL,	*Elect. Engin.,*	Philadelphia.
WHITESIDE, BEATRICE,	*French,*	Philadelphia.
WIESE, JOSEPH FREDERIC,	*Economics,*	Parkesburg.
WILDMAN, FLORENCE MARSHALL,	*English,*	Langhorne.
WILLIAMS, ANNE SHOURDS,	*History,*	Bridgeton, N. J.
WILLIAMS, MORRISA WALN,	*French,*	Glenolden.
WILLIARD, MILDRED ESTELLE,	*English,*	Philadelphia.
WILLIS, ALLEN PRESCOTT,	*Engineering,*	Rosslyn, Va.
WILLS, FRANCES DOROTHY,	*English,*	Wilkinsburg,
WILSON, GRACE TAYLOR,	*Latin,*	Lansdowne.
WILSON, HELEN GOULD,	*French,*	Lansdowne.
WILSON, RALPH ERDMAN,	*Economics,*	Leesburg, N. J.
WOODROW, ALINE MATHIESON,	*Latin,*	Ridgewood, N. J.
WOODWARD, RUTH HARRIET,	*Biology,*	Mendenhall.
YARNALL, META DOUGLASS,	*English,*	Yeadon.
YARNALL, RUSSELL ATLEE,	*Economics,*	Swarthmore.
YODER, CLARENCE HOWARD,	*Pol. Science,*	Kutztown.
YOUNG, ALFRED JAMES,	*Economics,*	Philadelphia.
YOUNG, JANET GRAHAM,	*French,*	Philadelphia.
YOUNG, WILLIAM CARLETON,	*Mech. Engin.,*	Atglen.
ZARTMAN, JOSEPHINE DEAN,	*English,*	Philadelphia.

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1893-94.

THOMAS ATKINSON JENKINS, A.B., 1887; Ph.B., University of Pennsylvania, 1888; Ph.D., Johns Hopkins University, 1894; Professor of French Philology, University of Chicago.

BENJAMIN FRANKLIN BATTIN, A.B., 1892; studied in Berlin; Ph.D., Jena 1900.

1894-95.

DAVID BARKER RUSHMORE, B.S., 1894; M.E., Cornell University, 1895; C.E., Swarthmore, 1897. Engineer, General Electric Co., Schenectady, N. Y.

1895-96.

HOWARD WHITE, JR., B.S., 1895; M.S., University of Michigan, 1896; C.E., Swarthmore, 1900. Deceased.

1896-97; 1897-98.

JOHN W. GREGG, B.L., 1894; A.M., Cornell University, 1898; LL.B., George Washington University, 1906. Lawyer.

1898-99.

ELLWOOD COMLY PARRY, B.L., 1897; studied in Berlin; M.L., Swarthmore, 1900; Ph.D., University of Pennsylvania, 1903. Professor of German, Central High School, Philadelphia.

1899-1900; 1900-01.

JOHN EDWIN WELLS, B.L., 1896; M.L., 1899; A.M., Columbia, 1900; Ph.D., Yale University, 1915. Head of the Department of English, Connecticut College for Women.

1901-02.

MARY GRAY LEIPER, B.L., 1899; studied in Berlin.

1902-03.

BIRD THOMAS BALDWIN, B.S., 1900; A.M., Harvard University, 1903; Ph.D., *Ibid.*, 1905. Major in Sanitary Corps, U. S. Army. Director Child Welfare Research University of Iowa, Iowa City, Iowa.

1903-04.

ALBERT COOK MYERS, B.L., 1898; M.L., 1901; studied in Universities of Wisconsin and Harvard. Historical Writer.

1904-05.

MARION VIRGINIA (PEIRCE) FRANK, A.B., Swarthmore, 1903; A.M., University of Chicago, 1904; studied in Ecole des Hautes Etudes, Sorbonne, and Collége de France in Paris, and in the Libraries of Madrid. Teacher.

1905-06.

LEWIS FUSSELL, B.S., 1902; M.S., 1903; E.E. and Ph.D., University of Wisconsin, 1907. Assistant Professor of Electrical Engineering, Swarthmore College.

1906-07.

LOUIS NEWTON ROBINSON, A.B., 1905; Ph.D., Cornell University, 1911; studied in University of Halle and Berlin, 1906-07; Fellow in Cornell University, 1907-08. Probation officer, Municipal Court of Philadelphia.

1907-08.

SAMUEL COPELAND PALMER, A.B., 1895; A.M., 1907; A.M., Harvard University, 1909; Ph.D., *Ibid*, 1912. Assistant Professor of Biology, Swarthmore College.

1908-09.

MARY ELIZA (NORTH) CHENOWETH, A.B., 1907; A.M., 1910; studied in Oxford University, England.

1909-10.

MARY TALBOTT (JANNEY) COXE, A.B., 1906; studied in University of Berlin, Germany.

1910-11.

SAMUEL COPELAND PALMER, A.B., 1895; A.M., 1907; A.M., Harvard University, 1909; Ph.D., *Ibid.*, 1912. Assistant Professor of Biology, Swarthmore College.

1911-12.

JOHN HIMES PITMAN, A.B., 1910; A.M., 1911; studied in University of California. Assistant Professor of Mathematics and Astronomy, Swarthmore College.

1912-13.

IOLA KAY EASTBURN, B.L., 1897; A.M., 1906; Ph.D., University of Pennsylvania, 1913; Professor of German, Wheaton College, Norton, Mass.

1913-14.

EDWIN ANGELL COTTRELL, A.B., 1907; A.M., Harvard University, 1913. Professor of Political Science Leland Stanford Junior University.

1914-15.

FREDERICK MYERLE SIMONS, JR., A.B., 1909; A.M., 1912; studied in the University of Chicago. Industrial Engineer, Arthur Andersea & Co.

1915-16.

FRANK H. GRIFFIN, B.S., 1910; A.M., Columbia University, 1916; studied in Columbia University. Chemist.

1916-17.

RAYMOND T. BYE, A.B., 1914; A.M., Harvard University, 1915; Ph.D., University of Pennsylvania, 1918. Instructor of Economics, University of Pennsylvania.

1917-18.

CHARLES J. DARLINGTON, A.B., 1915; A.M., 1916. Chemist with DuPont's.

1918-19.

JOHN E. ORCHARD, A.B., 1916; student, Harvard University.

1919-20.

PAUL FLEMING GEMMILL, A.B., 1917; student, University of Pennsylvania.

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1895-96.

HELEN BRIGHT (SMITH) BRINTON, A.B., 1895; studied in Oxford University; A.M., Swarthmore, 1899.

1896-97.

MARY STONE MCDOWELL, A.B., 1896; studied in Oxford University; A.M., Columbia University, 1903.

1897-98.

SARAH (BANCROFT) CLARK, B.S., 1897; studied in Newnham College, Cambridge.

1898-99.

EDNA HARRIET RICHARDS, B.L., 1898; studied in Berlin; A.M., Columbia University, 1904. Acting Dean of Women, Swarthmore College.

1899-1900.

MARY ELIZABETH SEAMAN, A.B., 1899; studied in Newnham College, Cambridge. Teacher.

1900-01.

ANNA GILLINGHAM, A.B., 1900; A.B., Radcliffe, 1901; A.M., Columbia University, 1910. Teacher in Ethical Culture School, New York, N. Y.

1901-02.

LILLIAN WINIFRED (ROGERS) ILLMER, A.B., 1901; studied in Berlin.

1902-03.

MARGARET HOOD TAYLOR, B.L., 1902; studied in Berlin.

1903-04.

ANNIE ROSS, A.B., 1903; Ph.M., University of Chicago, 1904. Teacher of French, High School, Flushing, L. I., N. Y.

1904-05.

CHARLOTTE RITZEMA BOGERT, A.B., 1904; A.M., Columbia University, 1905.

1905-06.

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1906-07.

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1907-08.

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1908-09.

ELIZA SIKES JAMES, A.B., 1908; studied in University of Berlin, Germany; A.M., University of Pennsylvania, 1911; Ph.D., University of Pennsylvania, 1914. Teacher of Latin and German, William Penn High School, Philadelphia, Pa.

1909-10.

HELEN HARRIET PORTERFIELD, A.B., 1909; studied in University of Chicago.

1910-11.

JEAN HAMILTON (WALKER) CREIGHTON, A.B., 1910; studied in University of Chicago.

1911-12.

ANNA HEYDT, A.B., 1911; A.M., Radcliffe College, 1912. Teacher in Palmerton, Pa., High School.

1912-13.

CAROLINE HALLOWELL (SMEDLEY) COLBURN, A.B., 1912; A.M., 1918; studied in University of California.

1913-14.

ESTHER MIDLER, A.B., 1913; studied in University of Berlin, Germany.

1914-15.

MARIE SAFFORD (BENDER) DARLINGTON, A.B., 1914; A.M., University of Chicago, 1916.

1915-16.

REBA MAHAN CAMP, A.B., 1915; A.M., Radcliffe College, 1916. Teacher of Mathematics, High School, Norristown, Pa.

1916-17.

ANNA M. MICHENER, A.B., 1916; A.M., Columbia University, 1917. Membership Secretary, Academy of Political Science.

1917-18.

HILDA A. LANG, A.B., 1917; studied in University of Wisconsin.

1918-19.

EDITH W. MENDENHALL, A.B., 1918; A.M., Columbia University, 1919. Teacher, Bryn Mawr School, Baltimore, Md.

1919-20.

GLADYS AMANDA REICHARD, A.B., 1919; student, Columbia University.

HOLDERS OF THE JOHN LOCKWOOD MEMORIAL FELLOWSHIP

1910-11.

EDWIN CARLETON MACDOWELL, A.B., 1909; studied in Harvard University; M.S., Harvard University, 1911; Ph.D., *Ibid.*, 1912. Investigator, Cold Spring Harbor.

1911-12.

HENRY FERRIS PRICE, A.B. ,1906; studied in University of Pennsylvania; A.M., University of Pennsylvania, 1913; Ph.D., University of Pennsylvania, 1915. Teacher of Mathematics, Portland, Ore., High School.

1912-13.

WALTER FRANK RITTMAN, A.B., 1908; A.M., 1909; M.E., 1911; Ph.D., Columbia University, 1914. Consulting Chemical Engineer, U. S. Government.

1913-14.

HELEN PRICE, A.B., 1907; studied in University of Pennsylvania; Ph.D., University of Pennsylvania, 1915. Dean and Professor of Latin, Hood College, Frederick, Md.

1914-15.

HELEN HEED, A.B., 1905; studied in Radcliffe College; A.M., Radcliffe College, 1915. Teacher of English, High School, Pleasantville, N. Y.

1915-16.

FRANCES DARLINGTON, A.B., 1896. Teacher.

1916-17.

RACHEL KNIGHT, B.L., 1898; A.M., 1909; student University of Iowa; student, Haverford Graduate School.

1917-18.

RALPH LINTON, A.B., 1915; A.M., University of Pennsylvania, 1916. Private in artillery, A. E. F., France.

1918-19.

WALTER HARRISON MOHR, A.B., 1914. Y. M. C. A. war work. Teacher, George School.

1919-20.

ESTHER E. BALDWIN, A.B., 1909.

HOLDERS OF THE HANNAH A. LEEDOM FELLOWSHIP

1913-14.

ARTHUR PERCIVAL TANBERG, A.B., 1910; A.M., 1913; Ph.D., Columbia University, 1915; studied in Columbia University. Chemist, E. I. du Pont de Nemours Co.

1914-15.

ARCHER TAYLOR, A.B., 1909; A.M., University of Pennsylvania, 1910; studied in Harvard University; Ph.D., Harvard University, 1915. Assistant Professor of German, Washington University, St. Louis, Mo.

1915-16.

HAROLD S. ROBERTS, A.B., 1912; A.M., Princeton University, 1915; student in the University of Wisconsin, 1915-17. Teacher, Mohegan Lake School, N. Y.

1916-17.

HANNAH B. (STEELE) PETTIT, A.B., 1909; A.M., 1912; student, Yerkes Observatory. Astronomer.

1917-18.

JAMES MONAGHAN, JR., A.B., 1913; A.M., University of Pennsylvania, 1918. Jensen, Utah.

1918-19.

CHARLOTTE BREWSTER JORDAN, B.L., 1882; M.L., 1886; studied in Madrid, Spain. Translator.

1919-20.

PAUL M. CUNCANNON, A.B., 1915; student, Princeton University.

HOLDERS OF THE MARTHA E. TYSON FELLOWSHIP

1914-15.

HELEN PRICE, A.B., 1907; studied in the University of Pennsylvania; Ph.D., University of Pennsylvania, 1915. Dean and Professor of Latin, Hood College, Frederick, Md.

1915-16.

ANNE SHOEMAKER (HAINES) MARTIN, A.B., 1912; A.M., University of Wisconsin, 1916.

1916-17.

KATHERINE PROCTER GREEN, A.B., 1907; A.M., Columbia University, 1917. Teacher of Latin in High School, Pleasantville, N. Y.

1917-18.

CHARLOTTE BREWSTER JORDAN, B.L., 1882; M.L., 1886; studied in Madrid, Spain. Translator.

1918-19.

EDNA ANNA TYSON, A.B., 1909; M.A., Columbia University, 1919. Teacher in High School, Trenton, N. J.

1919-20.

DOROTHEA GILLETTE, A.B., 1914; student, Columbia University.

HOLDERS OF THE IVY MEDAL *

1898. ANNA BELLE EISENHOWER, A.B., 1899; A.B., Radcliffe College, 1900; A.M., *Ibid.*, 1907.
1899. MARY G. LEIPER, B.L., 1899.
1900. MARY S. HAVILAND, B.L., 1900; A.B., Radcliffe, 1901.
1901. GEORGE A. SEAMAN, A.B., 1901.
1902. ELLIOTT RICHARDSON, B.S., 1902; C.E., 1905.
1903. SAMUEL T. STEWART, A.B., 1903.
1904. HALLIDAY R. JACKSON, A.B., 1904.
1905. LOUIS N. ROBINSON, A.B., 1905; Ph.D., Cornell University, 1911.
1906. T. H. DUDLEY PERKINS, A.B., 1906.
1907. AMOS J. PEASLEE, A.B., 1907; LL.B., Columbia University, 1911.
1908. HERMAN PRITCHARD, B.S., 1908; A.M., 1911.
1909. WALTER F. RITTMAN, A.B., 1908; A.M., 1909; M.E., 1911; Ph.D., Columbia University, 1914.
1910. JOHN JOHNSON, B.S., 1910.
1911. JOSEPH H. WILLITS, A.B., 1911; A.M., 1912; Ph.D., University of Pennsylvania, 1916.
1912. HERMAN ELLIOTT WELLS, B.S., 1912.
1913. HENRY LEE MESSNER, A.B., 1913.
1914. ALBERT ROY OGDEN, A.B., 1914.
1915. THOMAS BAYARD MCCABE, A.B., 1915.
1916. HUGH FREDERICK DENWORTH, A.B., 1916; A.M., University of Pennsylvania, 1918.
1917. WILLIAM WEST TOMLINSON, A.B., 1917.
1918. FREDERICK STOCKHAM DONNELLY, A.B., 1918.
1919. CHARLES MANLY HOWELL, 1919.

* This medal is placed in the hands of the faculty without restriction for such disposition as may be deemed best. It is usually awarded for Character, Scholarship, and Influence. Until the year 1910 it was known as the College Medal.

DEGREES CONFERRED IN 1919

BACHELOR OF ARTS

In Biology

HELEN ROBERTA BIDDLE.....Riverton, N. J.
DOROTHEA LINDSAY DARLINGTON.....Darling.
MARY HEADLEY VERNAM.....Trenton, N. J.
MARIAN CLEVELAND WARE.....Salem, N. J.

In Chemistry

JUDSON TUPPER BALLARD.....Philadelphia.
WILLIAM LINDSAY CORNOG.....Ithan.
JACOB NEVYAS.....West Chester.
THOMAS ROWE PRICE, JR.....Glyndon, Md.

In Chemical Engineering

OSBORNE ROBINSON QUAYLE.....Wilmington, Del.
DAVID JOHN STICKNEY.....Buffalo, N. Y.

In Economics

CATHARINE READING BELVILLE.....Trenton, N. J.
ALLISON GRISCOM CORNOG.....Ithan.
EDWIN TUDOR GOWDY.....Thompsonville, Conn.
ESTHER ANNE NEWCOMER.....Philadelphia.
JOHN MAHLON OGDEN.....Boothwyn.
ANDREW RUSSELL PEARSON.....Swarthmore.
ALLIN HUGH PIERCE.....Fort Dodge, Iowa.

In English

ARDIS MAYHEW BALDWIN.....Baltimore, Md.
JANE PANCOAST BROWN.....Leesburg, Va.
MARY INGRAM CROSLEY.....Melrose Park.
ESTHER RACHEL HAYES.....Swarthmore.
ELISABETH ANDREWS HIBBERD.....Oakland, Calif.
MARIE LOUISE MEETEER.....Middletown, N. Y.
RUTH MARIE ORNDORFF.....Philadelphia.
ELEANOR RAE RUNK.....Philipsburg.
ESTHER GERTRUDE TAYLOR.....Philadelphia.
MARY ELIZABETH WILSON.....Toughkenamon.
FRANCES WILLARD YOUNG.....Germantown.

In French

RUTH BREUNINGER ..... Washington, D. C.
MARGARET HAVILAND ..... Brooklyn, N. Y.
ELIZABETH PYLE ..... Washington, D. C.
HELENE BARRETT SCOTT ..... Wilmington, Del.
DOROTHY THOMAS ..... Glen Cove, N. Y.

In German

ELEANOR WILLIAMS ATKINSON ..... Trenton, N. J.

In Greek and Latin

PHYLLIS MIKI KOMORI ..... White Plains, N. Y.
GLADYS AMANDA REICHARD ..... Bangor.

In History

MARY HALL GOODALL ..... Philadelphia.
DOROTHY FORDYCE LUCAS ..... Atlantic City, N. J.
WALTER WILLIAM MAULE ..... Coatesville.
HELEN HUTCHINSON REID ..... Lansdowne.
PHEBE UNDERHILL SEAMAN ..... Jericho, N. Y.
ELINOR CHRISTIANA STOUT ..... Wenonah, N. J.
HELENE CARLOTTA TOERRING ..... Philadelphia.
ELIZABETH ATKINSON WATSON ..... Doylestown.

In Mathematics and Astronomy

RUTH HAY CROSS ..... Cynwyd.
ELIZABETH NEUMANN FRORER ..... Philadelphia.
DORIS MELLOR GILBERT ..... Philadelphia.
JOSEPHINE MURRAY GRIFFITHS ..... Norristown.
MARGARET ELGAR POWELL ..... Lansdowne.
CHARLES HENRY YARDLEY ..... York.
EDITH CORA YOUNG ..... Swarthmore.
HELEN GERTRUDE YOUNG ..... West Chester.

In Political Science

MARCUS PRITCHARD DOWDELL ..... Harrisburg.
RUSSELL CONWELL GOURLEY ..... Melrose Park.
DAVID MALCOLM HODGE ..... Chester.
ISABEL BRIGGS MYERS ..... Washington, D. C.
HARRY ARTHUR OLIN ..... Chicago, Ill.
EDGAR ZAVITZ PALMER ..... Ridley Park.
FRANCES BAKER WILLIAMS ..... Norristown.

In Psychology and Education

JANET MCPHERSON BROWN.....Washington, D. C.
IRMA KIPP RUSSELL.....Bedford.
ELIZABETH STOTSENBURG .....Ridley Park.

In Public Speaking

KATHERINE VANDEVORT FAHNESTOCK.....Harrisburg.
HELEN KOONS ROBEY.....Philadelphia.
DOROTHY YOUNG .....Easton.

In Electrical Engineering

CHARLES COLLIDAY ASHMEAD.....Beasley's Point, N. J.
ANDREW SIMPSON .....Darby.

In Mechanical Engineering

NORRIS CLEMENTS BARNARD.....Brooklyn, N. Y.
CHARLES MANLY HOWELL.....Millville, N. J.
CHARLES RAYMOND MICHENER.....Bendersville.
HAROLD SHOEMAKER WEBSTER.....Philadelphia.

Degree of Electrical Engineer

JOSEPH FRANKLIN GASKILL.....Jenkintown.
B.S., Swarthmore College, 1910

Mechanical Engineer

WARREN EARLE GATCHELL.....Rutledge.
A.B., Swarthmore College, 1914

DOCTOR OF LAWS (HONORARY)

WILLIAM CAMERON SPROUL.....Chester.
A. MITCHELL PALMER.....Stroudsburg.

COMMITTEE ON TRUSTS

CHARLES F. JENKINS,
West Washington Square, Philadelphia.

ISAAC H. CLOTHIER,
Eighth and Market Streets, Philadelphia.

HOWARD COOPER JOHNSON
1210-1214 Commonwealth Building, Philadelphia.

JOSEPH SWAIN,
Swarthmore, Pa.

T. STOCKTON MATTHEWS,
Calvert and German Streets, Baltimore, Md.

PHILIP M. SHARPLES,
West Chester, Pa.

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