

New Series, 1926
No. 3

Whole Number 368

THE
JOHNS HOPKINS
UNIVERSITY CIRCULAR

FACULTY OF PHILOSOPHY
1925-1926

WITH ANNOUNCEMENTS OF COURSES FOR
1926-27

BALTIMORE, MARYLAND
PUBLISHED BY THE UNIVERSITY
MARCH, 1926

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During 1925-26 the graduate courses will be as follows:

1. Seminary in Lucretius and Catullus.
Professor FRANK. *Two hours weekly.*
2. Latin Composition.
Professor MUSTARD. *One hour weekly.*
3. Pastoral Poetry.
Professor MUSTARD. *One hour weekly.*
4. Professor FRANK will give an additional course, the subject to be announced later.
One hour weekly.

UNDERGRADUATE COURSES

1. Livy (selections); Horace (selections); Prose Composition.
Four hours weekly through the year.
2. Tacitus, *Annals* (selections); Pliny's *Letters* (selections); Catullus.
Three hours weekly through the year.
3. Lucretius (selections); Vergil, *Georgics*; Horace, *Ars Poetica*.
Three hours weekly through the year.
4. Roman Comedy (selections); Roman Satire (selections).
Three hours weekly through the year.
5. Advanced Latin Composition.
Weekly through the year.

In October, 1925, a special course in Cicero and Vergil will be arranged for undergraduates who have had less than four years of high school Latin.

MATHEMATICS

The advanced courses are so arranged that a qualified student gets in three years the more important points of view of the whole subject. The courses are elastic in character, subjects being introduced as they are needed. In general, the plan pursued is to further independent inquiry on the part of the student. Once embarked on investigation, he uses all the apparatus of lectures and library with intelligent purpose. The seminary, which meets weekly, is primarily intended for the presentation of the results of the student's own thinking. Literature either intrinsically important or opportune is presented and discussed in the reading class, which also meets weekly. The following courses are offered:

ADVANCED COURSES

1. Mathematical Seminary.
One hour weekly. Professor MORLEY.
2. Reading Class.
One hour weekly. Professor MORLEY.

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3. Higher Geometry.

Three hours weekly, first half-year. Professor MORLEY.

This is a general course in Geometry, covering in three years such matters as Projective Geometry, the Invariants of Algebraic Forms, Line Geometry, Conformal Geometry.

4. Theory of Functions.

Three hours weekly, second half-year. Professor MORLEY.

Algebraic Functions and their Integrals; Elliptic, Elliptic Modular, and General Automorphic Functions; Theory of the Potential.

*5. Dynamics.

Two hours weekly, second half-year (every other year). Professor MORLEY. Special stress is laid on Rigid Dynamics.

*6. Vector Analysis.

Two hours weekly, first half-year (every other year). Professor MORLEY.

7. Elementary Theory of Functions.

Two hours weekly. Associate Professor COHEN.

An introduction to the theories of fractions of a real and a complex variable.

*8. Differential Equations.

Two hours weekly. Associate Professor COHEN.

Including, in three years, Ordinary Differential Equations, their Integral Curves and Singular Points; Partial Differential Equations; Lie's Theory.

*9. Differential Geometry.

Two hours weekly. Associate Professor COHEN.

Including a study of Curves in Space; Surfaces and Lines upon them; Quadratic Differential Forms; Invariants.

*10. Calculus of Variations.

Two hours weekly. Associate Professor COHEN.

11. Theory of Numbers.

Two hours weekly. Associate Professor COHEN.

12. Theory of Groups.

Two hours weekly. Dr. MUSSELMAN.

Including Theory of Equations, Finite Geometries, Theory of Algebraic Forms.

*13. Theory of Correspondence.

Three hours weekly. Dr. MUSSELMAN.

Including such matters as Cremona Transformations, General Birational Transformations.

14. Theory of Probability.

Two hours weekly. Dr. MUSSELMAN.

Including applications to Statistics and the Theory of Errors. Bernoulli, Poisson and Lexis series; methods of Pearson and Charlier applied to heterograde statistics; application of Hermite polynomials and theory of integral equations to the theory of frequency distributions.

*Courses thus marked will not be given in 1925-26.

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*15. Electricity and Magnetism.

Three hours weekly. Associate Professor MURNAGHAN.

Application of spherical and cylindrical harmonics; the theory of transmission of signals with special reference to long-distance telephony and wireless telegraphy.

16. Dynamical Systems.

Two hours weekly. Associate Professor MURNAGHAN.

Including a discussion of the structure and stability of the atom.

*17. Modern Theory of Gravitation.

Two hours weekly, first half-year. Associate Professor MURNAGHAN.

18. Elasticity and Hydrodynamics.

Three hours weekly. Associate Professor MURNAGHAN.

An introduction to the theory of elastic media and the propagation of waves. Special attention will be directed to problems on the motion of aeroplanes.

*19. Theory of Invariants.

Three hours weekly. Dr. NELSON.

Including the invariant theory of ordinary and partial Differential Equations.

20. Partial Differential Equations.

Three hours weekly. Dr. NELSON.

UNDERGRADUATE COURSES

1. Analytic Geometry; Elements of Calculus.

Three hours weekly. Associate Professor MURNAGHAN, Dr. MUSSELMAN, Dr. NELSON, and Assistants. [A: *Wed., Thurs., Fri., 9.30*; B: *Mon., Tues., Wed., 11.30*]

Conference. [A: *Tues., 2-4*; B: *Thurs., 2-4*]

This course is open to those students only who are credited with Trigonometry for matriculation; it counts eight points towards graduation.

01. Trigonometry; Analytic Geometry; Elements of Calculus.

Three hours weekly. Dr. NELSON, and Assistants. [A: *Wed., Thurs., Fri., 9.30*; B: *Mon., Tues., Wed., 11.30*]

Conference. [A: *Tues., 2-4*; B: *Thurs., 2-4*]

This course is for students who enter without Trigonometry; it counts six points towards graduation.

2. Differential and Integral Calculus.

Three hours weekly. Professor HULBERT, Associate Professors COHEN and MURNAGHAN, Dr. MUSSELMAN, and Dr. NELSON. [A: *Mon., Tues., Wed., 11.30*; B: *Mon., Tues., 8.30*; *Thurs., 9.30*]

Conference. [A: *Fri., 10.30-12.30*; B: *Wed., 2-4*]

The hours assigned to B are subject to change.

A student whose average mark in the Mathematics of the first year is below 7, is not permitted to take Mathematics 2.

* Courses thus marked will not be given in 1925-26.

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3. Applications of Calculus; Differential Equations; Mechanics.

Three hours weekly. Associate Professor COHEN. [Mon., Tues., Wed., 10.30]

4. Differential Equations.

Two hours weekly, first half-year. Associate Professor MURNAGHAN and Dr. NELSON. [A: Mon., Tues., 9.30; B: Mon., Tues., 10.30]

This course is designed primarily for Engineers.

5. Plane Algebraic Curves.

Three hours weekly. Professor HULBURT. [Mon., Tues., Wed., 10.30]

6 A. Mathematics of Finance.

Three hours weekly, first half-year. Dr. MUSSELMAN. [Wed., Thurs., Fri., 8.30]

Includes the study of Annuities, Sinking Funds, Amortization Tables, and Valuation of Bonds.

6 B. Elementary Theory of Probability.

Three hours weekly, second half-year. Dr. MUSSELMAN. [Wed., Thurs., Fri., 8.30]

Includes the Theory of Least Squares, and the application of mathematical methods to statistics.

7. Applied Mathematics.

Two hours weekly, second half-year. Associate Professor MURNAGHAN.

Includes Vector Analysis, advanced Calculus, and elementary function theory.

In connection with the three hours' class-room instruction, the instructor in certain undergraduate courses meets his students weekly in a two-hour session for the purpose of supplementary explanation and application of the principles taught in the class-room. This is that part of the courses designated as "Conference." It is not intended thus to increase the amount of work required of the student, but rather to aid him in the understanding and preparation of the work of the class.

DEPARTMENT OF MILITARY SCIENCE AND TACTICS
RESERVE OFFICERS' TRAINING CORPS

The traditional policy of the American people is to maintain a small regular army. With our rapidly growing population and increasing national responsibilities, some way must be found to keep our national strength for emergencies abreast of our national progress. One of the several means of doing this is in introducing a moderate course of military instruction in practically all of the important colleges and universities of the country. The course that is offered at the Johns Hopkins University is in substance the same that is offered at any other of our important institutions.

PURPOSE

The primary purpose of the Reserve Officers' Training Corps is to provide officers for the Reserve Corps. The Reserve Corps is the largest

* The identical list of math courses can be found in the circular entitled College of Arts and Sciences

THE
COLLEGE OF ARTS AND SCIENCES
OF
THE JOHNS HOPKINS UNIVERSITY

1925-26

BALTIMORE
THE JOHNS HOPKINS PRESS
1925

REQUISITES FOR THE DEGREE OF BACHELOR OF ARTS

I. INTRODUCTION

(1) **Significance of the Degree:** The degree of Bachelor of Arts is conferred as evidence that the student has successfully completed a course of study of a certain definite type and extent, known as the "Collegiate Course." This course is designed to include the instruction generally believed essential to a liberal education, as distinguished from that intended to prepare the student for a particular calling. Instruction of this latter type leads to the degree of Bachelor of Science. (Students desiring to pursue courses leading to this degree are referred to the circulars of the following schools: The School of Engineering; The School of Business Economics; The College for Teachers.) Students desiring to enter the Johns Hopkins School of Medicine should pursue the collegiate course.

(2) **Summary of Requisites for the Degree:** In order to receive the degree of Bachelor of Arts the student must have fulfilled certain requirements: (a) He must be admitted as a candidate for the degree of Bachelor of Arts. This is called *Matriculation*; and the requirements for admission are stated on pages 59-65. (b) He must complete satisfactorily certain studies (see II). (c) He must attend the University for a certain minimum time (see III). (d) He must pay certain fees (see pp. 71-72).

II. STUDIES REQUIRED

(1) **Technical Terms:** (a) *The Academic Year* is the period from the opening of the University in September or October to Commencement Day in June following, approximately thirty-six weeks.

(b) *The First Term* is from the opening of the University to the Mid-Year Examinations, about February 1st; and the *Second Term* is from the close of the Mid-Year Examinations to Commencement Day in June. There are about fifteen weeks of instruction in each term exclusive of vacations and the time required for examinations.

(c) A *Standard Course* is one having three meetings a week of one hour each for an entire academic year, provided that these meetings are devoted to class work, such as lectures or recitations, as distinguished from laboratory, drawing, or similar exercises. In this circular the word "course" is to be taken as meaning such a standard three-hour course unless otherwise stated. A half course means a similar three-hour course for one term only.

(d) **Marking System:** The scale of marks for reports is 10, 9.5, 9, etc., 10 being the highest and marks below 6 denoting failure (see VI (2)).

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(e) *Points*: The credit given towards a degree for the completion of a certain course is expressed in *Points*. The credit for a standard three-hour course is six points. That for other courses is in like proportion, three hours of laboratory work being taken as equivalent to one of class-work. A point therefore represents one hour of class-work a week for one term, and in that sense is equivalent to a "semester-hour" at other institutions.

No credit is given for part of a course, except for certain definitely arranged half courses.

Table of Credits

1. Each standard three-hour course counts 6 points.
2. Other courses count one point for each term for every hour of class work per week, and one point for each term for every three-hour laboratory period per week.
3. A two-hour conference in Mathematics each week counts one point per term.
4. Courses in Military Science count as follows:
 First year Basic (Freshmen) 3 points for the year.
 Second year Basic (Sophomore) 4 points for the year.
 First year Advanced (Junior) 5 points for the year.
 Second year Advanced (Senior) 5 points for the year.
5. Additional credit of one point is given to a student who takes three courses in: (a) any one foreign language, (b) English Literature, (c) History, (d) Political Economy, (e) Political Science.

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(2) *Points Required for Graduation*: A total credit of 125 points is required for the degree of Bachelor of Arts, except as follows:

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(a) A student who has an average of 9 for the work of the next to the last year, and has received no mark as low as 7 for any course since admission to the University, need offer only 119 points for graduation.

(b) A student who has completed in this University (with an average of not less than 8.5) three years of work preliminary to medicine and has to his credit 110 points toward graduation, may be admitted to the Medical School, and will receive the degree of Bachelor of Arts when he has completed satisfactorily one year of work in that school.

(3) *Selection of Courses*: The courses of study are selected by the student under the guidance of his Adviser, subject to the following limitations:

(a) *Prescribed Courses*: All candidates for the degree of Bachelor of Arts must take courses in the following subjects:

- (1) English Composition.
- (2) English Literature.
- (3) One laboratory course.
- (4) One of these: History, Political Economy, Philosophy.

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- (5) Two Modern Language courses, one of which must be French or German.
- (6) Military Science or Physical Education (for two years).
- (b) *First Year Courses*: In the first year of residence students must take the following courses, unless absolved previously:
 - (a) English Composition.
 - (b) French, German, or Spanish. (Beginning 1925-26 no elementary language work can be counted towards the degree. Students who need such courses for admission to the Medical School or for other reasons, may take them in the College for Teachers (see Tuition Fees and Expenses)).
 - (c) Students are advised that Mathematics 1 is a pre-requisite for work in medicine, the sciences, and certain courses in Political Economy. Students who expect to concentrate in languages, literature, or history are advised to take Latin or Greek.
 - (d) One of these: History 1, History 2, Chemistry 1 B, Biology 1, Economic History, Introductory Course for Freshmen.
 - (e) Military Science or Physical Education.
- (c) *Other Courses*: Upon completion of the work of the first two years a student shall select some one department in which he proposes to specialize. The department selected shall thereafter plan and direct his work, taking into account the courses he has already completed and the work he proposes to do after graduation. While the student shall be advised to concentrate his work on his major subject and closely related subjects, he shall not be required to devote more than one-half of the time of any one year to his major subject.
- (4) **Restrictions as to Courses which may be Counted or Taken:**
 - (a) Any of the courses listed in the College Catalogue may be counted for the degree. For restrictions upon the number of points which may be taken at one time see VIII. Additional electives may be chosen from approved courses selected from the College for Teachers, the Evening Courses in Business Economics, and the Summer Courses, a list of which may be obtained from the Registrar. Such courses may be counted only if they are taken with the approval of the student's adviser and reported to the Registrar's office on the usual forms. They are included in the number of points which may be taken at one time (see VIII).
 - (b) No other courses, either in the University or in any other institution, may be taken without written consent of the Dean of the College of Arts and Sciences.
 - (c) No student may count for graduation more than two courses (of six points or more each), in which his grade is below 7.
 - (d) No student who has failed in a course may take another course for which that course is a prerequisite. No student who has failed in the first term of a course may take the second term of the same course.

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(e) No student who has an average below 7 in Mathematics 1 may take Mathematics 2 or Physics 1.

(f) Those students who need elementary instruction in French, German and Spanish will have opportunity afforded in the College for Teachers. Such courses, however, may not be counted toward the Bachelor of Arts degree.

III. PERIOD OF RESIDENCE

The period of residence is the length of time the student must attend the University before he may graduate. He need not actually live at the University, though this is considered a great advantage.

(1) **Usual Period and Minimum Period:** In general four years are needed to complete the courses required for a degree, though a capable student may complete this work in three years (see 2 below). A student may be admitted to advanced standing in accordance with the regulations given on p. 58, but in all cases the candidate for the degree of Bachelor of Arts must pursue the last year of his course for that degree in this institution.

(2) **Ways of Completing the Course in Three Years:** A capable student who wishes to complete the work in three years may adopt any of the following methods:

(a) He may anticipate certain courses by special examinations at entrance.

A form of application for this privilege may be secured from the Registrar and must be filled and returned to him at least one week before the examination, which is held at or near the time of the regular matriculation examinations in September. The examination must be taken in the September next preceding entrance.

The courses that may be thus absolved are first year courses in languages (except English), in Mathematics, and in Chemistry (provided that no course in Chemistry in the University is taken for the degree). Under ordinary circumstances a student is not allowed to anticipate at entrance more than two courses. Students who have had satisfactory courses in preparatory schools in the subjects above named, but who are not ready to take the examination at entrance, may be examined at the beginning of the following year. No student, however, who has been permitted to take an advanced course in any subject may afterwards pass off the elementary part of the subject in order to receive credit therefor.

(b) He may present himself, at the beginning of the academic year, for examination in a single course, provided that the Committee on Admission and Advanced Standing, being satisfied that the student can obtain competent instruction, has authorized him in advance to pursue this course during the summer vacation.

A form of application for this privilege is provided and must be secured from the Registrar. For courses given in this University during the summer, many of which are helpful in preparing for advanced standing, see the special announcement of Summer Courses. In the case of private instruction, the instructor must be approved by the examiner before whom the student is to come, and must not be changed without the examiner's consent. The private

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LATIN

1. Livy (selections); Horace (selections); Prose Composition.
Four hours weekly through the year. [Mon., Tues., Wed., Fri., 11.30]
2. Tacitus, *Annals* (selections); Pliny's *Letters* (selections); Catullus.
Three hours weekly through the year. [Mon., Tues., Wed., 11.30]
3. Lucretius (selections); Vergil, *Georgics*; Horace, *Ars Poetica*.
Three hours weekly through the year. [Mon., Tues., 9.30, Fri., 10.30]
4. Roman Comedy (selections); Roman Satire (selections).
Three hours weekly through the year.
5. Advanced Latin Composition.
Weekly through the year.

In October, 1925, a special course in Cicero and Vergil will be arranged for undergraduates who have had less than four years of high school Latin.

MATHEMATICS

1. Analytic Geometry; Elements of Calculus.
Three hours weekly. Associate Professors MURNAGHAN and MUSSELMAN, Dr. NELSON, and Assistants. [A: Wed., Thurs., Fri., 9.30; B: Mon., Tues., Wed., 11.30]
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2. Differential and Integral Calculus.
Three hours weekly. Professor HULBURT, Associate Professors COHEN, MURNAGHAN, and MUSSELMAN, and Dr. NELSON. [A: Mon., Tues., Wed., 11.30; B: Mon., Tues., 8.30; Thurs., 9.30]
Conference. [A: Fri., 10.30-12.30; B: Wed., 2-4]
The hours assigned to B are subject to change.
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3. Applications of Calculus; Differential Equations; Mechanics.
Three hours weekly. Associate Professor COHEN. [Mon., Tues., Wed., 10.30]

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"Faculty of
Philosophy"
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identical.
The College of
Arts and
Sciences
appears to be
an evening
school

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4. Differential Equations.

Two hours weekly, first half-year. Associate Professor MURNAGHAN and Dr. NELSON. [A: Mon., Tues., 9.30; B: Mon., Tues., 10.30]
This course is designed primarily for Engineers.

5. Plane Algebraic Curves.

Three hours weekly. Professor HULBERT. [Mon., Tues., Wed., 10.30]

6 A. Mathematics of Finance.

Three hours weekly, first half-year. Associate Professor MUSSELMAN. [Wed., Thurs., Fri., 8.30]
Includes the study of Annuities, Sinking Funds, Amortization Tables, and Valuation of Bonds.

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Three hours weekly, second half-year. Associate Professor MUSSELMAN. [Wed., Thurs., Fri., 8.30]
Includes the Theory of Least Squares, and the application of mathematical methods to statistics.

7. Applied Mathematics.

Two hours weekly, second half-year. Associate Professor MURNAGHAN.
Includes Vector Analysis, advanced Calculus, and elementary function theory.

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DEPARTMENT OF MILITARY SCIENCE AND TACTICS
RESERVE OFFICERS' TRAINING CORPS

The traditional policy of the American people is to maintain a small regular army. With our rapidly growing population and increasing national responsibilities, some way must be found to keep our national strength for emergencies abreast of our national progress. One of the several means of doing this is in introducing a moderate course of military instruction in practically all of the important colleges and universities of the country. The course that is offered at the Johns Hopkins University is in substance the same that is offered at any other of our important institutions.

Purpose

The primary purpose of the Reserve Officers' Training Corps is to provide officers for the Reserve Corps. The Reserve Corps is the largest of the three component parts of the Army of the United States. This purpose is accomplished by providing for selected students a systematic

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