

BULLETIN OF
THE UNIVERSITY OF WISCONSIN

GENERAL ANNOUNCEMENT
OF COURSES

1935-36

(CATALOG 1934-35)



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MADISON—JULY, 1935

U. Wisc 1935-36

MATHEMATICS

- 200. RESEARCH. I, II; 2-4 cr. Research work on newspaper problems. Staff.
- 201. SEMINARY IN JOURNALISM. Yr; 2 cr. Subject for 1934-35, American newspapers from 1915-1920. Subject for 1935-36, American newspapers, 1920-1930. 3:30-5:30 Tu. Mr. Bleyer.
- 202. SEMINARY IN JOURNALISM. Yr; 2 cr. Subject for 1934-35, Public opinion. Subject for 1935-36, The influence of the press. 3:30-5:30 Th. Mr. Bleyer.

LATIN

(See Classics, page 113)

MATHEMATICS

- MARK HOYT INGRAHAM, Ph.D., *Professor of Mathematics, Chairman*
- RUDOLPH ERNEST LANGER, Ph.D., *Professor of Mathematics (on leave yr.)*
- HERMAN WILLIAM MARCH, Ph.D., *Professor of Mathematics*
- CHARLES SUMNER SLICHTER, Sc.D., *Professor of Applied Mathematics, Emeritus*
- THEODORE BENNETT, Ph.D., *Assistant Professor of Mathematics*
- HERBERT PULSE EVANS, Ph.D., *Assistant Professor of Mathematics*
- IVAN STEPHAN SOKOLNIKOFF, Ph.D., *Assistant Professor of Mathematics*
- R. L. JEFFERY, Ph.D., *Lecturer in Mathematics*

INSTRUCTORS

FLORENCE ELIZA ALLEN, Ph.D.
 JAMES JOSEPH BARRON, Ph.D.

ALBERT EMIL MAY, M.A.
 NATHAN SCHWID, Ph.D.

In this department, courses 1 to 7 inclusive are planned to give a working knowledge of elementary mathematics. Mathematics 7 is required of students in the School of Commerce. Students who elect the minimum amount of mathematics in fulfillment of the optional requirement for the B.A. degree may choose eight credits from any of the elementary courses.

MAJOR IN MATHEMATICS. This field of concentration includes all courses taught by the Mathematics Department. The major comprises a minimum of 21 credits which shall consist of Courses 5 (or 54 and 55); 6; at least one of 102, 104, 112; and other courses in mathematics numbered 100 or above. Students majoring in this department must earn at least as many grade-points as credits in all work included in the major. Eligibility to write a thesis is based on a minimum of 9 credits in mathematics taken at the University of Wisconsin and is determined by the average number of grade-points per credit earned in the courses included in the major. Those whose average thus computed is at least 2.5 will write theses; those whose average is less than 2.0 are not permitted to write theses; those with intermediate averages are subject to individual rulings by the department, with consideration given to the student's record and wishes. Students entering the junior class with advanced standing who expect to complete a major in mathematics in four semesters should previously have completed the equivalent of Mathematics 5.

MAJOR IN PHYSICS-MATHEMATICS. The courses listed below from (a) to (d) comprise the field of concentration in physics-mathematics. The major consists of the following required courses, with a maximum of 40 credits in groups

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 M

SCIENCE

of the elements and qualities
W. Mr. Bleyer.

RS. II; 2 cr. Theory and
rial policy; interpretation of
d 3. 9 TT. Mr. Nafziger.

ectures and practice in pre-
azines. Not open to students
ism 2. 10 or 11 TT. Miss

of criticism in journalism;
, and books for newspapers

cr. Analysis of the primary
ent of trade journals, house
Coy.

s and readings on libel, con-
phases of the laws affecting
il seniors in the School
3. 2:30 Th. Mr. Hyde.

of the evolution of the news-
with special reference to the
l of all seniors in the School
d 3. 9 MWF. Mr. Bleyer.

Lectures, reading, and dis-
to government and society;
ism. Required of all seniors
Bleyer.

struction and practice in the
al courts; municipal, state,
s, finance, and public affairs.
r. Nafziger.

onomics 116.

study of social, political, and
hey are reflected in current
0 TT. Mr. Bleyer.

I, Spain, Sr. Ortega. II.

MAGAZINES. II; 2 cr. The
departments in newspapers
service and educational in-
rnalism 105. 10 TT. Miss

er.

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(a) through (d) and a grand total of not more than 50 credits, including group (e).

- (a) Mathematics—algebra and trigonometry (which may be completed in high school); analytic geometry and calculus.
- (b) Physics 1, 31, or 51-52—10 credits.
- (c) Mathematics 112, or its equivalent, 3 cr.; and a minimum of 6 credits selected from courses 102, 104, 116, 118.
- (d) A minimum of 6 credits selected from Physics 106, 115, 116, 117, 118, 124.
- (e) A minimum of 6 credits selected from the following group of courses, which are within the division although not included within this field of concentration: Physics 2, 3, 4; Mathematics 101, 103, 117; Metallurgy 135; Mechanics 101, 107, 110; Electrical Engineering 116, 120, 155; Chemistry 130; Hydraulics 104, 115; Astronomy 6, 7, 116.

THE JUNIOR MATHEMATICAL CLUB, open to all students interested in the subject, meets twice a month.

ELEMENTARY COURSES

- 1. ALGEBRA. I, II; 4 cr. For students presenting one or one and a half units of algebra for entrance. May not be taken for credit by students who have had two years of high-school algebra. Prerequisite to all other courses. Staff.
- 2. TRIGONOMETRY AND ANALYTIC GEOMETRY. I, II; 4 cr. May be taken for 3 credits by students who have had a half year of high-school trigonometry. Prerequisite to all other courses except 1, 3, 7 and 24. Staff.
- 3. ANALYTIC GEOMETRY. I, II; 3 cr. Prerequisite: Trigonometry. I—11, 1:30 MWF; II—2:30 MWF. Staff.
- 5a. DIFFERENTIAL CALCULUS. I, II; 3 cr. Prerequisite (or co-requisite): Math. 2 or 3. Students who intend to major in mathematics or science are advised to take this course, together with 5b, in the sophomore year. Corresponds roughly to Math. 54, 4 cr., offered primarily for engineering students but open to others. I—10 MWF; II—9, 1:30 MWF. Staff.
- 5b. INTEGRAL CALCULUS. I, II; 3 cr. Prerequisite: Math. 5a. I—10 MWF; II—10 MWF. Staff.
- 6. ANALYTIC GEOMETRY OF THREE DIMENSIONS. I, II; 3 cr. Prerequisite: Math. 5, 54, or concurrent registration. It is desirable for mathematics majors to take this course concurrently with course 5b. I—2:30 MWF; II—1:30 MWF. Staff.
- 7. THEORY OF INVESTMENT. I, II; 4 cr. Prerequisite: Math. 1 or 51. Primarily for students in the pre-commerce sequence. Staff.
- 24. THEORY OF LIFE INSURANCE. II; 3 cr. Prerequisite: Math. 7 or equivalent. 2:30 MWF. Mr. Evans.
- 50. SUB-FRESHMAN ALGEBRA. I; no cr. For students who fail to pass the examination for admission to Math. 51. Staff.

- 51. ELEMENTARY MATHEMATICS for men in engineering. Mr.
- 52. ELEMENTARY MATHEMATICS. Math. 51. Required of
- 54. DIFFERENTIAL AND INTEGRALS in engineering. M
- 55. CALCULUS. I, II; 4 cr. for men in engineering. M
- 71. MATHEMATICS FOR AGRICULTURE
- 91. COLLEGE GEOMETRY. II; Euclidean geometry. Of the mathematics required. Mr. Hart.

These courses are offered
Math. 5 or 55 is prerequisite to

- 100. SENIOR THESIS. Yr; 2
- 101. ADVANCED COLLEGE ALGEBRA covering such topics as functions, interpolation, and mathematics 5b or concurrent
- 102. ADVANCED CALCULUS. Differential and integral calculus and advanced calculus and differential
- 103. ADVANCED GEOMETRY. Topics in geometry are extended and also considered. Application prerequisite: Mathematics 6
- 104. THEORETICAL MECHANICS. Statics and of a rigid body. Applications of equilibrium, mechanics of the top. This course is prerequisite to courses in applied mathematics
- 110. HIGHER MATHEMATICS. Mr. Sokolnikoff.
- 112. DIFFERENTIAL EQUATIONS. Students in mathematics and science
- 116. HIGHER ANALYSIS. Yr
- 117. VECTOR AND TENSOR ANALYSIS. Application to the treatment of vector manifolds. The second semester applications of tensor calculus to the theory of relativity. Mr. Sokolnikoff.

MATHEMATICS

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SCIENCE

than 50 credits, including
may be completed in high

l a minimum of 6 credits
106, 115, 116, 117, 118, 124.

Following group of courses,
led within this field of con-
103, 117; Metallurgy 135;
116, 120, 155; Chemistry

students interested in the

one or one and a half units
credit by students who have
quisite to all other courses.

; 4 cr. May be taken for 3
f high-school trigonometry.
id 24. Staff.

Trigonometry. I—11, 1:30

ite (or co-requisite): Math.
atics or science are advised
homore year. Corresponds
or engineering students but
F. Staff.

: Math. 5a. I—10 MWF;

I, II; 3 cr. Prerequisite:
desirable for mathematics
course 5b. I—2:30 MWF;

quisite: Math. 1 or 51. Pri-
e. Staff.

quisite: Math. 7 or equiva-

ts who fail to pass the ex-

51. ELEMENTARY MATHEMATICAL ANALYSIS. I, II; 5 cr. Required of freshmen in engineering. Mr. March and staff.
52. ELEMENTARY MATHEMATICAL ANALYSIS. I, II; 5 cr. A continuation of Math. 51. Required of freshmen in engineering. Mr. March and staff.
54. DIFFERENTIAL AND INTEGRAL CALCULUS. I, II; 4 cr. Required of all sophomores in engineering. Mr. March and staff.
55. CALCULUS. I, II; 4 cr. Continuation of Math. 54. Required of all sophomores in engineering. Mr. March and staff.
71. MATHEMATICS FOR AGRICULTURAL STUDENTS. I; 4 cr. Staff.
91. COLLEGE GEOMETRY. II; 2 cr. An extension of the procedure and content of Euclidean geometry. Open to juniors and seniors. May be counted toward the mathematics requirements for the teaching major and minor. 8 TT. Mr. Hart.

ADVANCED COURSES

These courses are offered every year unless an exception is specifically noted. Math. 5 or 55 is prerequisite to all courses in the following group, except 101, 137.

100. SENIOR THESIS. Yr; 2 cr. 9 TT. Staff.
101. ADVANCED COLLEGE ALGEBRA. Yr; 3 cr. An advanced course in algebra covering such topics as determinants, elimination, permutation and combinations, interpolation, and the theory of equations. Prerequisite: Mathematics 5b or concurrent registration. 8 MWF. Mr. Ingraham.
102. ADVANCED CALCULUS. Yr; 3 cr. A year course in analysis based on differential and integral calculus and containing the work usually given in advanced calculus and differential equations. 9 MWF. Mr. Evans.
103. ADVANCED GEOMETRY. Yr; 3 cr. The methods of elementary analytic geometry are extended to projective geometry; the synthetic viewpoint is also considered. Applications to rectilinear figures and conic sections. Prerequisite: Mathematics 6 or consent of instructor. 1:30 MWF. Mr. Bennett.
104. THEORETICAL MECHANICS. Yr; 3 cr. Statics and dynamics of a particle and of a rigid body. Topics studied include velocity, acceleration, conditions of equilibrium, motion under constant and variable forces, the theory of the top. This course is to be regarded as generally introductory to courses in applied mathematics. 11 MWF. Mr. March.
110. HIGHER MATHEMATICS FOR ENGINEERS. Yr; 3 cr. 8 MWF. Mr. Sokolnikoff.
112. DIFFERENTIAL EQUATIONS. II; 3 cr. Primarily a working course for students in mathematics and physics. 10 MWF. Staff.
116. HIGHER ANALYSIS. Yr; 3 cr. Not offered 1935-36. Mr. March.
117. VECTOR AND TENSOR ANALYSIS. Yr; 3 cr. The first semester is devoted to the treatment of vectors and tensors of Euclidean and non-Euclidean manifolds. The second semester's work deals with the physical and geometrical applications of tensors to Newtonian dynamics, electrodynamics, and theory of relativity. Offered in 1935-36 and in alternate years. 11 MWF. Mr. Sokolnikoff.

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118. THE THEORY OF PROBABILITIES AND METHODS OF LEAST SQUARES. I; 3 cr. 1:30 MWF. Mr. Evans.
137. THE MATHEMATICS OF STATISTICS. II; 3 cr. A course in curve fitting, correlation, dispersion, frequency distributions, graphical calculation, and portions of the theory of probability, including a certain amount of laboratory work. Prerequisites: Calculus and consent of instructor. 1:30 MWF. Mr. Evans.
173. A CRITIQUE OF ELEMENTARY AND COLLEGIATE MATHEMATICS. II; 3 cr. A discussion of the historical development with an analysis of the content and interrelations of selected topics in elementary and intermediate mathematics. Open to majors in the Department of Mathematics in their senior year, to graduates, and to others upon the consent of the instructor. 10 MWF. Mr. Ingraham.

GRADUATE COURSES

The graduate courses in mathematics are varied from year to year according to the needs of the students, other subjects being introduced in addition to those here listed. When there is no indication in the description of a course that it is given every year or every other year, this lack of information should be interpreted to mean that the course is given at irregular times.

200. READING AND RESEARCH. Staff.
219. DIFFERENTIAL GEOMETRY. I; 3 cr. A study of curves and surfaces in three dimensions by classical methods, followed by an introduction to corresponding problems in n -dimensions involving tensor methods. Not offered 1935-36. Mr. Bennett.
220. THEORY OF ANALYTIC FUNCTIONS. Yr; 3 cr. This course like Course 221, is fundamental in analysis. Its content is restricted to functions of the complex variable. It has some special interest in the application of mathematics to physics. Offered 1935-36 and in alternate years. 11 MWF. Mr. Jeffery.
221. THEORY OF FUNCTIONS OF A REAL VARIABLE. Yr; 3 cr. The aim of this course is to develop the fundamental concepts and theorems of analysis. It includes an introduction to the theory of point-sets. Offered 1936-37 and in alternate years. 11 MWF. Mr. Langer.
238. THE MATHEMATICS OF ECONOMIC STATISTICS. I; 3 cr. Not offered 1935-36. Mr. Ingraham.
243. MODERN THEORY OF DIFFERENTIAL EQUATIONS. I; 3 cr. A critical consideration of the ordinary differential equations in the domain of real variables. Existence theorems. Theorems of oscillation and comparison. Boundary conditions, the Green's function, and the development of functions in terms of solutions of differential equations. Not offered 1935-36. Mr. Langer.
244. HIGHER GEOMETRY. II; 3 cr. Not offered 1935-36. Mr. Bennett.
245. ALGEBRAIC GEOMETRY. I; 3 cr. Algebraic curves and their singularities; the geometry of the curve and the associated Riemann surface. 8 MWF. Mr. Bennett.

246. FINITE GROUPS. II; most important modern problems in c. Mr. Ingraham.
258. FOUNDATION OF ANALYSIS.
263. HIGHER ALGEBRA. I; quadratic forms, etc. Offered 1935-36 and
265. HARMONIC ANALYSIS the partial differential equations. Fourier's series. Offered 1936
266. THEORY OF NUMBER: integers. Offered 1935-36. Mr. Ingraham.
267. CALCULUS OF VARIATIONS: classical theory and calculus. Not offered 1935-36.
268. PARTIAL DIFFERENTIAL EQUATIONS: of the partial differential equations of linear partial differential equations. Offered 1935-36. Mr. Langer.
269. THEORY OF INTEGRAL EQUATIONS: classical approach to offered 1935-36. Mr. Langer.
271. LINEAR ALGEBRAS. I: algebras of finite order. Offered 1936-37 and in alternate years.
272. SEMINARY IN ALGEBRA.
278. ORDINARY DIFFERENTIAL EQUATIONS. Not offered 1935-36. Attention is also called to the following courses:
- Physics 211. ADVANCED INTEGRAL EQUATIONS and Hamiltonian hydrodynamics and alternate years. 10
- Physics 215. THEORY OF ELLIPTIC FUNCTIONS: mathematical treatment of offered 1936-37 and in alternate years.

Courses in Theory of Equations, Advanced Theory of Functions are given at irregular times.

LEAST SQUARES. I; 3 cr.

A course in curve fitting, graphical calculation, and certain amount of laboratory of instructor. 1:30 MWF.

MATHEMATICS. II; 3 cr. A analysis of the content and intermediate mathematics. Offered in their senior year, to instructor. 10 MWF. Mr.

From year to year according to those introduced in addition to those of a course that it is information should be interesting.

Curves and surfaces in three dimensions. Introduction to corresponding methods. Not offered 1935-

This course like Course 221, directed to functions of the complex plane and the application of mathematical methods. 11 MWF. Mr.

3 cr. The aim of this course is to present theorems of analysis. It is offered 1936-37 and

3 cr. Not offered 1935-36.

I; 3 cr. A critical comparison in the domain of real functions and comparison of the development of functions. Not offered 1935-36.

6. Mr. Bennett.

and their singularities; Riemann surface. 8 MWF.

246. FINITE GROUPS. II; 3 cr. Abstract groups with examples showing the most important modes of representation and with applications to fundamental problems in other branches of mathematics. Not offered 1935-36. Mr. Ingraham.
258. FOUNDATION OF ANALYSIS. II; 3 cr. Not offered 1935-36. Mr. Ingraham.
263. HIGHER ALGEBRA. I; 3 cr. Matrices, linear dependence and independence, quadratic forms, elementary divisors, and the theory of infinite matrices. Offered 1935-36 and in alternate years. 1:30 MWF. Mr. Ingraham.
265. HARMONIC ANALYSIS. Yr; 3 cr. Boundary value problems connected with the partial differential equations of ordinary occurrence in mathematical physics. Fourier's series, series of Bessel's functions, and spherical harmonics. Offered 1936-37 and in alternate years. Mr. March.
266. THEORY OF NUMBERS. II; 3 cr. Theory of congruences and of algebraic integers. Offered 1935-36 and in alternate years. 1:30 MWF. Mr. Ingraham.
267. CALCULUS OF VARIATIONS. I; 3 cr. An introductory course devoted to the classical theory and problems. Prerequisite: Differential and integral calculus. Not offered 1935-36. Mr. Langer.
268. PARTIAL DIFFERENTIAL EQUATIONS. II; 3 cr. This course treats the theory of the partial differential equation of the first order and the various types of linear partial differential equations of second order. It presupposes an ordinary introductory course in differential equations, and some elementary knowledge of the theory of power series. Not offered 1935-36. Mr. Langer.
269. THEORY OF INTEGRAL EQUATIONS. II; 3 cr. An introductory course. The classical approach to the equations of Volterra and Fredholm types. Not offered 1935-36. Mr. Langer.
271. LINEAR ALGEBRAS. II; 3 cr. A course in the theory of linear associative algebras of finite order and their associated number theories. Offered 1936-37 and in alternate years. Mr. Ingraham.
272. SEMINARY IN ALGEBRA. Yr; 1 or 2 cr. 2:30 Tu. Mr. Ingraham.
278. ORDINARY DIFFERENTIAL EQUATIONS OF A COMPLEX VARIABLE. I; 3 cr. Not offered 1935-36. Mr. Langer.

Attention is also called to the following courses which are essentially mathematical.

Physics 211. ADVANCED DYNAMICS. Yr; 3 cr. Centralized coordinates, Lagrange's and Hamilton's equations, free and forced vibrations, elements of hydrodynamics and of the theory of elasticity. Offered 1935-36 and in alternate years. 10 MWF. Mr. March.

Physics 215. THEORY OF ELECTRICITY. Yr; 3 cr. A course devoted to the mathematical treatment of the Maxwell-Lorentz theory of electrodynamics. Offered 1936-37 and in alternate years. Mr. Sokolnikoff.

Courses in Theory of Elasticity, Theory of Potential, Advanced Algebraic Theory of Equations, Advanced Analytic Theory of Equations, and Infinite Series of Functions are given at intervals when demand warrants.

TEACHERS' COURSE

THE TEACHING OF MATHEMATICS. See School of Education.