THE Yale University Catalogue, giving general information concerning all schools (Freshman Year, Yale College, Sheffield Scientific School, School of Engineering, Graduate School, School of Medicine, Divinity School, School of Law, School of the Fine Arts, School of Music, School of Forestry, School of Nursing), will be forwarded to any address by the Secretary of the University on the receipt of fifty cents. (A copy will be sent free of charge to any graduate who desires it.) Each school supplies, free of charge, its own catalogue, giving full information concerning entrance requirements, expenses, courses of study, etc.

BULLETIN OF YALE UNIVERSITY

LUX ET VERITAS

UNDERGRADUATE COURSES OF STUDY

FALL AND SPRING TERMS

1945–1946

SERIES 41 1 SEPTEMBER 1945 NUMBER 17

visor. Consult Mr. Bellinger for Latin and either Mr. Bellinger or Mr. Hubbell for Classics.

Latin 20a, *Ovid*. Mr. Silk. [Sp] (5)
M, W, F, 12.10.

Ovid, and selected Latin prose. This course (with Latin 20b) prepares for Latin 30a and 30b. *Intended for students who have entered college with only three years of preparation in Latin.*

Latin 20b, *Vergil*. Mr. Silk. [F] (5)
M, W, F, 12.10.

This course (with *Latin* 20a) prepares for *Latin* 30a and 30b. *Intended for students who have entered college with only three years of preparation in Latin.*

Latin 30a, *Catullus and Horace*. Mr. Silk. [Sp] (23)
T, Th, S, 9.10.

Assuming the student will have acquired a mastery of fundamentals, the course is essentially literary in character. *After Latin* 20a *and* 20b *or their equivalent or for students offering four years of Latin for admission.* May precede or follow 30b, in satisfaction of the requirement in Classics.

Latin 30b, *Latin Prose*. Mr. Silk. [F] (23)
T, Th, S, 9.10.

Assuming the student will have acquired a mastery of fundamentals, the course is essentially literary in character. Deals with representative prose authors of the Republic and early Empire (Sallust, Tacitus, Seneca, Suetonius). *After Latin* 20a *and* 20b *or their equivalent or for students offering four years of Latin for admission.* May precede or follow 30a, in satisfaction of the requirement in Classics.

Latin 32a, *Lucretius*. Mr. Bellinger. [F] (2
M, W, F, 9.10.

The *De Rerum Natura* of Lucretius. Poetry and science in time of revolution.

Latin 32b, *Cicero and Horace*. Mr. Bellinger. [Sp]
M, W, F, 9.10.

Cicero's philosophical works and the *Epistles* of Horace. Roman attitudes toward life at the end of the Republic.

Latin 42–49, *Special Reading*. (*Discussion Courses.*) [F, Sp]
Latin 42. [Sp] *Latin* 46. [Sp]
Latin 44. [F] *Latin* 48. [F]
Hours to be arranged.

For students who desire upper-class work in Latin, including those who wish to major in Latin, special courses of reading or programs of study will be arranged under the appropriate course numbers as indicated above, to be pursued under such supervision as may be required. Consult Mr. Bellinger or Mr. Silk.

Note the absence of reference to Winter term when fall and →

NOTE: For courses in Classical Civilization, Ancient History, and Archeology, see pages 49–50.

Properly qualified undergraduates may, with the consent of the department and of the dean concerned, be admitted to certain graduate courses in Latin. For a description of these, see the catalogue of the Graduate School.

OMITTED COURSES

Latin 31a,b, *Advanced Freshman Latin; Latin* 33, *The Roman Historians; Latin* 34, *Tacitus; Latin* 35, *Latin Literature of the Republic; Latin* 36, *Latin Literature of the Empire; Latin* 37, *The Latin Epic; Latin* 38a, *The Age of Nero; Latin* 38b, *Roman Life and Manners; Latin* 39, *Roman Comedy; Latin* 40, *Writers of the Later Empire and the Middle Ages.*

MATHEMATICS*

CANDIDATES for the B.S. degree electing to major in Mathematics should refer to page 14.

Candidates for the B.A. degree electing to major in Mathematics should note the following paragraphs:

Prerequisites: Mathematics 11a,b or 12a,b, and 21a,b or 25a,b, or the equivalent.

Sophomores and Juniors will consult at once with a member of the following committee:

Mr. E. J. Miles, 741 JE, *chairman;* Mr. Dunford, 312 WLH; Mr. W. A. Wilson, 310 WLH.

The major. The major in Mathematics will normally consist of five two-hour courses in Mathematics to be chosen from those open to undergraduates and numbered 26 or higher.

Qualified students majoring in Mathematics may, with the approval of the department, write a Senior essay. A suitable subject should be selected in consultation with the member of the department with whom the student wishes to work. A student who does not write a Senior essay will take three courses in Mathematics or related subjects during the Senior year. Usually at least one of these courses should be chosen from related fields, for example, astronomy, physics, mathematical economics, or

Mathematics 11a,b, *Calculus and Trigonometry*. Mr. E. J. Miles. 6 hrs. [F, Sp] (19)
Hours to be arranged.
Divisions which started S45 and will continue F45:
1. M, W, F, 11.10.
7. T, Th, S, 11.10.

Introduction to the principles and uses of the calculus. At first, only algebraic functions are considered. Later, the trigonometric functions are

paragraph 10, p. 29, in regard to graduate courses.

spring are mentioned. Implies semesters.

defined and the calculus used in developing laws of trigonometry, f
students who have not passed trigonometry for entrance.

Mathematics 12a,b, *Analytic Geometry and Calculus.* Consult Mr. Du
ford or Mr. W. A. Wilson. [F, Sp] (19

Hours to be arranged.

Divisions which started S45 and will continue F45:

8. M, W, F, 8.	19, 19a. T, Th, S, 9.10.
9, 9a. M, W, F, 9.10.	20, 20a. T, Th, S, 10.10.
10. M, W, F, 10.10.	21, 21a. T, Th, S, 11.10.
11, 11a. M, W, F, 11.10.	22. T, Th, S, 12.10.
12. M, W, F, 12.10.	

An introductory course in the fundamental ideas of the differential and integral calculus. A sufficient amount of analytic geometry for the purpose is included. *For students who have passed trigonometry for entrance.*

★*Mathematics* 14a,b, *Mathematics for Architects.* Mr. ——. [Sp] (5)

Division which started Sp45 and will continue F45:

M, W, F, 12.10.

The purpose of this course is to familiarize the student with the fundamentals of plane trigonometry, analytic geometry, and calculus. Throughout the course considerable emphasis is laid on applications to mechanics and design. *For students of Architecture only.*

Mathematics 15a,b, *Calculus.* Consult Mr. Longley. (19)

Division which started S45 and will continue F45:

1. M, W, F, 8.

A brief course in the differential and integral calculus for NROTC students.

Mathematics 21a,b, *Calculus (continued).* Consult Mr. Longley. 6 hrs. [F, Sp] (19)

I. T, Th, S, 9.10. [F]

Division which started S45 and will continue F45:

V. T, Th, S, 12.10.

Topics from analytic geometry and calculus, including methods of approximating the roots of algebraic and transcendental equations, polar coördinates, and differential equations. *For Sophomores in Chemical, Civil, Electrical, and Mechanical Engineering, Chemistry, and Metallurgy.*

Mathematics 25a,b, *Sophomore Mathematics.* Mr. W. A. Wilson, Mr. Dunford. 6 hrs. [Sp] (19)

This course, together with Mathematics 12a,b, covers the material usually taken in undergraduate courses in analytic geometry and calculus. Endeavor is made to provide the student with sufficient mastery of technique for ordinary purposes, typical illustrations of the uses of calculus in other fields are given, and considerable attention is paid to the foundations of the subject. *For Freshmen and Sophomores who have passed Mathematics* 12a,b, *or its equivalent.*

Mathematics 26a,b, *Higher Algebra.* Mr. ——. 6 hrs. [F] (9)

T, Th, S, 10.10.

Topics of algebra which are useful for the further pursuit of pure or applied mathematics, especially actuarial or statistical work, including interest and annuities, summation of series, probability, theory of equations, and determinants. *For Sophomores (with the consent of the instructor), Juniors, and Seniors. After Mathematics* 11a,b *or* 12a,b.

Mathematics 27a, *Analytic Geometry.* Mr. Begle. 3 hrs. [F] (1)

M, W, F, 11.10.

Topics in plane analytic geometry including systems of lines, important applications of the conics, polar theory, transformations of the plane, inversion, modern geometry of the triangle and circle. *For Sophomores (with the consent of the instructor), Juniors, and Seniors.*

Mathematics 27b, *Solid Analytic Geometry.* Mr. Begle. 3 hrs. [Sp] (4)

M, W, F, 11.10.

Study of the topics of solid analytic geometry including systems of planes and spheres, stereographic projection, the important properties of quadric surfaces, invariants, polar theory, projective transformations, elementary differential geometry. *For Sophomores (with the consent of the instructor), Juniors, and Seniors.*

Mathematics 30a,b, *Advanced Calculus.* Mr. E. J. Miles. 6 hrs. [F] (19)

T, Th, S, 12.10.

More advanced topics of differential and integral calculus, with their applications, including differential equations. *After Mathematics* 21a,b *or* 25a,b.

Mathematics 34b, *Functions of a Complex Variable.* Mr. Hille. 3 hrs. [F] (10)

T, Th, S, 11.10.

Introduction to the theory of functions of a complex variable. *After Mathematics* 30a,b.

Mathematics 35a, *Theory of Numbers.* Mr. Ore. 3 hrs. [F] (3)

M, W, F, 10.10.

Divisibility properties of numbers, perfect and amicable numbers, Euclid algorithm, continued fractions and congruences with applications. *After Mathematics* 21a,b *or* 25a,b.

Mathematics 35b, *Determinants and Matrices.* Mr. Ore. 3 hrs. [Sp] (3)

M, W, F, 10.10.

Basic properties of determinants and linear equations, matrices, the elements of linear vector spaces and characteristic values. *After Mathematics* 21a,b *or* 25a,b.

Mathematics 36a, *Higher Mathematics for Students of Science and Engineering I.* Mr. Longley. 3 hrs. [F] (10)

T, Th, S, 11.10.

Ordinary differential equations with emphasis on linear equations;

hyperbolic, Gamma, and Bessel's functions; polynomials of Legend
Linear partial differential equations of the second order. *After Mat*
matics 21a,b *or* 25a,b.

Mathematics 36b, *Higher Mathematics for Students of Science and En*
neering II. Mr. Longley. 3 hrs. [Sp] (1
T, Th, S, 11.10.

Selected topics in partial differentiation and multiple integrals; ellipt
integrals, Fourier series, line integrals, vector analysis. *After Mathemati*
21a,b *or* 25a,b.

Mathematics 38, *Probability.* Mr. Ore. 3 hrs. [Sp] (2
M, W, F, 9.10.

The basic laws of probability, applications to problems of vario
kinds, the law of large numbers, normal and other probability laws. *Aft*
Mathematics 21a,b *or* 25a,b.

Mathematics 39, *Statistics.* Mr. Ore. 3 hrs. [F] (2
M, W, F, 9.10.

Frequency distributions, statistical constants and curve fitting, correl
tion and sampling. *After Mathematics* 21a,b *or* 25a,b.

The following courses in the Navy V-12 Program may be elected b
civilians:

M1, Mathematical Analysis I. Consult Mr. Dunford. [F, Sp] (19
This course is designed for the student with a limited high-scho
background in mathematics. Includes elementary college algebra an
trigonometry. Five lecture-recitation periods per week.

M2, Mathematical Analysis II. Consult Mr. Dunford. [F, Sp] (19
11. M, T, W, Th, F, 8. [F]
13. M, T, W, Th, F, 12.10. [F]

A continuation of Mathematical Analysis I. Includes college algebr
trigonometry, and analytic geometry. Five lecture-recitation periods pe
week. *After Mathematics M1.*

M5, Calculus I. Consult Mr. Longley. [F, Sp] (19
M, W, F, 9.10; T, 1.45. [F]

An introductory course in the differential and integral calculus wit
applications. Four or five lecture-recitation periods per week. *Aft*
Mathematics M2 or M4.

M6, Calculus II. Consult Mr. Longley. [Sp] (19
A continuation of Calculus I. Three or four lecture-recitation perio
per week. *After Mathematics M5.*

OMITTED COURSES

Mathematics 10a,b, *Algebraic Analysis; Mathematics* 28, *Mathematics*
of Investment; Mathematics 31, *Theoretical Mechanics; Mathematic*

32a,b, *Actuarial Mathematics; Mathematics* 34a, *Differential Equations;*
Mathematics 37a,b, *The Foundations and Development of Mathematics;*
Mathematics 40a,b, *Introduction to Exact Science.*

MECHANICAL ENGINEERING

GE3 (N), Industrial Organization. Mr. Seward. 3 hrs. [F] (4)
M, W, F, 11.10.

The historical background of industry; the Industrial Revolution; in
ventions and their effect on the social system; development of industria
enterprises in the United States; management and organization; plan
layout; control of budgets; operations; costs; methods and personnel
time and motion study; purchasing; cost finding; wages; labor relations

ME1 (N), Kinematics. Mr. Crossley. 2 hrs. [F] (2
I. *Rec.*, M, 9.10; *Comp.*, M, 1.45–4.35.
II. *Rec.*, W, 9.10; *Comp.*, W, 1.45–4.35.

Arrangements of kinematic chains. Graphical and analytical study of
displacements and velocities in mechanisms, including use of instantane-
ous centers, vector analysis, and relative velocities; accelerations in mecha-
nisms; design of cams.

ME2 (N), Elementary Heat Power. Mr. Wiedmann, Mr. Rhodes, Mr.
Townsend, Mr. M. F. Smith. 3 hrs. [F] (20)
I. *Rec.*, T, Th, 8; *Lab.*, W, 1.45–4.35.
II. *Rec.*, T, Th, 9.10; *Lab.*, S, 9.10–12.

Elements of thermodynamics, combustion, power generation, distribu-
tion, and use.

ME3 (N), Heat Power I. Mr. Lichty, Mr. Olson, Mr. Onuf, Mr. Rhodes,
Mr. Waibler. 5 hrs. [F] (23)
Rec. I. M, W, F, 8. *Lab.* I. W, F, 9.10–12.
II. M, W, F, 9.10. II. T, Th, 9.10–12.

The application of the principles of thermodynamics to various ma-
chines and processes.

ME3a (N), Heat Power Ia. Mr. Spurlock. 3 hrs. [F] (9)
Rec., T, Th, 10.10; *Lab.*, S, 9.10–12.

This course has the same objective as *ME3* but with fewer applications.

ME4a (N), Thermodynamics Ia. Mr. Lichty, Mr. Onuf, Mr. Waibler. 3
hrs. [F] (27)
I. M, W, F, 8.
II. T, Th, S, 8.
III. M, W, F, 9.10.

Principles of thermodynamics; energy and energy transformations;
properties of media, mixtures of media; and various elementary processes.

BULLETIN OF YALE UNIVERSITY

UNDERGRADUATE COURSES OF STUDY

SPRING AND SUMMER TERMS 1945

15 JANUARY 1945 NUMBER 2

for Latin 30a and 30b. *Intended for students who have entered college with only three years of preparation in Latin.*

[*Latin* 20b, *Vergil.* Mr. Silk. To be given F45.]

Latin 30a, *Catullus and Horace.* Mr. Silk. [S] (8)
T, Th, S, 9.10.

Assuming the student will have acquired a mastery of fundamentals, the course is essentially literary in character. *After Latin* 20a *and* 20b *or their equivalent or for students offering four years of Latin for admission.* May precede or follow 30b, in satisfaction of the requirement in Classics.

Latin 30b, *Latin Prose.* Mr. Silk. [Sp] (8)
T, Th, S, 9.10.

Assuming the student will have acquired a mastery of fundamentals, the course is essentially literary in character. Deals with representative prose authors of the Republic and early Empire (Sallust, Tacitus, Seneca, Suetonius). *After Latin* 20a *and* 20b *or their equivalent or for students offering four years of Latin for admission.* May precede or follow 30a, in satisfaction of the requirement in Classics.

[*Latin* 31a,b, *Advanced Freshman Latin.* Not given Sp45–S45.]

Latin 32a, *Lucretius.* Mr. Silk. [Sp] (2)
M, W, F, 9.10.

The *De Rerum Natura* of Lucretius. Poetry and science in time of revolution.

Latin 32b, *Cicero and Horace.* Mr. Silk. [S] (2)
M, W, F, 9.10.

Cicero's philosophical works and the *Epistles* of Horace. Roman attitudes toward life at the end of the Republic.

[*Latin* 33, *The Roman Historians.* Not given Sp45–S45.]

[*Latin* 34, *Tacitus.* Not given Sp45–S45.]

[*Latin* 35, *Latin Literature of the Republic.* Not given Sp45–S45.]

[*Latin* 36, *Latin Literature of the Empire.* Not given Sp45–S45.]

[*Latin* 37, *The Latin Epic.* Not given Sp45–S45.]

[*Latin* 38a, *The Age of Nero.* Not given Sp45–S45.]

[*Latin* 38b, *Roman Life and Manners.* Not given Sp45–S45.]

[*Latin* 39, *Roman Comedy.* Not given Sp45–S45.]

[*Latin* 40, *Writers of the Later Empire and the Middle Ages.* Not given Sp45–S45.]

Latin 42–49, *Special Reading.* (*Discussion Courses.*) [Sp, S]

Latin 42. [Sp] *Latin* 46. [Sp]
Latin 43. [S] *Latin* 47. [S]
Hours to be arranged.

For students who desire upper-class work in Latin, including those who wish to major in Latin, special courses of reading or programs of study will be arranged under the appropriate course numbers as indicated above, to be pursued under such supervision as may be required. Consult Mr. Bellinger or Mr. Silk.

NOTE: For courses in Classical Civilization, Ancient History, and Archeology, see pages 62–64.

Properly qualified undergraduates may, with the consent of the department and of the dean concerned, be admitted to certain graduate courses in Latin. For a description of these, see the catalogue of the Graduate School.

MATHEMATICS*

STUDENTS electing to major in Mathematics in the Sheffield Scientific School should refer to page 30.

Students electing to major in Mathematics in Yale College should note the following paragraphs:

Prerequisites: Mathematics 11a,b or 12a,b, and 21a,b or 25a,b, or the equivalent.

Sophomores and Juniors will consult at once with a member of the following committee:

Mr. E. J. Miles, 741 JE, *chairman;* Mr. J. I. Tracey, 1562 TD; Mr. W. A. Wilson, 310 WLH.

The major. The major in Mathematics will normally consist of five two-term courses in Mathematics to be chosen from those open to undergraduates and numbered 26 or higher.

Qualified students majoring in Mathematics may, with the approval of the department, write a Senior essay. A suitable subject should be selected after consultation with the member of the department with whom the student wishes to work. A student who does not write a Senior essay will take three courses in Mathematics or related subjects during the Senior year. Usually at least one of these courses should be chosen from related fields; for example, astronomy, physics, mathematical economics, or statistics.

NOTE: Undergraduate courses which are marked omitted during the spring and summer terms may be given if there is sufficient demand.

Mathematics 10a,b, *Algebraic Analysis.* Mr. ——. 6 hrs.
Omitted during the war.]

* See paragraph 10, p. 42, in regard to graduate courses.

Mathematics 11a,b, *Calculus and Trigonometry.* Mr. E. J. Miles. 6 hrs. [Sp, S] (19)

Division which started F44 and will continue Sp45:
5. T, Th, S, 9.10.

An introduction to the principles and uses of the calculus. At first, only algebraic functions are considered. Later, the trigonometric functions are defined and the calculus used in developing laws of trigonometry. *For students who have not passed trigonometry for entrance.*

Mathematics 12a,b, *Analytic Geometry and Calculus.* Consult Mr. J. I. Tracey or Mr. W. A. Wilson. [Sp, S] (19)

Divisions which started F44 and will continue Sp45:
32. M, W, F, 10.10.
36. T, Th, S, 9.10.
40. T, Th, S, 12.10.

An introductory course in the fundamental ideas of the differential and integral calculus. A sufficient amount of analytic geometry for the purpose is included. *For students who have passed trigonometry for entrance.*

**Mathematics* 14a,b, *Mathematics for Architects.* Mr. Durfee. [Sp] (5)
M, W, F, 12.10.

The purpose of this course is to familiarize the student with the fundamentals of plane trigonometry, analytic geometry, and calculus. Throughout the course considerable emphasis is laid on applications to mechanics and design. *For students of Architecture only.*

Mathematics 21a,b, *Calculus (continued).* Consult Mr. Longley. 6 hrs. [Sp, S] (19)

I. M, W, F, 11.10. [Sp]
II. T, Th, S, 9.10. [Sp]
III. T, Th, S, 12.10. [Sp]

Division which started F44 and will continue Sp45:
V. T, Th, S, 9.10.

Topics from analytic geometry and calculus, including methods of approximating the roots of algebraic and transcendental equations, polar coördinates, and differential equations. *For Sophomores in Chemical, Civil, Electrical, and Mechanical Engineering, Chemistry, and Metallurgy.*

Mathematics 25a,b, *Sophomore Mathematics.* Mr. W. A. Wilson, Mr. Dunford. 6 hrs. [Sp] (19)
T, Th, S, 11.10.

This course, together with Mathematics 12a,b, covers the material usually taken in undergraduate courses in analytic geometry and calculus. Endeavor is made to provide the student with sufficient mastery of technique for ordinary purposes, typical illustrations of the uses of calculus in other fields are given, and considerable attention is paid to the foundations of the subject. *For Freshmen and Sophomores who have passed Mathematics* 12a,b, *or its equivalent.*

Mathematics 26a,b, *Higher Algebra.* Mr. J. I. Tracey. 6 hrs. (8)

Division which started F44 and will continue Sp45:
T, Th, S, 9.10.

Topics of algebra which are useful for the further pursuit of pure or applied mathematics, especially actuarial or statistical work, including interest and annuities, summation of series, probability, theory of equations, and determinants. *For Sophomores (with the consent of the instructor), Juniors, and Seniors. After Mathematics* 11a,b *or* 12a,b.

Mathematics 27a, *Analytic Geometry.* Mr. J. I. Tracey. 3 hrs.

Topics in plane analytic geometry including systems of lines, important applications of the conics, polar theory, transformations of the plane, inversion, modern geometry of the triangle and circle. *For Sophomores (with the consent of the instructor), Juniors, and Seniors.*
Omitted Sp45–S45.

Mathematics 27b, *Solid Analytic Geometry.* Mr. J. I. Tracey. 3 hrs.

Study of the topics of solid analytic geometry including systems of lines and spheres, stereographic projection, the important properties of quadric surfaces, invariants, polar theory, projective transformations, elementary differential geometry. *For Sophomores (with the consent of the instructor), Juniors, and Seniors.* Omitted Sp45–S45.]

Mathematics 28, *Mathematics of Investment.* Mr. ——. 3 hrs.

Problems arising in connection with annuities, bond issues, depreciation, life insurance, etc. Omitted Sp45–S45.]

Mathematics 30a,b, *Advanced Calculus.* Mr. E. J. Miles. 6 hrs. (19)

Division which started F44 and will continue Sp45:
T, Th, S, 12.10.

More advanced topics of differential and integral calculus, with their applications, including differential equations. *After Mathematics* 21a,b *or* 25a,b.

Mathematics 31, *Theoretical Mechanics.* Mr. Longley. 3 hrs.

The principles of mechanics based on Newton's laws of motion, with applications to dynamics of particles. *After Mathematics* 21a,b *or* 25a,b.
Omitted Sp45–S45.]

Mathematics 32a,b, *Actuarial Mathematics.* Mr. Longley. 6 hrs.

Selected topics from the differential and integral calculus, finite differences and interpolation. *After Mathematics* 21a,b *or* 25a,b.
Omitted Sp45–S45.]

Mathematics 34a, *Differential Equations.* Mr. Longley. 3 hrs. [S] (10)
T, Th, S, 11.10.

Theory of differential equations, ordinary and partial, with emphasis on linear equations of the second order. *After Mathematics* 30a,b.

Mathematics 34b, *Functions of a Complex Variable.* Mr. Hille. 3 hrs.

Introduction to the theory of functions of a complex variable. *After Mathematics* 30a,b. To be given fall term 1945.]

Mathematics 35a, *Theory of Numbers*. Mr. Ore. 3 hrs. [Sp] (3)
M, W, F, 10.10.

Divisibility properties of numbers, perfect and amicable numbers, Euclid algorithm, continued fractions and congruences with applications. *After Mathematics* 21a,b *or* 25a,b.

Mathematics 35b, *Determinants and Matrices*. Mr. Ore. 3 hrs. [S] (3)
M, W, F, 10.10.

Basic properties of determinants and linear equations, matrices, the elements of linear vector spaces and characteristic values. *After Mathematics* 21a,b *or* 25a,b.

Mathematics 36a, *Higher Mathematics for Students of Science and Engineering I*. Mr. Begle. 3 hrs. [Sp] (11)
T, Th, S, 12.10.

Ordinary differential equations with emphasis on linear equations; hyperbolic, Gamma, and Bessel's functions; polynomials of Legendre. Linear partial differential equations of the second order. *After Mathematics* 21a,b *or* 25a,b.

Mathematics 36b, *Higher Mathematics for Students of Science and Engineering II*. Mr. Longley. 3 hrs. [S] (11)
T, Th, S, 12.10.

Selected topics in partial differentiation and multiple integrals; elliptic integrals, Fourier series, line integrals, vector analysis. *After Mathematics* 21a,b *or* 25a,b.

[*Mathematics* 37a,b, *The Foundations and Development of Mathematics*. Mr. W. A. Wilson. 6 hrs.

Selected topics in the foundations of elementary mathematics, other special topics not included in the regular courses, and the history of mathematics. The objectives are to give the student some insight into rigorous thinking, to broaden his mathematical knowledge, and to acquaint him with the cultural aspects of mathematics. *After Mathematics* 21a,b *or* 25a,b. Omitted Sp45–S45.]

Mathematics 38, *Probability*. Mr. Ore. 3 hrs. [Sp] (2)
M, W, F, 9.10.

The basic laws of probability, applications to problems of various kinds, the law of large numbers, normal and other probability laws. *After Mathematics* 21a,b *or* 25a,b.

[*Mathematics* 39, *Statistics*. Mr. Ore. 3 hrs.

Frequency distributions, statistical constants and curve fitting, correlation and sampling. *After Mathematics* 21a,b *or* 25a,b.
To be given fall term 1945.]

[*Mathematics* 40a,b, *Introduction to Exact Science*. Mr. E. J. Miles, Mr. Pollard. Omitted during war.]

The following courses in the Navy V-12 Program may be elected by ...ans:

...*Mathematical Analysis II*. Consult Mr. J. I. Tracey. [Sp]
...continuation of Mathematical Analysis I. Includes college algebra, ...nometry, and analytic geometry. Five lecture-recitation periods per ...k. *After Mathematics* M1.

...*Calculus I*. Consult Mr. Longley. [Sp, S]
...n introductory course in the differential and integral calculus with ...lications. Four or five lecture-recitation periods per week. *After ...hematics* M2 *or* M4 *or* 10-Va,b.

...*Calculus II*. Consult Mr. Longley. [Sp, S]
41. M, W, F, 9.10; T, 1.45. 4 hrs. [Sp]
42. M, W, F, 10.10. 3 hrs. [Sp]
43. T, Th, S, 9.10. 3 hrs. [Sp]
...continuation of Calculus I. Three or four lecture-recitation periods ...week. *After Mathematics* M5.

MECHANICAL ENGINEERING

...*E.* 12, *Mechanical Engineering*. Mr. Seeley, Mr. Keator. 4 hrs. Omitted in 1945.]

...*E.* 13, *Heat-Power Engineering*. Mr. Seeley, Mr. Keator. 4 hrs. Omitted in 1945.]

...*E.* 16, *Mechanical Equipment*. Mr. Keator. 3 hrs. Omitted in 1945.]

...*E.* 17, *Mechanical Design*. Mr. Waters. 3 hrs. Omitted in 1945.]

...*E.* 23a,b, *Industrial Management*. Mr. Seward. 6 hrs. Omitted in 1945.]

...*E.* 25a,b, *Thermodynamics*. Mr. Lichty. 5 hrs. Omitted in 1945.]

...*E.* 26, *Thermodynamics Laboratory*. Mr. Keator. 1 hr. Omitted in 1945.]

...*E.* 28a,b, *Senior Seminar*. Mr. Dudley. 2 hrs. [Sp, S]
I. T, 11.10–12.40.
II. W, 1.45–3.05.
...Papers by students on selected topics and addresses of general interest, ...th emphasis upon the method of preparation and effective presentation ...m the professional standpoint. *Part b may be taken before a.*

...*E.* 36a,b, *Engineering Design*. Mr. Waters. 6 hrs. Omitted in 1945.]

...*E.* 38a,b, *Mechanics of Machinery*. Mr. Seward. 4 hrs. Omitted in 1945.]

YALE COLLEGE*

WILLIAM CLYDE DEVANE, PH.D., LITT.D., Dean.
RICHARD CUSHMAN CARROLL, M.A., Assistant Dean.
RONALD CHARLES MARSH, B.A., Registrar.

YALE COLLEGE offers courses of study in the liberal arts leading to the degree of Bachelor of Arts (B.A.). The two requirements of a liberal education are the achievement of a liberal breadth, and the mastery of a particular study. The work of Sophomore year is designed to carry on work begun in Freshman year and to introduce the student to new fields of study. In Junior and Senior years opportunity is provided for a greater degree of concentration in a field of major interest, the student's comprehension of which is tested by his independent work in the field during his last two years and by a departmental examination at the close of his Senior year.†

Award of honors. The degree with honors in the work of any department may be awarded a Senior who, in the opinion and on the recommendation of the department concerned, and with the concurrence of the Committee on Honors, merits such award in view of his course work and his achievement in his major subject.

GENERAL PROVISIONS

1. *Basic program.* Each program of courses for the B.A. degree must provide first of all for the breadth of distribution which is essential to a rounded experience and basic to sound progress and concentration in the major field. Students who began their work at Yale before July 1, 1942, are required to take a course of two terms in each of the first three groups listed below. Students beginning their attendance at Yale after July 1, 1942, are required to take before graduation two term courses, or one two-term course, in each of the six groups, and in the first three groups the term courses must be consecutive or paired.

I. *Classical Languages and Civilization:*
Latin or Greek at level of 30 or above, or Classical Civilization.

II. *Modern Language:*
A course numbered 22 or above in French, or 30 or above in German, Italian, or Spanish. This requirement may also be satisfied by Italian 21a,b.*

III. *Natural Science:*
Astronomy, Biology, Botany, Chemistry, Geology, Physics, Zoology.

IV. *Social Science:*
Anthropology, Economics, Government, History, Psychology, Religion, Sociology.

V. *The Arts and Letters:*
The Fine Arts, Music, Literature—ancient or modern.

VI. *Systematic Thinking:*
Mathematics, Philosophy, or an advanced natural science. A course in the history of language.

2. The student shall normally elect five courses each term. Students in their final academic year shall take four courses each term, the essay or independent work required as part of the departmental major being counted as their fifth course. In the case of men of unusual promise and interest in independent work the Dean, on the recommendation of a department, may allow a student to substitute work on his essay or independent work for a third elective in his sixth term at Yale. Basic elementary courses must be taken in two consecutive terms.

3. At the end of Sophomore year every student shall elect a subject in which he will do his major work during his last two years. In general, the major will be the continuation of a subject studied in Freshman or Sophomore year (counting Biology as an introduction to Zoology): departures from this rule, to provide for the election of subjects not taken in the first two years, require the permission of the Dean of Yale College. The student shall frame his schedule of courses in his *major subject* in consultation with the department concerned and must secure the written approval of the department before his schedule is handed in. He should acquaint himself fully with all requirements of the department of his major study, with regard not merely to his immediate choices of Junior courses but to the plan of his entire work in preparation for the departmental examination at the close of his Senior year. This departmental examination, required of every student, will test his proficiency in his major subject as a whole.

Schedules including more than two courses in the major subject require the approval of the Dean.

*In the academic year 1944–45 this requirement may also be met by an intensive course of ten hours a week in French, German, Italian, and Spanish.

*The *Undergraduate Courses of Study* bulletin lists the individual courses, hours, and credits of subjects of instruction open to undergraduates.

†The departmental examination has been suspended for the duration of the war.

The list of subjects in which majors may be taken is as follows: Architecture; Art; Botany; Chemistry*; Classical Civilization (including Ancient History and Archeology); Classics (Greek and Latin combined); Drama; Economics; English; French; Geology; German; Government; Greek; History; History of Art; International Relations; Italian; Latin; Mathematics; Music; Philosophy; Physics; Psychology; Religion; Sociology (including Anthropology); Spanish; and Zoology. Astronomy may be elected, provided the plan of work embracing courses in related subjects is approved by the department and the Dean. Interdepartmental majors may also be taken in the following fields: French and Philosophy; History, the Arts, and Letters; Latin American Affairs; Oriental Studies, History, and Sociology (including Malayan Studies); and Philosophy and Government.

4. During the war the reading periods are eliminated. Seniors and Juniors are expected to prepare independently such essays as the department of their major may demand.

5. No credit will be given for an elementary course in a classical or modern language unless followed by a second course in the same language. However, credit for two three-hour term courses is given upon completion of French 12a,b, Greek 10–20a,b, or Italian 21a,b. Students intending to continue their work in graduate schools are strongly advised to equip themselves with Latin, French, and German, and other appropriate languages.

6. Subject to the written consent of the instructor, students may attend as auditors any course in Yale College.

GENERAL STANDARDS

A student in good standing who at the end of a term has attained an average of 80 or better is placed on the *Dean's Honor List* for the succeeding term.

The passing grade in a course is 60. To maintain good standing in his class the student must have passed all his courses in the preceding term and have attained a grade of 70 in at least 60 per cent of his work.

To be recommended for the Bachelor of Arts degree a student must complete successfully the work of all eight terms and attain grades of 70 in at least 60 per cent of his total work. He must also at-

* Attention is called to the fact that students who wish to prepare themselves directly for postgraduate or professional study or for professional work in chemistry should elect the program of study in Chemistry leading to the degree of Bachelor of Science.

T 8 terms implies semesters

tain at least six term grades of 70 in the work of his major field in his last four terms; pass the departmental examination and other work required in the field of his major; and be recommended to the faculty by the department of his major.

Students who have failed to meet the requirements for good standing in their respective classes at the end of any term or year are placed upon General Warning for the following term. When the student has reached the rank of Senior in good standing he shall not be subject thereafter to General Warning because of his grades. Notice of General Warning will be sent to the parent or guardian.

A student who has dropped a course, or failed it with a grade below 55, must take an additional course in a later term to make up his deficiency. A student who has failed a term course with a grade of 55 shall take a reëxamination in that course as arranged by the Dean's office. A grade of 60 in a reëxamination will remove the course deficiency, and will restore the student to good standing in his class if all other requirements have been met. A grade of 70 or better on a reëxamination will not count among the total grades of 70 or better required for graduation save in examinations taken after Commencement in Senior year.

Any student may be dropped from college after two General Warnings or when at the close of a term he has failed in two courses.

COMBINED COURSES

Students in Yale College may anticipate some of the work of the professional courses in the School of the Fine Arts. Credit is given for the work done in such courses toward both the B.A. and the B.Arch. or B.F.A. degrees. If a student elects to major, while in Yale College, in Architecture, Art (Painting or Sculpture), or Drama, he may anticipate as much as two terms' professional work. Consult the adviser for the major concerned.

Students in Yale College may also anticipate work in the School of Music by taking certain courses in the department of Music which are counted both for the B.A. and for the Mus.B. degrees. It is possible for qualified students who have majored in Music to obtain the Mus.B. degree by enrolling in the School of Music for one year after receiving the B.A. degree.

Students in Yale College who plan to study medicine and find it necessary or advisable to begin their medical studies before the completion of the full academic program of study may, if accepted by the School of Medicine, transfer to the Sheffield Scientific School without loss of credits and, under the existing combined-course arrangement between this school and the School of Medicine, be matricu-

lated in the latter and take the first year's work in medicine in place of the usual Senior program. Upon the satisfactory completion of this work they will be granted the degree of Bachelor of Science.

SOPHOMORE YEAR

For his Sophomore year every student must choose five of the following subjects: Anthropology, Arabic, Architecture, Art, Astronomy, Biology (or Zoology), Botany, Chemistry, Chinese, Classical Civilization, Drama, Economics, English, French, Geology, German, Government, Greek, History, History of Art, Italian, Japanese, Latin, Malay, Mathematics, Military Science, Music, Naval Science, Philosophy, Physics, Portuguese, Psychology, Religion, Russian, Sociology, Spanish. Certain other subjects are open to Sophomores under special conditions explained in the statements of the individual courses.

Courses numbered 30 or above, except in the modern languages, are not generally open to Sophomores unless a statement to that effect appears in the description of the course.

In general, a Sophomore will not be allowed to take more than one course in a subject; a student having serious reasons for taking more than one course in the same subject must submit a written statement, pinned to his schedule blank.

Students must meet the modern language requirement in their Junior year at the latest. The requirement is satisfied by passing or anticipating a course numbered 22 or above in French or 30 or above in German, Italian, or Spanish. Italian 21a,b also satisfies this requirement. In the academic year 1944–45 this requirement may also be met by the intensive courses in French, German, Italian, and Spanish, meeting ten hours a week.

Required in Sophomore schedules. Five courses each term. These courses must include a modern language, unless the requirement has been fulfilled, and Latin 30a and 30b or two terms of Greek 30a, 30b, or 30c, unless already passed in college, or Classical Civilization. The student choice of courses in Sophomore year must be signed by his counselor or the Dean.

SHEFFIELD SCIENTIFIC SCHOOL*

CHARLES HYDE WARREN, PH.D., Dean.
LOOMIS HAVEMEYER, PH.D., Associate Dean.

THE SHEFFIELD SCIENTIFIC SCHOOL offers departmental programs of study leading to the degree of Bachelor of Science (B.S.) in the following fields: Chemistry, Physiological Chemistry, Physics, Geology, Biology (botany, zoology, general biology for teachers, and agricultural science; includes premedical and preforestry studies), Bacteriology, Mathematics; and in certain basic technical and economic studies which prepare for careers in industry and commerce, designated Industrial Administration and Engineering, and Applied Economics, respectively.

The school also offers programs of study leading to the degree of Bachelor of Science (B.S.) which combine (*a*) an undergraduate course in biology with the work of the first year of the School of Medicine; (*b*) an undergraduate course in biology (botany option) with the work of the first year of the School of Forestry.

While no separate program of study is offered in Astronomy, students who wish to prepare for advanced study in this field should take the course in Mathematics or in Physics and elect, with the advice of the chairman of the department of Astronomy, certain of the courses in Astronomy offered by that department.

In each field of study the program offered is designed to allow the student to devote a substantial part of his time to study of fundamental subjects in or essential to his chosen field of concentration. Adequate provision is made, however, so that the student may take, if he desires, additional work in his major field beyond the minimum amount prescribed, or he may elect subjects of collateral interest or those of a more purely cultural character.

In order to qualify for the degree, a student must have passed all of his subjects of study and in addition must have received a grade of C or better in at least 60 per cent of his work. He must also have passed a final departmental examination (or its equivalent in one of the combined courses) in the field of his major subject of study.†

A more detailed statement regarding requirements for promotion from the lower to higher years, etc., may be found in the pamphlet entitled *Sheffield Scientific School Regulations.*

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†The departmental examination has been suspended for the duration of the war.