

Degrees and Courses of Study

Vassar College offers a balanced course of study leading to the degree of Bachelor of Arts. To permit flexibility, it offers also an opportunity for a four-year program leading to a combined Bachelor of Arts and Master of Arts or Science degree in a limited number of specified areas. It encourages students to pursue the degree through the development of a coherent program of study which recognizes, as much as possible, individual needs.

Requirements for the Degree of Bachelor of Arts

Units

Each candidate for the Bachelor of Arts degree is required to complete 34 units of work, equivalent to the standard of 120 semester hours recognized by the Board of Regents of the University of the State of New York. The system of units is threefold:

- a) the single unit, a course for one semester
- b) the half unit, equivalent to one-half of a semester course taken over an entire semester or for a half semester only
- c) the double unit, consisting of a year sequence of semester courses or the equivalent of two semester courses in one term

Freshman Course and Foreign Language Requirements

All graduates must comply with the Freshman Course requirement and the foreign language proficiency requirement as described below.

Residence

While four years is the usual length of time expected for the baccalaureate degree, students may be permitted to spend a longer or shorter time. The fact that many students will benefit from a break in the four-year sequence is acknowledged and reflected in the residence requirement. While students are expected to make orderly progress toward the degree, they are encouraged to move at the pace and in the fashion which suits their needs and those of their chosen program.

Residence Requirement

1. A student choosing a regular four-year program must spend at least three of those years in residence.

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III. Advanced

Prerequisite for all advanced courses: 2 units at the 200 level or by permission.

300a. Senior Thesis (1)
The department.

301b. Pasolini and Calvino: Culture, Language, and Society in Italy, 1948-1978 (1)

A study of Italian culture since World War II, concentrating on two major figures. Topics examined include: the Resistance, the national language and the dialects, Gramsci's Marxism, ecology and Neocapitalism, Neorealism and the cinema, semiotics. Mr. Ahern.

Required of all senior majors. Open to others with the instructor's permission.

327-328. Dante's *Divine Comedy* (1)

A close reading of the entire *Comedy* in its historical, philosophical, theological, and literary contexts. Designed for Italian majors in their senior year. Students in this course attend the same lectures as in Italian 227, 228, but do the reading in the original, attend a separate discussion class, and take separate exams. Mr. Ahern.

[330. The Early Renaissance] (1)

A study of Italian literature from Petrarch to Lorenzo de' Medici. The course will also deal with men and movements of primarily historical and intellectual rather than literary significance, such as Leon Battista Alberti and the Florentine Academy. Mr. Ahern.

Not offered in 1984-85.

[331a. The High Renaissance] (1)

A study of Italian literature and civilization from Machiavelli to Tasso. Special emphasis will be given to Machiavelli, to Guicciardini, to the decline of the Florentine republic, and to the beginnings of the Counter-Reformation in Italy. Mr. Ahern.

Not offered in 1984-85.

[370a, 371b. Practice in Writing and Discussion] (1)

Content to be determined by the needs and interests of the students. The aim is to develop a critical sense and to give methodological training in research in Italian literature. Instructor to be announced.

Not offered in 1984-85.

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Mathematics

Professor: David M. Merriell; **Associate Professors:** John A. Feroe (Chairman), Donald Z. Spicer; **Assistant Professors:** Alan B. Evans, David Guichard, John H. McCleary^{ab}, Charles I. Steinhorn; **Visiting Assistant Professor:** Peter Pappas.

Requirements for Concentration: 11 units including 120/121 or 180/181, 200, 224/225, 301, 326, 361, and 335 or 355. Freshman seminars, 117, 119, 165, and reading courses are not counted among the required 11 units. The department allows Pass/Fail work to be used to satisfy major requirements but advises against this as a general practice.

Senior Year Requirements: At least 1 unit each semester of 300-level work in addition to 301. This requirement may be satisfied by 399 if the student has already completed 6 units of 300-level work in regular classes.

Recommendations: Majors are strongly urged to elect at least 2 units in applications of mathematics to other fields. A reading knowledge of French, German, or Russian is advised for those contemplating graduate study.

Sequence of Courses for Concentration: Students will normally elect 120/121 or 180/181, 200, 224/225, but freshmen eligible for Advanced Placement should confer with the department. Election of advanced courses should be made in consultation with a departmental adviser.

Advisers: The department.

Please note:

- a) No student who has received one unit of Advanced Placement credit based on either the AB Mathematics Advanced Placement Examination or the calculus credit examination administered by the Department of Mathematics may be granted credit for Math 115, 120, or 180.
- b) No student who has received a total of two units of Advanced Placement credit based on the BC Advanced Placement Examination, the AB Advanced Placement Examination, the calculus credit examination or a combination of the above may be granted credit for Math 115, 120, 121, 125, 180 or 181.

I. Introductory

114a-115b. Pre-Calculus and Introduction to Calculus (½, 1)

This sequence is designed for students who wish to take Mathematics 115, Introduction to Calculus, but whose mathematical background is deficient. Students with three years of high school mathematics should begin with Mathematics 115. Topics of Mathematics 114 include the algebra of polynomials, operations with fractions, solving equations and inequalities, exponents and radicals, elements of coordinate geometry, functions and their graphs, logarithms and elements of trigonometry. The department.

On the satisfactory completion of Mathematics 115, the student will receive one-half unit of credit for Mathematics 114.

Not open to students with AP credit in mathematics or students who have completed Mathematics 115, 120 or 180.

Prerequisite: high school mathematics.

^{ab}Absent on leave for the year.

115b. Introduction to Calculus (1)
A short course intended for students not majoring in mathematics or the physical sciences who need a working knowledge of calculus. The course emphasizes techniques and applications with relatively little attention to the rigorous foundations. The department.

Not open to those who have had 120 or 180.

Prerequisite: at least three years of high school mathematics.

117b. Excursions in Mathematics (1)
An investigation of several problems in mathematics aimed at developing an appreciation of the spirit of mathematics. Mr. Guichard.

[119a. Non-Euclidean Geometry] (1)
The consequences of dropping the parallel postulate from Euclid's axioms of geometry. Philosophical implications, historical perspective, and real-world applications with careful development of the theory. Mr. McCleary.

Prerequisite: one year of high school geometry.

Not offered in 1984-85.

120a/121b.

120a. Elementary Calculus I (1)
Calculus of functions of one variable. Limits, continuity, derivatives, mean value theorem, applications of derivatives, definite integral. The department.

Not open to those who have had 115 or 180.

Prerequisite: a minimum of three years of high school mathematics, preferably including trigonometry.

121a or b. Elementary Calculus II (1)
Continuation of 120. Transcendental functions, techniques of integration, applications of definite integrals, approximation methods, parametric equations, polar coordinates. The department.

Not open to those who have had 125 or 181.

Prerequisite: 120 or equivalent.

125a. Topics in Calculus (1)
A continuation of 115. Topics may include matrix methods, use of differentiation and integration, differential equations, partial differentiation. Emphasis will be on techniques and applications. Mr. Evans.

Not open to those who have had 121.

Prerequisite: 115 or equivalent.

[165b. Elementary Statistics] (1)
Probability spaces; random variables; random samples; laws of large numbers; estimation of parameters; central limit theorem; confidence intervals and tests of hypotheses; regression.

Prerequisite: two years of high school algebra.

Not offered in 1984-85.

180a/181b. Calculus With Discrete Mathematics (1)
This course, which is being offered for the first time, eventually will supplant Mathematics 120a/121b. Topics from the calculus of one variable, discrete

mathematics and probability are combined to reflect their common features, and are applied to a variety of disciplines. Topics include: limits, continuity, derivatives, applications of derivatives, transcendental functions, the definite integral, applications of definite integrals, approximation methods, difference and differential equations, combinatorial methods, discrete and continuous probability. The department.

Not open to those who have had Math 120 or Math 115.

Prerequisite: a minimum of three years of high school mathematics, preferably including trigonometry.

II. Intermediate

Prerequisite for all intermediate courses: 121, 125, 181 or equivalent, unless otherwise indicated.

200b. Infinite Series (1/2)
Sequences, series, convergence tests, power series. Mr. Merriell.
Two 50-minute periods.

201b. Differential Equations (1/2)
Emphasis on methods of solution of ordinary differential equations. First and second order equations, linear equations, power series methods. Mr. Merriell.
Two 50-minute periods.

210a. Discrete Mathematics (1)
Mathematical induction, elements of set theory and logic, permutations and combinations, relations, topics in graph theory, generating functions, recurrence relations, Boolean algebras. Mr. Evans.

215b. Methods of Mathematical Modeling (1)
A survey of mathematical models with emphasis on how they arise in a given problem; topics chosen from linear, integer and dynamic programming, game theory, decision theory, queuing theory, combinatorial methods, and graph theory. Probabilistic and differential techniques developed as needed. Mr. Pappas.

224a/225b.

224a. Multivariable Calculus I (1)
Calculus of functions of several variables. Elements of linear algebra, differential calculus of vector functions. The department.

225b. Multivariable Calculus II (1)
Continuation of 224. Implicit function theorem, extreme values, multiple integrals, vector field theory. The department.
Additional prerequisite: 224 or equivalent.

268a. Probability Models (1)
A presentation of commonly applied discrete and continuous probability distributions. The use of expectation, independence, conditional probability, and related statistical concepts. Mr. Feroe.

- 275b. Introduction to Numerical Methods** (1)
 (Same as Computer Science 275) Error and its propagation. Numerical approximation, interpolation, differentiation, integration. Solution of algebraic equations, systems of linear equations. Mr. Duffy.
 Additional prerequisite: ability to program in one high level language.

Reading Courses

Prerequisite: 224 or equivalent, and permission of the instructor.

- 297.01. Elementary Number Theory** (½)
 The department.
- 297.04. Non-Euclidean Geometry** (½)
 The department.
- 298. Junior Independent Work** (½ or 1)
 Election should be made in consultation with a departmental adviser.

III. Advanced

Prerequisite for all advanced courses: 225, unless otherwise indicated.

For students planning graduate study in mathematics, 355, 365, and 375 are strongly recommended.

- 301b. Senior Seminar** (½ or 1)
 Areas of study and units of credit will vary from year to year. Mr. Spicer.
 Open only to seniors whose major is mathematics.
- 303b. Senior Seminar** (½)
 (Same as Mathematics-Computer Science Seminar 303b.) Topics will vary from year to year. Mr. Guichard.
 Open only to seniors whose major is Mathematics-Computer Science.
- 326a. Real Analysis** (1)
 A rigorous treatment of topics in the classical theory of functions of a real variable from the point of view of metric space topology; limits; continuity, sequences and series of functions, and the Riemann-Stieltjes integral. Mr. Spicer.
- [328b. Theory of Differential Equations]** (1)
 Existence and uniqueness theorems for ordinary differential equations; general theory and eigenvalue methods for first order linear systems. Mr. Feroe.
 Prerequisite: 326 or permission of the instructor; 201 will also be helpful but is not essential.
 Not offered in 1984-85.
- [335b. Topics in Differential Geometry and Topology]** (1)
 Aspects of the elementary geometry and topology of differentiable manifolds. Topics will vary from year to year. Mr. McCleary.
 Prerequisite: 326.
 Not offered in 1984-85.

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- [340b. Theory of Computation]** (1)
 (Same as Computer Science 340) Finite automata and regular sets; context-free grammars and languages, push-down automata; models of computation including Turing machines and partial recursive functions: recursive function theory, the halting problem and other unsolvable problems. Mr. Evans.
 Prerequisite: Math 210.
 Not offered in 1984-85.

- 341b. Computational Complexity and Analysis of Algorithms** (1)
 (Same as Computer Science 341) Models of computation; construction of algorithms, analysis of worst-case and average behavior; complexity measures and bounds; sorting and searching, algorithms on trees, graphs and networks, matrix operations; the classes of P, NP and NP-complete problems, intractable problems and approximation algorithms. Mr. Evans.
 Prerequisite: Math 210.

- 350a. Foundations of Mathematics** (1)
 Axiom systems, set theory, cardinal numbers, well-ordering, real numbers, controversies in mathematical philosophy. Mr. Guichard.

- 355b. Topology** (1)
 An introduction to point set topology; a study of topological spaces with emphasis on continuous mappings, connectedness, compactness, separation properties, metric and product spaces. Mr. Steinhorn.
 Prerequisite: 326.

- 361a. Modern Algebra** (1)
 Groups, rings, and fields. Mr. Merriell.
 Prerequisite: 224.

- 365b. Complex Analysis** (1)
 Integration and differentiation in the complex plane. Topics include: holomorphic (differentiable) functions; power series as holomorphic functions; Taylor series and their singularities; complex integration and, in particular, Cauchy's theorem and its consequences; Laurent series. Mr. Spicer.

- 375a. Linear Algebra with Applications** (1)
 (Same as Computer Science 375) Advanced topics in matrix theory and linear algebra. Mr. Steinhorn.

- 380b. Topics in Advanced Mathematics** (1)
 Advanced study in such areas as real analysis and modern algebra, offered in response to demand. The department.

- 399. Senior Independent Work** (½ or 1)
 Election requires the approval of a departmental adviser and of the instructor who will supervise the work.