

THE MATHEMATICS MINOR

AT FRANKLIN & MARSHALL COLLEGE

Catalog description

A minor in mathematics may be completed in one of two tracks. The “theoretical math track” consists of MAT 109, 110, 111, and 211; and two courses chosen from MAT 325, 330, 331, 442, 445, 446, or other theoretical courses as designated by the department. The “applied math track” consists of MAT 109, 110, and 111; and three courses from MAT 216, 229, 316, 323, 329, 337, 338, 339, or other applied modeling courses as designated by the department.

Course Offering Schedule

Spring 2010

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|----------------------------|------------------------------------|------------------------------------|
| •211 IHM [111] | *316 Prob. & Stat. II [111, 216] | •474 Topics in Real Analysis [331] |
| *216 Prob. & Stat. I [110] | *329 Fourier Series (M) [229] | |
| *229 LA/DE [111] | •330 Abstract Algebra [211] | |
| | *337 Optimization (M) [229] | |
| | 372 Dynamical Systems [211 or 229] | |

Fall 2010

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|----------------------------|-----------------------------|---------------------|
| •211 IHM [111] | •325 Number Theory [211] | •445 Geometry [330] |
| *216 Prob. & Stat. I [110] | •331 Intro. Analysis [211] | |
| *229 LA/DE [111] | *339 Math. Models (M) [229] | |

Spring 2011

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|----------------------------|----------------------------------|-----------------------------|
| •211 IHM [111] | *316 Prob. & Stat. II [111, 216] | •442 Complex Analysis [331] |
| *216 Prob. & Stat. I [110] | *323 Stoch. Proc. (M) [111, 216] | |
| *229 LA/DE [111] | •330 Abstract Algebra [211] | |
| 237 Discrete Math. | | |

Fall 2011

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|----------------------------|--------------------------------|--------------------------|
| •211 IHM [111] | •331 Intro. Analysis [211] | •446 Topology [330]<331> |
| *216 Prob. & Stat. I [110] | *338 Comp. Math. [229, CPS150] | |
| *229 LA/DE [111] | | |

Spring 2012

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|----------------------------|----------------------------------|-------------------------------|
| •211 IHM [111] | *316 Prob. & Stat. II [111, 216] | •47X Topics in Algebra [330] |
| *216 Prob. & Stat. I [110] | *329 Fourier Series (M) [229] | or |
| *229 LA/DE [111] | •330 Abstract Algebra [211] | •47X Topics in Analysis [331] |
| | *337 Optimization (M) [229] | |

[] = prerequisite(s) < > = corequisite(s) (M) = modeling course (for major)
 • = theoretical math track * = applied math track

Mathematics Courses

211. Introduction to Higher Mathematics.

Every Semester

A course designed as a transition from calculus to advanced mathematics courses. Emphasis on developing conjectures, experimentation, writing proofs, and generalization. Topics will be chosen from number theory, combinatorics and graph theory, polynomials, sequences and series, and dynamical systems, among others. Prerequisite: MAT111.

216. Probability and Statistics I

Every Semester

Introduction to single variable probability and statistics. Random variables. Binomial, geometric, Poisson, exponential and gamma distributions, among others. Counting techniques. Estimation and hypothesis tests on a single parameter. Prerequisite: MAT110.

229. Linear Algebra and Differential Equations.

Every Semester

Systems of linear equations and matrices, vector spaces, linear transformations, determinants, eigenvalues and eigenvectors, n th order linear differential equations, systems of first order differential equations. Prerequisite: MAT111.

237. Discrete Mathematics.

Spring 2011

Basic set theory, combinatorics (the theory of counting), finite difference equations, and graph theory with related algorithms.

316. Probability and Statistics II

Every Spring

Continuation of MAT216. Multivariate distributions. Estimation and hypothesis tests for multiple parameters. Regression and correlation. Analysis of variance. Prerequisites: MAT111, MAT216.

323. Stochastic Processes.

Spring 2011

Properties of stochastic processes, Markov chains, Poisson processes, Markov processes, queueing theory. Applications of stochastic modeling to other disciplines. Prerequisites: MAT111, MAT216.

325. Number Theory.

Fall 2010

Properties of the natural numbers and integers: divisibility, primes, number theoretic functions, Diophantine equations, congruences, quadratic reciprocity, additive number theory, unsolved problems. Prerequisite: MAT211.

329. Fourier Series.

Spring 2010

Fourier series, orthogonal series, boundary value problems, applications. Prerequisite: MAT229.

330. Abstract Algebra.

Every Spring

Algebraic systems and their morphisms including sets, functions, groups, homomorphisms, factor groups, rings, and fields. Prerequisite: MAT211.

331. Introduction to Analysis.

Every Fall

An introduction to the ideas and proof techniques specific to mathematical analysis. Real numbers, sequences, limits, derivatives, integrals, infinite series, cardinality; other topics as chosen by instructor. Prerequisite: MAT211.

337. Mathematics for Optimization.

Spring 2010

Discrete, deterministic models of interest to the social sciences. Linear programming, duality, simplex method, sensitivity analysis, convex sets. Selections from: assignment, transportation, network flow, nonlinear programming problems. Prerequisite: MAT229.

339. Mathematical Models.

Fall 2010

An introduction to the art of creating and analyzing deterministic mathematical models. Models of physical, biological, and social phenomena. Topics vary with instructor; examples are predator-prey interactions, spread of epidemics, arms races, and changes in global temperature. Mathematical techniques include phase-plane analysis of systems of differential equations, and function iteration. Prerequisite: MAT229.

442. Complex Analysis.

Spring 2011

Functions of one complex variable: analytic functions; mappings; integrals; power series; residues; conformal mappings. Prerequisite: MAT331.

445. Geometry.

Fall 2010

Selections from: advanced synthetic geometry; groups of transformations; affine geometry; metric geometry; projective geometry; inversive geometry. Prerequisite: MAT330.

446. Topology.

Fall 2011

An introduction to topological spaces and continuous functions. Prerequisite: MAT330. Corequisite: MAT331.