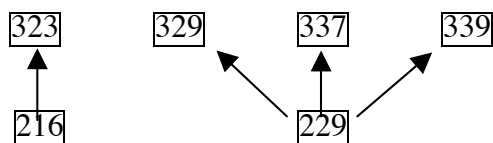


THE MATHEMATICS MAJOR AT FRANKLIN & MARSHALL COLLEGE

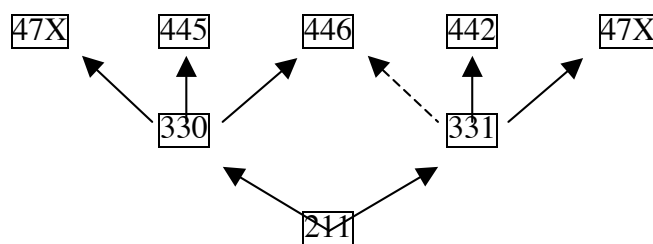
Catalog description

A major in Mathematics requires completion of MAT 109, 110, 111, 211, and 229; MAT 330 and 331; one course from MAT 323, 329, 337, 339, or other courses in mathematical modeling as offered by the department; one mathematics course numbered 400 or higher, other than 490 or 491; and sufficient electives so that the total number of mathematics courses taken beyond MAT 111 is nine. One of the electives may be chosen from PHY 226, ECO 410 (now 310), PHI 244, CHM 321, PSY 360, or, with approval of the department, other mathematically intensive courses; 100-level courses may not be used as electives for the Mathematics major.

Prerequisite structure for modeling courses (one required)



Prerequisite structure for 400 level courses (one required)



→ prerequisite
- - - → corequisite

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.

Mathematics Course Offering Schedule

Spring 2010

211 IHM [111] 216 Prob. & Stat. I [110] 229 LA/DE [111]	316 Prob. & Stat. II [111, 216] 329 Fourier Series (M) [229] 330 Abstract Algebra [211] 337 Optimization (M) [229] 372 Dynamical Systems [211 or 229]	474 Topics in Real Analysis [331]
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Fall 2010

211 IHM [111] 216 Prob. & Stat. I [110] 229 LA/DE [111]	325 Number Theory [211] 331 Intro. Analysis [211] 339 Math. Models (M) [229]	445 Geometry [330]
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Spring 2011

211 IHM [111] 216 Prob. & Stat. I [110] 229 LA/DE [111] 237 Discrete Math.	316 Prob. & Stat. II [111, 216] 323 Stoch. Proc. (M) [111, 216] 330 Abstract Algebra [211]	442 Complex Analysis [331]
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Fall 2011

211 IHM [111] 216 Prob. & Stat. I [110] 229 LA/DE [111]	331 Intro. Analysis [211] 338 Comp. Math. [229, CPS150]	446 Topology [330]<331>
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Spring 2012

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

< > = corequisite(s)

(M) = modeling course

Advice for planning your math classes

You should consult frequently with your advisor, and keep these guidelines in mind.

You should take MAT211 as soon as possible, no later than the first semester of your junior year. If you plan to study abroad, you should take MAT211 before you go.

If you are interested in teaching secondary school mathematics, you should try to take MAT216, 316, 325, 445, and CPS150.

If you are interested in actuarial science or statistics, you should = try to take MAT216, 316, 323, and CPS150.

If you are planning to go to graduate school, you should try to take MAT442, 446, 47X, and CPS150.

While we do not require that you take a computer science course, it would be a good idea to take one if you can; you should start with CPS 150 Introduction to Computer Science.

A chart for planning your math courses

	Math Course	Pre-requisite
Fall, Junior year	_____	_____
	_____	_____
Spring, Junior year	_____	_____
	_____	_____
Fall, Senior year	_____	_____
	_____	_____
Spring, Senior year	_____	_____
	_____	_____