375. Applied Fixed and Mixed Effects Models (Gaugler)
This course will explore the applications of linear models. After a brief review of simple and multiple regression (including residual diagnostics, transformations and model selection), topics will include modern approaches to shrinkage estimation and variable selection (e.g. ridge regression and the LASSO), experimental design and effects on factor classification (fixed/random), the general ANOVA framework and F-test construction, and repeated measures models via covariance structure specification in mixed models.
Prequisite: Mathematics 336.

Visit http://math.lafayette.edu/ for updates on these and other courses anticipated for next academic year.

Note: It is recommended that both Mathematics **290** and **300** be taken by the end of the second year to permit the widest possible selection of courses in the third and fourth years.

Anticipated Courses for Spring 2016

182 Discrete Mathematics
264 Differential Equations
272 Linear Algebra with Applications
282 Techniques of Mathematical Modeling
290 Transition to Theoretical Mathematics
300 Vector Spaces
306 Operations Research
310 Ordinary Differential Equations
335 Probability
336 Mathematical Statistics
352 Abstract Algebra II
356 Introduction to Real Analysis
400 Senior Seminar

Special Topics:

TBA

Special & Advanced Mathematics Courses for Fall 2015

264. Differential Equations (Corvino/Yuster)
An introductory course in ordinary differential equations including techniques of elementary linear algebra. Emphasis is on first-order equations, and higher-order linear equations and systems of equations. Topics include qualitative analysis of differential equations, analytical and numerical solutions, Laplace transforms, existence and uniqueness of solutions, and elemental models in science and engineering. **Prerequisite: Mathematics 263.**

272. Linear Algebra with Applications (Thompson)
An introductory course in linear algebra emphasizing applications to fields such as economics, natural sciences, computer science, statistics, and engineering. The course covers solutions of systems of equations, matrix algebra, vector spaces, linear transformations, determinants, eigenvalues, and eigenvectors. **Corequisite: Mathematics 263 or permission of instructor.**

290. Transition to Theoretical Math (Corvino)
An introduction to the concepts and techniques that permeate advanced mathematics. Topics include set theory, propositional logic, proof techniques, relations, and functions. Special emphasis on developing students' facility for reading and writing mathematical proofs. Examples and additional topics are included from various branches of mathematics, at the discretion of the instructor. **Corequisite: Mathematics 263 or permission of instructor.**

301. Case Studies in Math Modeling (Hill)
A course which engages students in the creation of mathematical models to answer questions about a variety of phenomena. Students work in small teams on a sequence of projects which require the formulation, analysis, and critical evaluation of a mathematical model and conclude with the submission of a written report by each student. **Prerequisite: Mathematics 272 or 300.**

325. Combinatorics (Bloom)
An introduction to the techniques and theory of enumeration of finite sets. Topics include combinations, permutations, generating functions, recurrence relations, the inclusion-exclusion principle, block designs, and graph theory. **Prerequisite: Math 263 or permission of instructor; reading and writing proofs will be a significant part of the course, so Math 290 could be useful, though it is not a prerequisite.**

335. Probability (Lu)
A development of basic probability theory including the axioms, random variables, expected value, the law of large numbers, and the central limit theorem. Additional topics include distribution functions and generating functions. **Prerequisite: Mathematics 263.**

336. Mathematical Statistics (Liebner)
A mathematical development of fundamental results and techniques in statistics. Topics include estimation, sampling distributions, hypothesis testing, correlation and regression. **Prerequisite: Mathematics 335.**

343. Advanced Multivariable Calculus (Dahl)
A continuation of multivariable calculus from Mathematics 263, using concepts from linear algebra. Topics include the derivative as a linear transformation, the Chain Rule, the Inverse and Implicit Function Theorems, the Change of Variables Theorem, and the integral theorems of Green, Gauss and Stokes. Additional topics may include differential forms and series of functions.
Prerequisite: Mathematics 263 and 272 or 300.

351. Abstract Algebra I (McMahon)
An introduction to some of the fundamental ideas and structures of abstract algebra. Homomorphisms and isomorphisms, substructures and quotient structures are discussed for algebraic objects such as fields, vector spaces, rings, and groups. Other topics may include factorization in rings, and finite group theory. **Prerequisite: Mathematics 290.**

357. Real Analysis II (Hill)
An introduction to metric spaces and measure theory. Topics covered include metric space topology, compactness and completeness, uniform convergence of functions, basic measure theory, construction of Lebesgue measure on the real line, and the definition and basic convergence properties of the Lebesgue integral.
Prerequisite: Mathematics 356 or permission of instructor.