Special Topics:

Math 37* Intro to Bayesian Analysis
Bayesian analysis is a method of statistical analysis that uses a framework of probability statements to address questions regarding hypotheses and parameter values. This framework allows for updating as additional evidence or data becomes available. Bayesian statistics presents an alternative view to statistical analysis that is growing in popularity, contrasting the familiar frequentist approach. Topics include prior and posterior distributions, empirical Bayes, Gibbs samplers, and the Metropolis-Hastings algorithm. Prerequisite: Math 336 or permission of instructor
Liebner

Math 37* Representation Theory
This course provides an introduction to the representation of finite groups. Topics covered include the group algebra, Maschke's Theorem, Schur's Lemma, as well as the theory of characters. Applications of representation theory to algebra, like the famous Schur-Zassenhaus Theorem, and to combinatorics, like the representations of the symmetric group, will also be explored. Prerequisite: Math 351; Corequisite: Math 300, or permission of instructor
Bloom

Recommendation: ***AB/BS Math Majors should take both Mathematics 290 and 300 by the end of the second year to permit the widest possible selection of courses in the third and fourth years.***

Some Anticipated Courses for Fall 2021:

264 Differential Equations
272 Linear Algebra with Applications
290 Transition to Theoretical Mathematics
301 Case Studies in Mathematical Modeling
325 Combinatorics
335 Probability
336 Mathematical Statistics
343 Advanced Multivariable Calculus
351 Abstract Algebra I
357 Real Analysis II

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

Special & Advanced Mathematics Courses

Spring 2021

264. Differential Equations
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. **TBA**

272. Linear Algebra with Applications
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. **TBA**

282. Techniques of Mathematical Modeling
A course that introduces students to the fundamentals of mathematical modeling through the formulation, analysis, and testing of mathematical models in a variety of areas. Modeling techniques covered include proportionality, curve fitting, elementary linear programming, and simulation.
Prerequisite: Mathematics 162 or 166. **Zhou**

286. Intro to Probability & Math Statistics
This course will serve as a one-semester introduction to probability and mathematical statistics, with roughly half of the semester devoted to each. After learning basics of set theory and axiomatic probability, we review random variables, probability mass/density functions, expected value (including covariance and correlation), and expected value and variance of linear combinations. Then we begin inferential statistics (confidence intervals and hypothesis tests), correlation and simple linear regression, and, time permitting, one-way analysis of variance and/or chi-squared tests. Prerequisite: Math 263. **Gaugler**

290. Transition to Theoretical Math
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. **Corvino**

300. Vector Spaces
A first course in theoretical linear algebra, emphasizing the reading and writing of proofs. Topics include systems of linear equations, matrix algebra, vector spaces and linear transformations, eigenvectors and diagonalization, inner product spaces, and the Spectral Theorem. Not open to students with credit for Mathematics 272.
Prerequisite: Mathematics 290 or permission of instructor. **Zulli**

306. Operations Research
A study of some mathematical methods of decision making. Topics include: linear programming (maximizing linear functions subject to linear constraints), the simplex algorithm for solving linear programming problems, sensitivity analysis, networks and inventory problems and applications.
Prerequisite: Mathematics 272 or Mathematics 300 or permission of instructor. **Bloom**

312. Partial Differential Equations
An introduction to partial differential equations and their applications. Formulation of initial and boundary value problems for these equations and methods for their solution are emphasized. Separation of variables and Fourier analysis are developed. The course includes interpretation of classical equations and their solutions in terms of applications. Prerequisite: Mathematics 263. **Corvino**

328. Number Theory
An introduction to the theory of the integers and techniques for their study and application. Topics include primality, modular arithmetic, arithmetic functions, quadratic residues, and diophantine equations. **Reiter**

335. Probability
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: Math 263. **Fisher**

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

347. Financial Mathematics A wide range of topics in mathematical finance are covered, including: continuous time models such as the Brownian motion model for stock prices, the Black-Scholes model for options prices, the Ho-Lee, Vasicek and other models for interest rates, also different hedging strategies and numerical approaches for derivative pricing such as binomial trees, Monte-Carlo simulation and finite difference methods, and price models for credit derivatives such as asset swaps, credit default swaps and collateralized debt obligations.
Prerequisite: Economics 101, Mathematics 335.
Lu

356. Intro to Real Analysis
A rigorous development of the calculus of functions of one real variable including the topology of the real line, limits, uniform convergence, continuity, differentiation and integration. Prerequisite: Mathematics 290.
Fisher