Mathematics (MT)

MT 5312. Boundary Value Problems. 3 Semester Hours.
Theory and methods used to analyze linear and nonlinear boundary value problems within both classical and modern frameworks. Emphasis is placed on functional analytic techniques, including Sobolev spaces and weak formulations, to establish existence, uniqueness, and regularity results. Advanced topics such as Sturm–Liouville theory, Green's functions, variational methods, spectral theory, and the treatment of singular and nonlinear problems will be examined. FA2, 8-wk, Asynchronous.

MT 5323. Computing for Mathematics. 3 Semester Hours.
This course introduces graduate students to essential computational tools and methodologies—including LaTeX typesetting, programming in Python and R, numerical analysis, data visualization, simulation techniques, and algorithmic thinking—that serve as the foundation for advanced studies in applied mathematics, mathematical modeling, probability, statistics, image processing, and cryptography. SU, 8-wk, Asynchronous.

MT 5324. Introduction to Applied Mathematics. 3 Semester Hours.
This course provides a comprehensive overview of key problem-solving techniques and foundational concepts in linear algebra, differential equations, and analysis, laying the groundwork for advanced study in mathematical modeling and applied research. SU, 8-wk, Asynchronous.

MT 5331. Advanced Probability. 3 Semester Hours.
Convergence concepts, discrete and continuous probability spaces, random variables and their distributions, independence, conditional expectation, laws of large numbers, central limit theorem, generating functions, and applications. SP1, 8-wk, Asynchronous.

MT 5334. Mathematical Statistics. 3 Semester Hours.
This course develops the mathematical foundations of statistics. Topics covered include sampling distributions; estimation methods, including matching moments, percentile matching, and maximum likelihood estimation; properties of estimators, including bias, variance, mean square error, consistency, efficiency, and UMVUE; statistical inference methods, including the construction of confidence intervals for unknown parameters; and hypothesis testing, including the Neyman-Pearson lemma, significance and power, the likelihood ratio test, and information criteria. SP2, 8-wk, Asynchronous.

MT 5372. Math Modeling. 3 Semester Hours.
Creative model construction and the modeling process, model fitting and models requiring optimization, empirical model construction, modeling dynamic behavior. FA1, 8-wk, Asynchronous.