

The Applied and Computational Mathematics (ACM) Program at the Johns Hopkins University will offer graduate courses in statistics and applied mathematics in the summer semester (4 June 2007 to 25 August 2007) at locations in the Baltimore–Washington area (Howard and Montgomery Counties, Maryland).

Subject to meeting admission criteria, a non-degree candidate may register as a special student to take one or more courses to enhance mathematical and statistical skills. Courses being offered in summer 2007 are given below. These courses are scheduled at times convenient for the working adult. Registration and general information is at <http://www.epp.jhu.edu>. Information specific to the ACM Program is at <http://www.epp.jhu.edu/academic-programs/applied-and-computational-mathematics>; some of the courses below have additional information available at the Course Homepages site <http://www.epp.jhu.edu/course-homepages/#625>. For further information related to academic requirements and course content, please contact [Dr. James Spall](#), Program Chair (240-228-4960).

625.201 General Applied Mathematics

Instructor: Ronald Farris

Location: Applied Physics Laboratory (southern Howard County)

This course is designed for students whose prior background does not fully satisfy the mathematics requirements for admission and/or for students who wish to take a refresher course in applied mathematics. The course provides a review of differential and integral calculus in one or more variables. It covers elementary linear algebra and differential equations, including first- and second-order linear differential equations. Basic concepts of matrix theory are discussed (e.g., matrix multiplication, inversion, and eigenvalues/eigenvectors). Note: Not for graduate credit. This course alone does not fulfill the mathematics requirements for admission to the Applied and Computational Mathematics Program; additional course work is required.

Prerequisites: Two semesters of calculus.

625.420 Mathematical Methods for Signal Processing

Instructor: Raouf Boules

Location: Applied Physics Laboratory (southern Howard County)

This course familiarizes the student with modern techniques of digital signal processing and spectral estimation of discrete-time or discrete-space sequences derived by the sampling of continuous-time or continuous-space signals. The class covers the mathematical foundation needed to understand the various signal processing techniques as well as the techniques themselves. Topics include the discrete Fourier transform, the discrete Hilbert transform, the singular-value decomposition, the wavelet transform, classical spectral estimates (periodogram and correlogram), autoregressive, autoregressive-moving average spectral estimates and Burg maximum entropy method.

Prerequisites: Mathematics through calculus, matrix theory or linear algebra, and introductory probability theory and/or statistics. Students are encouraged to refer any questions to the instructor.

625.409 Matrix Theory

Instructor: Daniel Rio

Location: Montgomery County Center (Rockville, MD)

In this course, topics include the methods of solving linear equations, Gaussian elimination, triangular factors and row exchanges, vector spaces (linear independence, basis, dimension, and linear transformations), orthogonality (inner products, projections, and Gram-Schmidt process), determinants, eigenvalues and eigenvectors (diagonal form of a matrix, similarity transformations, and matrix exponential), singular value decomposition, and the pseudo-inverse. The course also covers applications to statistics (least squares fitting to linear models, covariance matrices) and to vector calculus (gradient operations and Jacobian and Hessian matrices). MATLAB software will be used in some class exercises.

Prerequisites: Mathematics through multivariate calculus.

625.439 Mathematics of Finance

Instructor: M. Pemy

Location: Applied Physics Laboratory (southern Howard County)

This course offers a rigorous treatment of the subject of investment as a scientific discipline. Mathematics is employed as the main tool to convey the principles of investment science and their use to make investment calculations for good decision making. Topics covered in the course include the basic theory of interest and its applications to fixed-income securities, cash flow analysis, and capital budgeting, mean-variance portfolio theory and the associated capital asset pricing model, utility function theory and risk analysis, derivative securities and basic option theory, and portfolio evaluation.

Prerequisites: Multivariate calculus and an introductory course in probability and statistics (such as 625.403). Some familiarity with optimization is desirable but not necessary.

625.721 Probability and Stochastic Process I

Instructor: Mostafa Aminzadeh

Location: Applied Physics Laboratory (southern Howard County)

The course is an introduction to probability theory. Topics include sample space, combinatorial analysis, conditional probability, discrete and continuous distributions, expectation and generating functions, laws of large numbers, and central limit theorem. This course is proof oriented and the primary purpose is to lay the foundation for the second course 625.722 and other specialized courses in probability.

Prerequisites: Multivariate calculus and 625.403 Statistical Methods and Data Analysis or equivalent.