Courses in Mathematics

A Mat 106
Survey of Calculus (3)
This course offered fully online. An intuitive approach to differentiation and integration of algebraic and transcendental functions, intended only for students who plan to take no more calculus. Does not yield credit toward the major or minor in mathematics. May not be taken for credit by students with credit for A Mat 111, 112 or 118. Prerequisite(s): A Mat 100 or satisfactory performance on the mathematics placement exam.
(1552) Goldfarb, Boris
4 Week 1: May 24-June 18
(1723) Goldfarb, Boris
4 Week 2: June 21-July 16

A Mat 108
Elementary Statistics (3)
This course offered fully online. Frequency distributions, measures of central tendency and dispersion, probability and sampling, estimation, testing of hypotheses, linear regression and correlation. Prerequisite(s): three years of high school mathematics. Only one of A Mat 108 and B Itm 220 may be taken for credit.
(1033) Lenseth, Douglas
6 Week 1: May 24-July 2
(1398) Reinhold-Larsson, Karin
4 Week 3: July 19-August 13
(1553) Reinhold-Larsson, Karin
4 Week 3: July 19-August 13

A Mat 112
Calculus I (4)
This course offered fully online. Calculus of one variable. Limits, continuity, differentiation of algebraic functions, applications of differentiation, antiderivatives, the definite integral, transcendental functions. Prerequisite(s): A Mat 100 or satisfactory performance on the mathematics placement exam.
(2228) Hults, Jennifer
6 Week 1: May 24-July 2

A Mat 113
Calculus II (4)
This course offered fully online. Techniques of integration, applications of the definite integral, conics, polar coordinates, improper integrals, infinite series. Prerequisite(s): A Mat 111 or 112.
(2219) Cardenas, Roy
6 Week 3: July 6-August 13

A Mat 214
Calculus of Several Variables (4)
This course offered fully online. Curves and vectors in the plane, geometry of three-dimensional space, vector functions in three-space, partial derivatives, multiple integrals, line and surface integrals. Prerequisite(s): A Mat 113 or 119.
(2222) Peebles, Thomas
6 Week 3: July 6-August 13
A Mat 220
Linear Algebra (3)
This course offered fully online. Linear equations, matrices, determinants, finite dimensional vector spaces, linear transformations Euclidean spaces. Prerequisite(s): A Mat 113 or 119.
(1724) Zhu, Kehe
4 Week 1: May 24-June 18

A Mat 301 (=A Eco 351)
Theory of Interest (3)
This course offered fully online. The basic measures of interest, annuities, sinking funds, amortization schedules, bonds, and installment loans. Recommended as preparation for Actuarial Society exam FM. Only one version of A MAT 301 may be taken for credit. Prerequisite(s): A MAT 113 or 119.
(2408) Isralowitz, Joshua
6 Week 2: June 21-July 30

A Mat 311
Ordinary Differential Equations (3)
This course offered fully online. Linear differential equations, systems of differential equations, series solutions, boundary value problems, existence theorems, applications to the sciences. Prerequisite(s): A Mat 214.
(2015) Yang, Rongwei
4 Week 3: July 19-August 13

A Mat 362
Probability for Statistics (3)
This course offered fully online. Introduction to discrete and continuous probability models, including probability mass functions, density functions and cumulative distribution functions. Discrete examples will include the binomial, negative binomial, Poisson, and hypergeometric distributions. Continuous distributions will include the normal and exponential distributions, the family of gamma and beta densities, and, if time permits, t and chi-square distributions. Other topics are the probability axioms, equally likely sample spaces (combinatorics), conditional probability, joint distributions, marginal distributions, conditional distributions, covariance, correlation, moment generating functions and the Central Limit Theorem. A MAT 362 constitutes substantial preparation for Actuarial Exam P. A student may not apply both A MAT 362 and A MAT 367 towards a major or minor in mathematics or a minor in statistics. Prerequisite(s): A MAT 214 and A MAT 299.
(1725) Kwon, Hyun-Kyoung
4 Week 1: May 24-June 18

A Mat 363
Statistics (3)
This course offered fully online. A calculus-based introduction to statistics. Confidence intervals and hypothesis tests for means and variances, differences of means and ratios of variances, including P-values, power functions and sample size estimates and involving normal, binomial, t, chi-square, and F distributions. Additional topics may include introductions to simple linear regression, Bayesian statistics, sample survey methods, goodness of fit tests, non-parametric tests, or analysis of variance. Only one version of A Mat 363 may be taken for credit. Students with credit for A Mat 367 but who have not taken A Mat 362 may take A Mat 363 only with permission of instructor. Students with credit for A Mat 368 may not take A Mat 363. Prerequisite(s): A Mat 362.
(1177) Feng, Yunlong
4 Week 2: June 21-July 16

A Mat 367
Discrete Probability (3)
This course offered fully online. Introduction to discrete probability models (including the binomial, negative binomial, Poisson, and hypergeometric distributions, their means, variances and cumulative distribution functions). Other topics include probability axioms, equally likely sample spaces
(combinatorics), conditional probability, the gamblers' ruin problem, finite state Markov chains, moment generating functions, joint distributions (including the multinomial distribution), marginal distributions, conditional distributions, covariance and correlation, the weak law of large numbers, and, if time permits, the Central Limit Theorem. Students who intend to take A MAT 363 should take A MAT 362, not A Mat 367. Students who have taken A MAT 367 and who wish to take a first statistics course can take A MAT 308. Actuarial students, who need continuous as well as discrete probability, should take A MAT 362 (which constitutes substantial preparation for Actuarial Exam P). A student may not apply both A MAT 362 and A MAT 367 toward any major of minor in mathematics or a minor in statistics. A MAT 367Z is the writing intensive version of A MAT 367; only one may be taken for credit. Prerequisite(s): A MAT 113 or 119 plus 6 credits at the 200 level or above in either mathematics or computer science.

(2226) Corradino, Jesse
4 Week 1: May 24-June 18

Graduate Courses

A Mat 522
Linear Algebra for Applications (3)
*This course offered fully online.* The course's main concentration is on theory of abstract linear spaces with applications to Numerical Analysis, probabilistic and statistical considerations including Markov chains and migration process, least squares method, etc. Such topics as Singular Value Decomposition, Numerical Rank, Power method and QR algorithm for finding eigenvalues are considered in detail using techniques of spectral theory. Prerequisites: AMAT 214, or equivalent course in multivariable calculus, or permission of the instructor.

(2110) Stessin, Michael
4 Week 1: May 24-June 18

A Mat 583
Topological Data Analysis I (3)
*This course offered fully online.* Basic techniques and concepts of topology that are used in data analysis. This is the first of a two semester sequence in Topological Data Analysis. This subject requires knowledge of rather advanced topics in topology. This course navigates to the point where the student is ready to see the applications in data science, through a careful selection of the sequence of topics: graph theory, high-dimensional simplicial complexes, nerves of coverings, some basic general topology and homotopy theory, computational linear algebra, simplicial homology and cohomology. Prerequisites: Basic linear algebra as in AMAT 220 or equivalent.

(1819) Goldfarb, Boris
4 Week 1: May 24-June 18

A Mat 584
Topological Data Analysis II (3)
*This course offered fully online.* An introduction to the two main areas of Topological Data Analysis, the persistent homology and the Mapper algorithm. This is the second of a two semester sequence in Topological Data Analysis. In this course, the students will learn to apply homology computations to filtered metric spaces producing the main topological signature of a data set called persistent homology. In the second half of the course, the Mapper will be used as an illustration of topology based dimension reduction techniques which produce a one-dimensional summary, a graph, of the multi-dimensional data set. Case studies with real world applications are included to illustrate the theory. Prerequisites: AMAT 583 or permission of instructor.

(1976) Goldfarb, Boris
4 Week 2: June 21-July 16

A Mat 590
Function Theory and Functional Analysis for Applications (3)
*This course offered fully online.* This course covers function analytic aspects necessary for applications in various areas of science and engineering, notably in Data Science. Among main topics of the course are: elementary theory of Lebesgue measure and integration, spaces of Lebesgue integrable functions, Banach
spaces and Hanh-Banach theorem, duality in Banach spaces, Hilbert spaces, reproducing kernel Hilbert spaces, non-linear analysis in Banach spaces. Prerequisites: Basic linear algebra, e.g., AMAT 220; calculus of several variables, e.g., AMAT 214.
(1820) Stessin, Michael
4 Week 2: June 21-July 16

A Mat 591
Optimization Methods and Nonlinear Programming (3)
This course offered fully online. Modern methods in convex optimization and nonlinear programming. Newton's method, gradient descent, linear programming, quadratic optimization, semidefinite programming and related topics. Prerequisites: AMAT590
(1977) Ying, Yiming
4 Week 3: July 19-August 13

A Mat 592
Machine Learning (3)
This course offered fully online. The primary goal of this course is to provide students with statistical tools and mathematical principles needed to solve both the traditional and modern data science problems encountered in practice. In particular, the course covers a wide variety of topics in machine learning. It introduces the key terms, concepts and methods in machine learning, with an emphasis on developing critical analytical skills through hands-on exercises of actual data analysis tasks. At the same time, it will cover modern machine learning topics such as boosting and online learning for large-scale data analysis. In addition, the students will practice basic programming skills to use software tools in machine learning. Prerequisites: Linear algebra, e.g., AMAT 220; multivariable calculus, e.g., AMAT 214; basic probability and statistics, e.g., AMAT 554.
(1821) Ying, Yiming
4 Week 3: July 19-August 13