

MATHEMATICS-ALGEBRAIC STRU (MAS)

MAS 3105 - Linear Algebra (3 Credits)

Introduction to the basic concepts and theorems of linear algebra. Topics include matrices and determinants, matrix operations and canonical factorizations, Gauss-Jordan elimination, vector spaces, linear transformations, basis, independence, orthogonality, eigenvalues and eigenvectors, similarity, diagonalization, and an introduction to Markov chains.

Prerequisite(s): MAC 2313

Attribute(s): GRMT - Computation Skills

MAS 4106 - Matrix Methods & Data Science (3 Credits)

Topics in Linear Algebra drawn from a broad range of applications such as large-matrix computation techniques, pseudo-inverses and linear regression, non-negative matrices and the PageRank algorithm, low rank approximation and compressed sensing, computer graphics, multivariate Gaussian and weighted least squares, Markov chains, optimization, neural networks and machine learning.

Prerequisite(s): MHF 2191 and MAS 3105

Attribute(s): GRMT - Computation Skills

MAS 4214 - Elementary Number Theory (3 Credits)

Basic principles of algebraic number theory. Topics include divisibility and residues, congruences, primes, pseudoprimes and primality tests, systems of congruences and Chinese remaindering, multiplicative functions, continued fractions.

Prerequisite(s): MHF 2191

Attribute(s): GRMT - Computation Skills

MAS 4301 - Abstract Algebra I (3 Credits)

Introduction to fundamental concepts of modern algebra. Topics include group axioms, subgroups, Lagrange's Theorem, homomorphism, quotient groups, permutation and symmetry groups, rings, integral domains and fields, rings of polynomials, field of quotients.

Prerequisite(s): MHF 2191

Attribute(s): GRMT - Computation Skills, SUSC - Sustainability Component

MAS 4302 - Abstract Algebra II (3 Credits)

Continuation of MAS 4301. Topics include subgroups and Sylow theorems, homomorphisms and quotient groups, ideals in rings, principal ideal domains and Euclidean domains, quotient rings, fields and extension fields. Emphasis is on skills and topics needed for graduate study in mathematics.

Prerequisite(s): MAS 4301

Attribute(s): GRMT - Computation Skills, SUSC - Sustainability Component

MAS 4730 - Computational Technology (2 Credits)

Training in formulating and solving problems with the aid of a computer algebra system. A wide-ranging selection of exercises will be addressed with Maple 10 or a similar system.

Prerequisite(s): MAC 2312 (may be taken concurrently)

Attribute(s): GRMT - Computation Skills, SUSC - Sustainability Component

MAS 5117 - Math for Machine Learning (3 Credits)

Numerical methods underlying a variety of modern machine learning and data analysis techniques are discussed. Topics include block-matrix multiplication and its role in high-performance computing, Identification of fundamental low-dimensional structure or parameters in high-dimensional problems, and model reduction through Principal Component Analysis, Data fitting and classification through multi-objective and constrained least squares, Introduction to data fitting and classification through nonlinear least squares, Bias-Variance tradeoff in Lasso (L1) and Ridge (L2) regression in data fitting problems, and ill conditioning.

MAS 5145 - Advanced Linear Algebra (3 Credits)

Advanced topics in linear algebra, to include abstract vector spaces, subspaces, linear transformations and matrices, canonical forms and decompositions, eigenvalues and singular values, quadratic form, and positive definite matrices.

Attribute(s): GRMT - Computation Skills

MAS 5215 - Number Theory (3 Credits)

Course will feature an accelerated review of elementary concepts in sufficient detail to support a more intensive study of the classical problems in algebraic number theory. Permission of instructor required.

Attribute(s): GRMT - Computation Skills

MAS 5307 - Introductory Abstract Algebra (3 Credits)

This course is an intensive review of basic structures of abstract and linear algebra. Topics may include groups, rings and ideals, polynomials and factorization, vector spaces and modules, linear transformations, and the classical Galois theory of fields. It is intended as a refresher course for students in the Mathematics Certificate program prior to enrolling in MAS 5311. It is not available for credit to students enrolled in the M.S. in Mathematics program.

MAS 5311 - Modern Algebra I (3 Credits)

Graduate level introduction to basic theory of groups and rings. Topics include groups, subgroups, homomorphism, quotient groups, rings, fields, and Sylow theory.

Attribute(s): GRMT - Computation Skills