MATHEMATICS (MATH)

Courses

MATH 5230. Adv Ordinary Diff Equations. 3 Credits.
Linear and nonlinear systems, approximate solutions, existence, uniqueness, dependence on initial conditions, stability, asymptotic behavior, singularities, self-adjoint problems. Prerequisite: Graduate student or Instructor permission; knowledge of differential equations required.

MATH 5678. Combinatorial Graph Theory. 3 Credits.
Paths and trees, connectivity, Eulerian and Hamiltonian cycles, matchings, edge and vertex colorings, planar graphs, Euler's formula and the Four Color Theorem, networks. Prerequisite: Graduate student or Instructor permission.

MATH 5737. Gr Intro to Numerical Anyl. 3 Credits.
Error analysis, root-finding, interpolation, least squares, quadrature, linear equations, numerical solution of ordinary differential equations. Credit not awarded for both MATH 5737 and MATH 3737 or CS 3737. Prerequisite: Graduate student or Instructor permission. Cross-listed with: CS 5737.

MATH 5766. Gr Chaos,Fractals&Dynmcl Systm. 3 Credits.
Discrete and continuous dynamical systems, Julia sets, the Mandelbrot set, period doubling, renormalization, Henon map, phase plane analysis and Lorenz equations. Credit not awarded for both MATH 5766 and MATH 3766. Prerequisites: Graduate student or Instructor permission. Cross-listed with: CSYS 5766.

MATH 5788. Mathematical Biology&Ecol. 3 Credits.
Mathematical modeling in the life sciences. Topics include population modeling, dynamics of infectious diseases, reaction kinetics, wave phenomena in biology, and biological pattern formation. Prerequisites: Graduate student or Instructor permission; knowledge of linear algebra and differential equations required.

MATH 5990. Special Topics. 1-18 Credits.
See Schedule of Courses for specific titles.

MATH 5993. Independent Study. 1-18 Credits.
A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

MATH 6230. Partial Differential Equations. 3 Credits.
Classification of equations, linear equations, first order equations, second order elliptic, parabolic, and hyperbolic equations, uniqueness and existence of solutions. Prerequisite: Knowledge of differential equations required.

MATH 6344. Algebraic Topology. 3 Credits.
Homotopy, Seifert-van Kampen Theorem; simplicial, singular, and Cech homology. Prerequisite: Knowledge of real analysis or topology required.

MATH 6391. Master's Thesis Research. 1-18 Credits.
Research for the Master's Thesis.

MATH 6441. Theory of Func of Complex Var. 3 Credits.
Complex functions, differentiation and the Cauchy-Riemann equations, power and Laurent series, integration, calculus of residues, contour integration, isolated singularities, conformal mapping, harmonic functions. Prerequisite: Two semesters of real analysis required.

MATH 6444. Thry Functions Real Variables. 3 Credits.
Lebesgue measure and integration theory, Monotone and Dominated Convergence Theorems and applications, product measures, basic theory of LP-spaces. Prerequisite: Two semesters of real analysis required.

MATH 6551. Abstract Algebra III. 3 Credits.
Advanced group theory and field theory. Prerequisite: Two semesters of abstract algebra required.

MATH 6555. Abstract Algebra IV. 3 Credits.
Ring theory and module theory at the graduate level, with emphasis on commutative algebra. Prerequisite: MATH 6551.

MATH 6678. Topics in Combinatorics. 3 Credits.
Topics will vary each semester and may include combinatorial designs, coding theory, topological graph theory, cryptography. Course is repeatable for credit. Prerequisite: MATH 3551 or MATH 5678.

MATH 6701. Principles of Complex Systms 1. 3 Credits.
Introduction to fundamental concepts of complex systems. Topics include: emergence, scaling phenomena, and mechanisms, multi-scale systems, failure, robustness, collective social phenomena, complex networks. Students from all disciplines welcomed. Pre/co-requisites: Calculus and statistics required; linear algebra, differential equations, and computer programming recommended but not required. Cross-listed with: CSYS 6701.

MATH 6713. Principles of Complex Systms 2. 3 Credits.
Detailed exploration of distribution, transportation, small-world, scale-free, social, biological, organizational networks; generative mechanisms; measurement and statistics of network properties; network dynamics; contagion processes. Students from all disciplines welcomed. Pre/co-requisites: MATH 6701, CSYS 6701, calculus, and statistics required. Cross-listed with: CSYS 6713.

MATH 6737. Numerical Diff Equations. 3 Credits.
Numerical solution and analysis of differential equations: initial-value and boundary-value problems; finite difference and finite element methods. Prerequisites: Calculus and linear algebra required in addition to differential equations or numerical analysis.

MATH 6990. Special Topics. 1-18 Credits.
Subject will vary from year to year. May be repeated for credit.

MATH 6991. Internship. 1-18 Credits.
On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

MATH 6993. Independent Study. 1-18 Credits.
A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

MATH 6995. Graduate Independent Research. 1-18 Credits.
Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

MATH 7491. Doctoral Dissertation Research. 1-18 Credits.
Research for the Doctoral Dissertation.

MATH 7990. Special Topics. 1-18 Credits.
See Schedule of Courses for specific titles.

MATH 7991. Internship. 1-18 Credits.
On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

MATH 7995. Graduate Independent Research. 1-18 Credits.
Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.