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. 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. 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.