

MATH 2220 Partial Differential Equations (3,3,0) (E)

Prerequisite: MATH 1111 Mathematical Analysis I and MATH 2110 Differential Equations

This course treats the theory and solution techniques for partial differential equations appearing in physics, biology, chemistry and social sciences.

MATH 2230 Operations Research I (3,3,0) (E)

Prerequisite: MATH 1120 Linear Algebra

This course aims to introduce students some fundamental topics in operations research. Students will learn theory, techniques and applications of linear programming, network programmes, dynamic programming and inventory control problems.

MATH 2610 Graph Theory (3,3,0) (E)

Prerequisite: Year II standing

This course covers some fundamental concepts and principles of graph theory. Some algorithms of graphs are also discussed. Students will learn some techniques to solve some graph problems.

MATH 2630 Number Theory (3,3,0) (E)

Prerequisite: Year II standing

This course will provide an introduction to the theory of numbers. Basic concept such as divisibility, congruence, diophantine equations will be covered. Some applications such as cryptography will be introduced.

MATH 2770 Internship I (1,0,0) (E)

Prerequisite: Students must apply to and receive permission from the co-op coordinator preferably one semester in advance

This is a work experience programme available to students in MATH. Interested students should contact departmental advisors as early in their careers as possible, for proper counselling.

MATH 2780 Internship II (1,0,0) (E)

Prerequisite: MATH 2770 Internship I, and students must apply to and receive permission from the co-op coordinator preferably one semester in advance

This is a work experience programme available to students in MATH. Interested students should contact departmental advisors as early in their careers as possible, for proper counselling.

MATH 3205 Linear and Integer Programming (3,3,0) (E)

Prerequisite: MATH 2207 Linear Algebra

This course aims to introduce students to the fundamental topics in Linear and Integer programming. Students will learn theory, techniques and applications of linear programming and integer programming. Some modeling techniques will be also introduced for linear and integer programming. However, the interior point theory will not be covered.

MATH 3206 Numerical Methods I (3,3,0) (E)

Prerequisite: MATH 1005 Calculus and MATH 2207 Linear Algebra

This introductory course presents students some classical and commonly used numerical methods in various disciplines involving computing and numerical approximation and solution of equations. The course teaches students how to choose an appropriate numerical method for a particular problem and to understand the advantages and limitations of the chosen numerical scheme for a given mathematical problem so that results from the computation can be properly interpreted. The course also highlights important theoretical considerations on convergence and stability for numerical algorithm design.

MATH 3405 Ordinary Differential Equations (3,2,1) (E)

Prerequisite: MATH 1005 Calculus, MATH 2207 Linear Algebra

This course aims to introduce students to the basic theory of linear ordinary differential equations (ODE) with constant and variable coefficients and the modeling of diverse practical phenomena by ODE. Students will learn both quantitative

and qualitative methods for solving these equations. Topics include first and second order scalar ODE, systems of first order ODE, autonomous systems of ODE, existence and uniqueness theorem, Laplac transform for initial value problems, regular and singular Sturm-Liouville boundary value problems and nonlinear differential equations. Classical numerical methods for solving ODE will also be introduced.

MATH 3406 Abstract Algebra (3,3,0) (E)

Prerequisite: MATH 1205 Discrete Mathematics

This course covers some properties of groups, rings and fields. Permutation groups and polynomial rings are included. Application of permutation group on counting and application of finite field on error correcting code are included.

MATH 3407 Advanced Linear Algebra (3,3,0) (E)

Prerequisite: MATH 2207 Linear Algebra

This course is designed for mathematical science major students. General vector space, linear transformations, inner products, diagonal form, Jordan form, dual space and quadratic forms will be introduced. The course emphasizes on general theory of linear algebra.

MATH 3415 Vector Calculus (3,3,0) (E)

Prerequisite: MATH 2205 Multivariate Calculus and MATH 2207 Linear Algebra

This course is designed to develop the intuitive understanding, theory, and computational skills necessary for the concepts of vector functions by tying together multivariate calculus with concepts of vector. Topics covered include Vector Fields, Stokes theorem, Green's theorem, Gauss' theorem, and their applications.

MATH 3416 Complex Analysis (3,3,0) (E)

Prerequisite: MATH 2215 Mathematical Analysis

This course provides an up-to-date introduction to the basic theory of analytic functions of one complex variable. Residue Theorem and its applications to the evaluation of integrals and sums will be one of the main objectives. Also conformal mappings and their applications will be discussed.

MATH 3417 Game Theory (3,3,0) (E)

Prerequisite: MATH 1205 Discrete Mathematics

The purpose of this class is to provide an introduction to game modeling and theory. In studying of strategic behavior among parties having apposed, mixed or similar interests, students will be able to think strategically, understand and explain a wide range of problems. Students will learn how to recognize and model strategic situations, to predict when and how your actions will influence the decisions of others and to exploit strategic situations for your own benefit. It is also important to emphasize that game theory is a deductive, mathematical enterprise; therefore, it requires abstract, symbolic reasoning. The major topics covered are strategic games, extensive games with perfect and imperfect information, and coalitional games.

MATH 3425 Graph Theory (3,3,0) (E)

Prerequisite: MATH 1205 Discrete Mathematics

This course covers some fundamental concepts and principles of graph theory. Some algorithms of graphs are also discussed. Students will learn some techniques to solve some graph problems.

MATH 3426 Number Theory (3,3,0) (E)

Prerequisite: MATH 1205 Discrete Mathematics

This course provides an introduction to the theory of numbers. Basic concept such as divisibility, congruence, diophantine equations will be covered. Some applications such as cryptography will be introduced.

MATH 3427 Real Analysis (3,3,0) (E)

Prerequisite: MATH 2215 Mathematical Analysis

This course provides an introduction to measure theory, Lebesgue integration, L^p spaces, and Fourier analysis. Equipped with this knowledge, students are prepared for further studies in numerical analysis, functional analysis and advanced probability theory.