

MATH 1205 Discrete Mathematics (3,3,0)

This course integrates the fundamental topics in discrete mathematics and linear system. These topics, including propositional logic, proof methods, set theory, combinatorics, graph algorithms, Boolean algebra, and system of linear equations, are essential for precise processing of information.

MATH 2005 Probability and Statistics for Computer Science (3,3,0)

Antirequisite: MATH 2006 Probability and Statistics for Science and MATH 2206 Probability and Statistics

Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I

This course aims to provide an understanding of the basic concepts in probability and statistical analysis, and focuses on applied probability and statistics. Students will learn the fundamental concepts of random variables, the basic concepts and techniques of parameter estimation and hypothesis testing. After taking this course, students will be able to apply the concepts to real-life IT/engineering problems and use popular statistics software to perform analysis.

MATH 2006 Probability and Statistics for Science (3,3,0)

Antirequisite: MATH 2005 Probability and Statistics for Computer Science and MATH 2206 Probability and Statistics

Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I

This course aims to provide an understanding of the basic concepts in probability and statistical analysis, and focuses on applied probability and statistics. Students will learn the fundamental concepts of random variables, the basic concepts and techniques of parameter estimation and hypothesis testing. After taking this course, students will be able to apply the concepts and methods to solve different problems in Science and use popular statistics packages to perform analysis.

MATH 2205 Multivariate Calculus (3,3,1)

Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I, MATH 2207 Linear Algebra (*recommended*)

This course deals with calculus and functions of several variables. Students should know the basic concepts and technique of univariate calculus. Some knowledge on linear algebra, such as matrix notations and calculations, is preferred. Topics include partial derivative, multiple integral, and their theories and applications.

MATH 2206 Probability and Statistics (3,3,1)

Antirequisite: MATH 2005 Probability and Statistics for Computer Science

This course deals with probability and statistical methods. The emphasis is on what, how, when and why certain probability model and statistical methods can and cannot be applied. Topics include exploratory data analysis, distributions of random variable, estimation, hypothesis testing, analysis of variance, simple linear regression and nonparametric methods. Students are required to solve a variety of problems by using calculators and statistical tables.

MATH 2207 Linear Algebra (3,3,1)

Introduction to linear equations, matrices, determinants, vector spaces and linear transformations, bases, inner products, orthogonality, eigenvalues and eigenvectors, diagonalization, least squares problems and other applications. The course emphasizes matrix and vector calculations and applications.

MATH 2215 Mathematical Analysis (3,3,1)

Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I

This course places its main weight on mathematical analysis with using ϵ - δ argument as an introduction to proofs. It pays special attention to developing the students' ability to read and

write proofs. Covered materials include sets and functions, real numbers, open and closed sets, limits of sequences and series, limits and continuity of functions, infinite series, and sequences.

MATH 2216 Statistical Methods and Theory (3,3,1)

Prerequisite: MATH 1005 Calculus or HKDSE Mathematics with Module 1/2, MATH 2207 Linear Algebra or MATH 2205 Multivariate Calculus (*recommended*)

This course deals with the elementary probability theory and the mathematical foundation of some commonly used statistical methods. First the rigorous mathematical frame of the probability theory based upon the concepts of random variables and probability distributions are introduced. The general procedures of statistical inference, such as parameter estimation, hypothesis test, analysis of variance are demonstrated with detailed discussion about their mathematical features. Students are required to comprehend the most commonly used probability distributions and their relations. Central Limit Theorem and related statistical application should be well understood. Several optimal schemes for the estimation accuracy and the hypothesis test power form another important part of the course.

MATH 2217 Advanced Calculus II (3,3,0)

Prerequisite: MATH 1006 Advanced Calculus I

This course deals with the basic theory of analysis in real-valued functions in single variable. It provides students with a good foundation for more advanced courses in the mathematical science major. Topics include integration and series.

MATH 2805 Mathematics of Compound Interest (3,3,0)

Prerequisite: MATH1005 Calculus

To introduce the mathematical theory of interest with application to real financial problems. Students will learn some of the major issue in the field of compound interest.

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

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)

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 (3,3,0)

Prerequisite: MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II, 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.