MATH 2005 Probability and Statistics for Computer Science (3,3,1) (E)

Prerequisite: MATH 1005 Calculus; students with credit for MATH 2206 are not allowed to take MATH 2005 for further credit

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 applications and use popular statistics packages, such as SAS, SPSS, S-Plus, R or MATLAB, to perform simple and sophisticated analysis.

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

Prerequisite: MATH 1005 Calculus; students with credit for MATH 2005 or MATH 2206 are not allowed to take MATH 2006 for further credit

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, such as R, to perform analysis.

MATH 2110 Differential Equations (3,3,0) (E)

Prerequisite: MATH 1111 Mathematical Analysis I, MATH 1112 Mathematical Analysis II and MATH 1120 Linear Algebra

This course aims to introduce students to the basic theory of ordinary differential equations and the modelling of diverse practical phenomena by ordinary differential equations by a variety of examples. Students will learn both quantitative and qualitative methods for solving these equations. Topics include first and second order differential equations, linear systems of first order differential equations, autonomous systems of differential equations, existence and uniqueness theorem and Laplace transform to initial value problem.

MATH 2130 Real Analysis (3,3,0) (E)

Prerequisite: MATH 1111 Mathematical Analysis I

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.

MATH 2140 Numerical Methods I (3,3,0) (E)

Prerequisite: Year II standing

This course provides students with the ideas underlying commonly used numerical methods. It teaches students how to choose an appropriate numerical method for a particular problem and to interpret the resulting output. It also highlights important considerations on convergence and stability for numerical algorithm design.

MATH 2150 Mathematical Analysis III (3,3,0) (E)

Prerequisite: MATH 1111-2 Mathematical Analysis I & II (MATH 1120 Linear Algebra is not required but recommended)

This course deals with vectors calculus. It provides basic concept on several variables real-valued functions. Topics include sequences in space, limit and continuity, differentiation, Riemann integrals, multiple integrals, line integrals and surface integrals.

MATH 2160 Mathematical and Statistical Software (3,1,2)

Prerequisite: COMP 1170 Structured Programming

This course teaches students how to use some popular software packages for solving problems in various areas of mathematics, statistics and operations research. Examples of software packages that may be covered are MATLAB, SAS, S-plus, LINDO, and Latex. Students will learn both how to use these software packages to efficiently to solve the related problems and how to interpret the results. Such knowledge should be useful for students' course work, projects and future careers.

MATH 2205 Multivariate Calculus (3,3,1) (E)

Prerequisite: MATH 1005 Calculus, MATH 2207 Linear Algebra or MATH 1205 Discrete Mathematics (*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) (E)

Prerequisite: HKDSE Mathematics-Compulsory Part

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) (E)

Prerequisite: HKDSE Mathematics-Compulsory Part

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) (E)

Prerequisite: MATH 1005 Calculus or MATH 1205 Discrete Mathematics (*recommended*)

This course places its main weight on mathematical analysis with using ε–δ argument s 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) (E)

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 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.