

MATH 3625 Advanced Numerical Analysis (3,3,0)

Prerequisite: MATH 3206 Numerical Methods I

This course provides a theoretical understanding of the major ideas of numerical analysis. Emphasis is placed on the study of underlying principles, error bounds, convergence theorems, etc. in the area of numerical analysis.

MATH 3805 Regression Analysis (3,3,0)

Prerequisite: MATH 2207 Linear Algebra, and one of the following: (i) MATH 2005 Probability and Statistics for Computer Science; (ii) MATH 2006 Probability and Statistics for Science; (iii) MATH 2206 Probability and Statistics; or (iv) MATH 2216 Statistical Methods and Theory

This course aims to provide an understanding of the classical and modern regression analysis and techniques which are widely adopted in various areas such as business, finance, biology, and medicine. There have been great developments in the past decades such as nonlinear regression, robust regression, nonparametric and regression. With the help of a statistical package such as SAS, Matlab or R, students can analyse multivariate data by modern regression techniques without any difficulty.

MATH 3806 Multivariate Statistical Methods (3,3,0)

Prerequisite: MATH 2206 Probability and Statistics or equivalent, MATH 2207 Linear Algebra

To provide an understanding of the classical multivariate analysis. Very often, observations in the social, life and natural sciences are multidimensional or very high dimensional. This kind of data sets can be analysed by techniques in multivariate analysis. With the help of statistical package, such as Matlab and R, students will learn how to treat real multivariate problems.

MATH 3807 Simulation (3,2,1)

This course aims to introduce basic technique in computer simulation. Two computer software packages (one for continuous systems and one for discrete systems) will be taught. Various practical problems will be modelled, discussed, and simulated through computer simulation. Upon completion of this course, students should be able to simulate a wide range of practical problems in the daily life.

MATH 3815 Statistical Design and Analysis of Experiments (3,3,0)

Prerequisite: MATH 3805 Regression Analysis

To provide an understanding of various kinds of experimental designs involving factorial and uniform designs. The experimental design has a long history and has been widely used in industry, agriculture, quality control, natural sciences, computer experiments and even survey design. They are useful in business and social sciences. The statistical software will be used to support the lecture.

MATH 3816 Statistical Analysis of Sample Surveys (3,3,0)

Prerequisite: MATH 2206 Probability and Statistics or equivalent

To provide students with a good understanding of survey operations, survey sampling methods and the corresponding analyses of data. Important points in questionnaire design will also be addressed in the course. Students will form teams to do course projects. On completion of the course, students should be able to design, carryout, and write reports based on a professional survey.

MATH 3817 Dynamic Programming and Inventory Models (3,3,0)

Prerequisite: MATH 2207 Linear Algebra, MATH 2206 Probability and Statistics, MATH 3205 Linear and Integer Programming

This course introduces basic principles, classical models, popular algorithms and various applications in other fields of inventory management and dynamic programming.

MATH 3825 Life Insurance and Life Contingencies (3,3,0)

Prerequisite: MATH 2206 Probability and Statistics or equivalent

To introduce the theory of life insurance and life contingencies with application to insurance problems. Students will learn some of the major issue in the field of actuaries.

MATH 3826 Markov Chain and Queuing Theory (3,3,0)

Prerequisite: MATH 2207 Linear Algebra, MATH 2206 Probability and Statistics, MATH 3205 Linear and Integer Programming

This course introduces basic principles, classical models, popular algorithms and various applications in other fields of Queuing Theory and Markov Chain.

MATH 3827 Network Models (3,3,0)

Prerequisite: MATH 2207 Linear Algebra, MATH 3205 Linear and Integer Programming

This course aims to introduce basic principles, classical models, popular algorithms and various applications in other fields of network programming.

MATH 3836 Data Mining (3,3,0)

This course introduces the concept of data mining and data mining techniques (including advanced statistical and machine learning techniques) for solving problems such as data cleaning, clustering, classification, relation detection, forecasting.

MATH 3837 Actuarial Mathematics (3,3,0)

Prerequisite: MATH 2206 Probability and Statistics, MATH 2805 Mathematics of Compound Interest

To introduce the theory of life insurance and life contingencies with application to insurance problems. Students will learn some of the major issue in the field of actuaries.

MATH 4205 Topics in Probability Theory and Stochastic Processes (3,3,0)

Prerequisite: MATH 2205 Multivariate Calculus, MATH 2206 Probability and Statistics

This course introduces topics from conditional expectations, Markov chains, Markov processes, Brownian motion, and martingales, and their applications to stochastic calculus.

MATH 4206 Financial Derivatives (3,3,0)

Prerequisite: MATH 2205 Multivariate Calculus, MATH 2206 Probability and Statistics

This course introduces computational methods for problems of finance, including mainly the computation of market indicators and option price.

MATH 4207 Computational Finance (3,3,0)

Prerequisite: MATH 2205 Multivariate Calculus, MATH 2206 Probability and Statistics

This course introduces basic numerical methods, numerical solutions of PDEs and probabilistic methods.

MATH 4216 Mathematical Finance (3,3,0)

Prerequisite: MATH 2205 Multivariate Calculus, MATH 2206 Probability and Statistics

This course introduces topics from replication of trading strategies, arbitrage, completeness, martingale representation theorem, fundamental theorem of finance, stochastic differential equations, and Black-Scholes formula of option pricing.

MATH 4406 Differential Geometry (3,3,0)Prerequisite: MATH 2205 Multivariate Calculus and MATH 2207 Linear Algebra or MATH 3405 Ordinary Differential Equations (*recommended*)

This course teaches students the mathematical tools of classical differential geometry. Applications to curve and surface designs are also given.