MATH 4807 Categorical Data Analysis (3,3,0) (E)
Prerequisite: MATH 3805 Regression Analysis
To equip students with statistical methods for analyzing categorical data arisen from qualitative response variables which cannot be handled by methods dealing with quantitative response, such as regression and ANOVA. Some computing software, such as SAS, S-PLUS, R or MATLAB, will be used to implement the methods.

MATH 4815 Interior Point Methods for Optimization (3,3,0)
Prerequisite: MATH 3205 Linear and Integer Programming
This course aims to introduce students to the fundamental topics in the interior point based methods for optimization, both the discrete and continuous versions of the interior point methods will be taught. Students will learn theory, techniques and solution schemes of the interior point based methods for linear programming, quadratic programming, convex programming, and semi-definite programming problems. Some Mathlab implementation will be also addressed.

MATH 4816 Optimization Theory and Techniques (3,3,0) (E)
Prerequisite: MATH 2207 Linear Algebra, MATH 2215 Mathematical Analysis
This course aims to (a) provide the fundamental theory and techniques in unconstrained and constrained optimization, (b) introduce some existing numerical software packages, and (c) offer some interdisciplinary techniques and applications related to optimization.

MATH 4817 Stochastic Processes (3,3,0)
Prerequisite: MATH 2216 Statistical Methods and Theory
To introduce the theory of stochastic processes with their application, and to develop and analyse probability models that capture the salient features of the system under study to predict the short and long term effects that this randomness will have on the systems under consideration.

MATH 4825 Survival Analysis (3,3,0)
Prerequisite: MATH 3805 Regression Analysis, MATH 4807 Categorical Data Analysis
This course aims to provide students with a good understanding of techniques for the analysis of survival data, including methods for estimating survival probabilities, comparing survival probabilities across two or more groups, and assessing the effect of covariates on survival. The emphasis will be on practical skills for data analysis using statistical software packages. Students will form groups to do projects involving the analysis of real data.

MATH 4826 Time Series and Forecasting (3,3,0) (E)
Prerequisite: MATH 3805 Regression Analysis
The course aims at providing students with an understanding of the statistical methods for time series data whose order of observation is crucially important in depicting the background dynamics of the related social, economical, and/or scientific phenomena. The students will learn to use various time series models and techniques such as exponential smoothing, ARIMA, etc., to model and make forecasts. Corresponding programming techniques to facilitate these practices will also be introduced within the platforms of MATLAB. Case studies will be provided to make the students acquainted with the elementary techniques.

MATH 4875 Special Topics in Statistics I (3,3,0) (E)
MATH 4876 Special Topics in Statistics II (3,3,0) (E)
MATH 4877 Special Topics in Statistics III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of Statistics. Emphasis is laid on the continuation and consolidation of those fundamental applied courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 4998 Mathematical Science Project I (3,0,9)
Prerequisite: Year IV Standing
This is a half-year individual project which usually relates to an interdisciplinary or applied topic, and requires knowledge and skill acquired in various courses. A thesis and an oral presentation are required upon completion of the project.

MATH 4999 Mathematical Science Project II (3,0,9)
Prerequisite: MATH 4998 Mathematical Science Project I, and Recommendation by the supervisor
This is an extension of MATH 4408 for outstanding students, who are now supposed to conduct more innovative further developments for their results obtained in MATH 4408. A thesis and an oral presentation for Project I are waived but will be required upon completion of Project II.

MATH 7010 Topics in Graph Theory (3,3,0)
Prerequisite: Postgraduate standing or consent of instructor
This course provides fundamental concepts and principles of graph theory to students who might be interested to pursue research in that field, or to graduate students who wants exposure to graph theory. It will give a survey on recent results and possible research directions. While graduate standing in Mathematics or related area may find this subject useful.

MATH 7020 Finite Element Methods (3,3,0)
Prerequisite: Postgraduate standing or consent of instructor
To introduce the concepts of finite element methods, typical elements in engineering applications, demonstrate the use of software packages, and to introduce the convergence theory of the finite element method.

MATH 7030 Numerical Linear Algebra (3,3,0) (E)
Prerequisite: Postgraduate standing or consent of instructor
This course covers the advanced topics in numerical linear algebra. Theoretical issues as well as practical computer applications will be addressed.

MATH 7050 Optimization Theory and Techniques (3,3,0) (E)
Prerequisite: Postgraduate standing or consent of instructor
This course introduces the fundamental theory and techniques for both unconstrained and constrained optimization. Overview of the existing numerical software packages will be addressed. Finally some interdisciplinary techniques and applications related to optimization will be discussed.

MATH 7060 Complexity of Numerical Problems (3,3,0)
Prerequisite: Postgraduate standing or consent of instructor
This course is concerned with a branch of complexity theory, the information based complexity theory. It studies the intrinsic complexity of numerical problems, that means, the minimum effort required for the approximate solution of a given problem up to a given error. Based on a precise theoretical foundation, lower bounds are established, i.e. bounds which hold for all algorithms. We also study the optimality of known algorithms, and describe ways to develop new algorithms if the known ones are not optimal.

MATH 7070 Pseudospectral Methods and Radial Basis Functions (3,3,0)
Prerequisite: Postgraduate standing or consent of instructor
Spectral methods and radial basis function methods are two modern numerical techniques which have been studied extensively by scientists and engineers in the past two decades. There exist many differences between the modern numerical methods and the classical approaches such as finite element and finite difference methods. This course will provide students with a sound understanding of the highly accurate and efficient numerical schemes and a useful training on how to implement these methods.