MATH 4416 Combinatorics (3,3,0)
Prerequisite: MATH 3406 Abstract Algebra (*recommended*)
This is an advance level enumerative combinatorics course. This course introduces a systematic coverage of enumeration of configurations with specified properties. Some combinatorics objects and some advanced techniques for counting, such as recurrence relation, generating function, Burnside's theorem, cyclic index and Pólya's theorem, will be introduced.

MATH 4417 Topology (3,3,0)
Prerequisite: MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II
This course covers the essential concepts of topological spaces. Important topological properties are also taught to lay the ground work for further studies.

MATH 4465 Special Topics in Mathematics I (3,3,0)
MATH 4466 Special Topics in Mathematics II (3,3,0)
MATH 4467 Special Topics in Mathematics III (3,3,0)
This course is devoted to the study of up-to-dated and important topics in different areas of mathematics. Emphasis is laid on the continuation and consolidation of those fundamental 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 4606 Functional Analysis (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II, or consent of instructor
This course aims at familiarizing the student with the basic concepts, principles and methods of functional analysis and its applications. Functional analysis plays an important role in the applied sciences as well as in mathematics itself. Roughly speaking, functional analysis develops the tools from calculus and linear algebra further to the more general setting where one has vector spaces comprising functions or general abstract infinite-dimensional vector spaces. Problems from various application areas can then be conveniently posed in this common general set up, and solved using the techniques of functional analysis. The basic objects studied in functional analysis are vector spaces with a notion of distance between vectors, and continuous maps between such vector spaces. This interplay between the algebraic and analytic setting gives rise to many interesting and useful results, which have a wide range of applicability to diverse mathematical problems, such as from numerical analysis, differential and integral equations, optimization and approximation theory.

MATH 4615 Introduction to Numerical Linear Algebra (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, MATH 3206 Numerical Methods I
This course aims to provide a thorough discussion of the advanced topics and state of art development in numerical linear algebra. This course emphasizes on both the theoretical analysis and the computer applications of numerical linear algebra in various areas.

MATH 4665 Special Topics in Applied Mathematics I (3,3,0)
MATH 4666 Special Topics in Applied Mathematics II (3,3,0)
MATH 4667 Special Topics in Applied Mathematics III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of applied mathematics. 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 4805 Applied Nonparametric Statistics (3,3,0)
Prerequisite: MATH 2216 Statistical Methods and Theory
The course aims at introducing some efficient nonparametric statistical methods to students and let them know how to use those methods in practice. 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 4807 Categorical Data Analysis (3,3,0)
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)
Prerequisite: MATH 2207 Linear Algebra, MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II
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 Models (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
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)
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.