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)
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 1006 Advanced Calculus I
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 2217 Advanced Calculus II (3,3,0) (E)
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 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.

MATH 2230 Operations Research I (3,3,0) (E)
Prerequisite: MATH 1120 Linear Algebra
This course aims to introduce students some fundamental topics in operations research. Students will learn theory, techniques and applications of linear programming, network programmes, dynamic programming and inventory control problems.

MATH 2610 Graph Theory (3,3,0) (E)
Prerequisite: Year II standing
This course covers some fundamental concepts and principles of graph theory. Some algorithms of graphs are also discussed. Students will learn some techniques to solve some graph problems.

MATH 2630 Number Theory (3,3,0)
Prerequisite: Year II standing
This course will provide an introduction to the theory of numbers. Basic concept such as divisibility, congruence, diophantine equations will be covered. Some applications such as cryptography will be introduced.

MATH 2770 Internship I (1,0,0)
Prerequisite: Students must apply to and receive permission from the co-op coordinator preferably one semester in advance
This is a work experience programme available to students in MATH. Interested students should contact departmental advisors as early in their careers as possible, for proper counselling.

MATH 2780 Internship II (1,0,0)
Prerequisite: MATH 2770 Internship I, and students must apply to and receive permission from the co-op coordinator preferably one semester in advance
This is a work experience programme available to students in MATH. Interested students should contact departmental advisors as early in thier careers as possible, for proper counselling.

MATH 3205 Linear and Integer Programming (3,3,0) (E)
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) (E)
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 3285 Job Practicum I (1,0,0)
Prerequisite: Year II or above and students must apply to and receive permission from the co-op coordinator preferably one semester in advance
This is the first time of work experience available to students in the Department of Mathematics. Interested students should contact departmental advisors as early in their careers as possible, for proper counselling.

MATH 3286 Job Practicum II (1,0,0)
Prerequisite: MATH 3285 Job Practicum I and students must apply to and receive permission from the co-op coordinator preferably one semester in advance
This is the second time of work experience available to students in the Department of Mathematics.

MATH 3287 Job Practicum III (1,0,0)
Prerequisite: MATH 3286 Job Practicum II and students must apply to and receive permission from the co-op coordinator preferably one semester in advance
This is the third time of work experience available to students in the Department of Mathematics.

MATH 3405 Ordinary Differential Equations (3,3,0) (E)
Prerequisite: MATH 2215 Mathematical Analysis, 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.

MATH 3406 Abstract Algebra (3,3,0) (E)
Prerequisite: MATH 1205 Discrete Mathematics
This course is intended to introduce general calculus of a single real variable. It will help students with some background and skill for algebraic manipulations in calculus to understand the basic concepts and fundamental theories of differentiation, integration and their applications.

MATH 3407 Advanced Linear Algebra (3,3,0) (E)
Prerequisite: MATH 2207 Linear Algebra
This course is designed for mathematical science major students. General vector space, linear transformations, inner products, diagonal form, Jordan form, dual space and quadratic forms will be introduced. The course emphasizes on general theory of linear algebra.

MATH 3415 Vector Calculus (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus and MATH 2207 Linear Algebra
This course is designed to develop the intuitive understanding, theory, and computational skills necessary for the concepts of vector functions by tying together multivariate calculus with concepts of vector. Topics covered include Vector Fields, Stokes theorem, Green's theorem, Gauss' theorem, and their applications.

MATH 3416 Complex Analysis (3,3,0) (E)
Prerequisite: MATH 2215 Mathematical Analysis
This course provides an up-to-date introduction to the basic theory of analytic functions of one complex variable. Residue Theorem and its applications to the evaluation of integrals and sums will be one of the main objectives. Also conformal mappings and their applications will be discussed.

MATH 3417 Game Theory (3,3,0)
Prerequisite: MATH 1205 Discrete Mathematics
The purpose of this class is to provide an introduction to game modeling and theory. In studying of strategic behavior among parties having apposed, mixed or similar interests, students will be able to think strategically, understand and explain a wide range of problems. Students will learn how to recognize and model strategic situations, to predict when and how your actions will influence the decisions of others and to exploit strategic situations for your own benefit. It is also important to emphases that game theory is a deductive, mathematical enterprise; therefore, it requires abstract, symbolic reasoning. The major topics covered are strategic games, extensive games with perfect and imperfect information, and coalitional games.

MATH 3425 Graph Theory (3,3,0) (E)
Prerequisite: MATH 1205 Discrete Mathematics
This course covers some fundamental concepts and principles of graph theory. Some algorithms of graphs are also discussed. Students will learn some techniques to solve some graph problems.

MATH 3426 Number Theory (3,3,0)
Prerequisite: MATH 1205 Discrete Mathematics
This course provides an introduction to the theory of numbers. Basic concept such as divisibility, congruence, diophantine equations will be covered. Some applications such as cryptography will be introduced.

MATH 3427 Real Analysis (3,3,0) (E)
Prerequisite: MATH 2215 Mathematical Analysis
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 3591 Mathematical Science Project I (3,0,9)
Prerequisite: Year III 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 3592 Mathematical Science Project II (3,0,9)
Prerequisite: MATH 3591 Mathematical Science Project I and Recommendation by the supervisor
This is an extension of MATH 3591 for outstanding students, who are now supposed to conduct more innovative further developments for their results obtained in MATH 3591. A thesis and an oral presentation for Project I are waived but will be required upon completion of Project II.

MATH 3605 Numerical Methods II (3,3,0) (E)
Prerequisite: MATH 3206 Numerical Methods I, MATH 3405 Ordinary Differential Equations
This is the continuation of the Numerical Methods I. The course covers the concepts of Discrete/Fast Fourier Transform (DFT/FFT), the concepts of optimization, numerical methods for solution of systems of nonlinear equations, numerical methods for optimization and algorithms for solutions of initial value problems and boundary value problems for ordinary differential equation. The constructions of the algorithms and their advantages and limitations will be discussed so that the results of the computations can be properly interpreted.

MATH 3606 Partial Differential Equations (3,3,0) (E)
Prerequisite: MATH 2205 Multivariate Calculus, MATH 3405 Ordinary Differential Equations
This course introduces the theory of multi-dimensional scalar and system of parabolic, elliptic and hyperbolic partial differential equations (PDEs) that model physical processes in areas such as physics, biology, chemistry and social science. Solution techniques such as the separation of variables, eigenfunction expansions, Green functions, Fourier and Laplace transforms for solving the equations in a bounded and unbounded domain, with homogeneous and inhomogeneous source term will be studied in detail. Some classical numerical methods such as finite difference schemes and finite elements schemes for solving partial differential equations will also be introduced.

MATH 3607 Boundary Value Problems (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus, MATH 3606 Partial Differential Equations
The principle objective of this course is to tie together the mathematics developed and the student's physical intuition by solving boundary value problems involving partial differential equation. This is accomplished by deriving the mathematical model, by using physical reasoning in the mathematical development, by interpreting mathematical results in physical terms, and by studying the heat, wave, and potential equations separately. Student is assumed to have enough background in physics to follow the derivations of the heat and wave equations.

MATH 3615 Digital Image Analysis (3,3,0) (E)
Prerequisite: MATH 1005 Calculus
This course aims to introduce students to the foundation of digital image analysis. Students will learn elementary point operation techniques for image enhancement, and advanced techniques (including the theory of Fourier transform) for image restoration and image analysis. Students will come to understand all the major issues involved in the design and implementation of a digital imaging system.

MATH 3616 Numerical Methods for Differential Equations (3,3,0) (E)
Prerequisite: MATH 3606 Partial Differential Equations and MATH 3206 Numerical Methods I
This course introduces the major numerical techniques for solving partial differential equations. Emphasis is placed on finite