MATH 1140 Computational Mathematics (3,3,0) (E)
Prerequisite: MATH 1000 Supplementary Mathematics (Calculus and Linear Algebra) or Grade D or above in AL Pure Mathematics
This course aims to introduce Computer Science major students to the basic concepts in modern computational mathematics and its application. It provides various solid fundamental concepts and knowledge for modelling, real life application and optimization. Topics include advanced vector Algebra, number system, linear systems, various numerical methods, power method, numerical optimization and multivariable calculus. Practical applications and programming techniques are both emphasized.

MATH 1205 Discrete Mathematics (3,3,0) (E)
This course integrates the fundamental topics in discrete mathematics and linear system. These topics, including propositional logic, proof methods, set theory, combinatorics, graph algorithms, Boolean algebra, and system of linear equations, are essential for precise processing of information.

MATH 1550 Calculus and Linear Algebra (3,3,0)
This course introduces topics in linear algebra, mathematical analysis and differential equations. Applications to chemistry are provided.

MATH 1570 Advanced Calculus (3,3,0) (E)
Prerequisite: Year I standing
This course gives students fundamental mathematical knowledge in a wide variety of areas including vector algebra, vector differentiation and integration, as well as an introduction to baisc linear algebra.

MATH 1590 Calculus and Linear Algebra for Chemistry (3,3,0) (E)
This course introduces topics in linear algebra, mathematical analysis and differential equations. Applications to chemistry are provided.

MATH 1006 Advanced Calculus I (3,3,0)
Antirequisite: MATH 1005 Calculus
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 real numbers, sequences, limit and continuity, and differentiation.

MATH 2005 Probability and Statistics for Computer Science (3,3,0) (E)
Antirequisite: MATH 2006 Probability and Statistics for Science and MATH 2206 Probability and Statistics
Prerequisite: MATH 1005 Calculus; student with credit for MATH 2006 or 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 problems and use popular statistics software, such as SPSS, SAS to perform analysis.

MATH 2006 Probability and Statistics for Science (3,3,0) (E)
Antirequisite: MATH 2005 Probability and Statistics for Science and MATH 2206 Probability and Statistics
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 SPSS, SAS 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)
Antirequisite: MATH 2005 Probability and Statistics for Science and MATH 2206 Probability and Statistics
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)
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