

Title (Units):	MATH 0021-2 Mathematics for Science I-II (3,3,0)
Syllabus Reviewed by:	W.C. Shiu, L.Z. Liao, C. S. Tong
Pre-requisite:	Nil
Objectives:	This subject introduces basic ideas and techniques in advanced mathematics so that students can master mathematics, especially calculus and statistics, in their university studies. After taking this subject, students will improve their logic thinking and be able to prove fundamental theorems
Calendar Description:	This subject aims at introducing basic ideas and techniques in advanced mathematics for students who have to use mathematics, especially calculus and statistics, in their university studies; developing students' ability in proving theorems; and enhancing students' logical thinking. After taking this subject, students are expected to master the foundation of advanced mathematics.
Textbook:	L.D. Hoffmann, G.L. Bradley, <i>Calculus, for Business, Economics and the Social and Life Sciences</i> , 9th Ed., McGraw Hill, 2004.
References:	A. I. Khuri, <i>Advanced Calculus with Applications in Statistics</i> , Wiley-Interscience, 1993.
Assessment:	1-hour Test and Assignments (30%) Final Examination (70%)

Subject Content and Outline for MATH 0021:

<u>Topic</u>	<u>Hours</u>
I. Mathematical Induction (include using induction to prove the sums of arithmetic and geometric sequences)	6
II. Functions	8
A. Injective, surjective and bijective functions	
B. Polynomials including binomial theorem	
C. Exponential and logarithm functions	
D. Trigonometric functions including compound angle	
III. Differentiation	16
A. Differentiation from first principles	
B. Differentiation of a sum, a product, a quotient	
C. Differentiation of composite functions (i.e., chain rule) and implicit function	
D. Mean value theorem	
E. Second derivatives	

F. Extrema problem	
G. Introduction to differential equations	
IV. Integration	10
A. Indefinite integration as the anti-derivative	
B. Definite integrals and their properties	
C. Techniques of integration	
D. Fundamental theorem of calculus	
Subject Content and Outline for MATH 0022:	
V. Matrices	10
A. $m \times n$ matrices with $1 \leq m, n \leq 3$	
B. Algebra of matrices	
C. Applications to 2-dimensional geometry	
D. Solve system of linear equations of two or three unknowns by Gaussian elimination	
VI. Inequalities	8
A. Linear and quadratic inequalities in one or two variables	
B. Applications to linear programming	
VII. Combinatorics	7
A. Combinations	
B. Permutations	
C. Addition law	
D. Multiplication law	
VIII. Probability	9
A. Sample space	
B. Events	
C. Independence	
D. Conditional probability	
E. Bayes' theorem	
F. Simple rules of probability	
G. Binomial, geometric, hypergeometric, uniform, Poisson, exponential and normal distributions	
IX. Statistics	6
A. Graphical representations	
B. Tabular representations	
C. Measures of central tendency	
D. Measures of locations	
E. Measures of dispersion	
F. Applications of normal distribution	

Total

80