

Hong Kong Baptist University
Faculty of Science
Department of Mathematics

Title (Units): MATH 1130 Discrete Structures (3,2,1)

Course Aims: This course addresses a variety of fundamental topics in computer science, including propositional logic, proof techniques, set theory, combinatorics, graph theory and Boolean algebra.

Prerequisite: None

Prepared by: K I Liu

Learning Outcomes (LOs):

Upon successful completion of this course, students should be:

No.	Learning Outcomes (LOs)
	Knowledge
1	Able to understand propositional logic
2	Able to understand different methods of proof
3	Able to understand properties of sets, relations and functions
4	Able to know the techniques in counting problems
5	Able to know different kinds of graphs and the associated problems
6	Able to understand the Boolean algebra and its applications
	Skill
7	Able to carry out proofs in propositional logic, set theory and graph theory
8	Able to carry out mathematical induction
9	Able to solve the counting problems using the appropriate techniques
10	Able to execute the appropriate algorithms in graph theory to solve the problems
11	Able to apply Boolean algebra for circuit design
	Attitude
12	Aware different discrete models to represent objects in Computer Science

Assessment:

No.	Assessment Methods	Weighting	Remarks
1	Continuous Assessment	30%	Continuous Assessment are designed to measure how well the students have learned the logics, set theory, combinatoric, graph theory and Boolean algebra.
2	Final Examination	70%	Final Examination questions are designed to see how far students have achieved their intended learning outcomes. Questions will primarily be analysis and skills based to assess the student's ability in analysis the problems, formulating the models and applying the appropriate algorithms to find the answers.

Learning Outcomes and Weighting:

Contents		LO No.	Teaching (in hours)
I	Logic and Proofs	1,2,7,8	8
II	Set Theory	3,7	8
III	Combinatorics	4,9	6
IV	Graph Theory	5,7,10,12	8
V	Trees	5,7,10,12	4
VI	Boolean Algebra	6,11,12	6

Textbook: K.H. Rosen, Discrete Mathematics and Its Applications, 6th Ed., McGraw-Hill, 2006

References: R. Johnsonbaugh, Discrete Mathematics, 7th Ed., Prentice Hall, 2008

R.A. Ross and C.R.B. Wright, Discrete Mathematics, 5th Ed., Prentice Hall, 2002

Course Contents in Outline:

	<u>Topics</u>	<u>Hours</u>
I.	Logic and Proofs A. Propositions B. Conditional Propositional and Logical Equivalence C. Methods of Proof D. Mathematical Induction	8
II.	Set Theory A. Sets B. Sequences and Strings C. Relations D. Functions	8
III.	Combinatorics A. Permutations B. Combinations C. The Pigeonhole Principle D. Recurrence Relations	6
IV.	Graph Theory A. Terminology of Graph B. Path and Cycles C. Hamiltonian Cycles and the Traveling Salesperson Problem D. Shortest Path Problem	8
V.	Trees A. Terminology and Characterizations of Trees B. Binary Trees C. Spanning Trees and Minimal Spanning Trees	4
VI.	Boolean Algebra A. Boolean Functions B. Representing Boolean Functions C. Logic Gates D. Minimization of Circuits	6