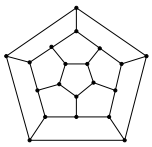

MATH 2343
Discrete Structure
2024-25 Spring

https://canvas.ust.hk/courses

Lecture

Time	Monday and Wednesday 12:00pm-13:20pm
Venue	G009A, GYT
Instructor	**Prof. Beifang Chen**
E-mail	mabfchen@ust.hk
Office	Room 3458, Office Hour: Wed, 4:00pm-6:00pm

Tutorial

Time	Tuesday 6:00pm-6:50pm
Venue	Room 2465, Lift 25-26
Teaching Assistant	**Hei Chun Leung**
E-mail	hcleungat@connect.ust.hk
Office	Room 4382, Office Hour: by appointment

Course Description

Course outline: Thus is an introductory course on Discrete Mathematics for Year One students, with proof and structure style. We will cover set theory, elementary formal logic, binary relations, combinatorics, elementary number theory, graph theory, Boolean algebra, and discrete probability. If time permits, we may add some more details to each of the topics. There is no prerequisite to take this course, though an A-Level Math is required.

Credits: 4

Prerequisites: A Level Math.

Textbooks and References

Textbook: Kenneth A. Ross & Charles B. Wright, *Discrete Mathematics* (5th edition), Prentice Hall International Editions 2003.

References: Ralph P. Grimaldi, *Discrete and Combinatorial Mathematics: An Applied Introduction* (5th edition), Pearson Addison Wesley 1999.

Intended Learning Outcomes (ILOs)

Upon completion of this course, students are expected to:

(1) Develop concrete knowledge to understand the core concept and ideas of discrete structures such as set theory, formal logic, binary relation, number theory, and graph theory, etc. Be able to formulate problems in the language of discrete structures.
(2) Recognize the power of abstraction and generalization and carry out investigative mathematical work with independent judgment.
(3) Master the basic concepts and techniques of discrete mathematics; apply the fundamental principles, formulas, algorithms, and other techniques to formulate problems in related areas and solve them in skills.

Assessment and Grading

Homework: There will be four or five sets of problems. Each contains at least six problems. Students should submit each homework in the form of a clearly written and scanned or a LaTeX-typed PDF on the Canvas system before the deadline. No late homework is accepted, unless agreed upon by the TA.

Examinations: There will be a one hour twenty minute midterm exam during Week 6-7 (the exact date to be confirmed) and a three hour final exam arranged by ARO.

Make-up midterm policy:

- Under any circumstance, students who are unable to attend the midterm exam will **not** be offered a makeup test that takes place after the regular exam session.
- For students who have valid reasons for missing the midterm (such as time crash with another midterm), the instructor may approve an early midterm, or assign the midterm marks according to the final exam performance.
- However, for students who miss the midterm without a valid reason, the midterm score will be considered 0. This includes self-claimed sickness without any medical statement.

Makeup final exam policy: For final exams, the course will follow the makeup exam policy set by ARO. The approval of the instructor, the dean, and ARO will be needed to apply for a final makeup exam, and students must complete the final makeup exam within 1 week after the approval decision from ARO. In any circumstance, the makeup final exam will use a different set of problems, and there is no guarantee that the level of difficulty remains the same as the regular sitting.

Grading Scheme:

	percentage	Address ILOs
Attendance/Homework	25%	1, 2, 3
Midterm	30%	1, 2, 3
Final	45%	1, 2, 3
Course Total	100%	100%

TENTATIVE COURSE SCHEDULE

- Week 1-2: Set Theory (Sections 1.1-1.7)
  sets and subsets, operations on sets, sequences and functions, properties of functions

- Week 2-3: Formal Logic (Sections 2.1-2.6)
  propositional calculus, tautologies, methods of proof, lofic in proofs, analysis of arguments

- Week 4: Binary relations (Sections 3.1-3.5)
  Representations of binary relations, digraphs and graphs, Boolean matrices, equivalence relations and partitions

- Week 5: Elementary Number Theory
  Divisibility, greatest common divisor, least common multiple, Euclidean algorithm, RSA public key cryptography, solving Diophantine equations, Chinese Remainder Theorem

  Midterm exam: March 15, 2025; Fri, 6:00pm-7:20pm; venue TBA

- Week 6: Induction and Reduction (Sections 4.1-4.7
  loop invariants, mathematical induction, recursive definitions, recurrence relations

- Week 7-8: Counting (Sections 5.1-5.5)
  basic counting techniques, permeations, combinations, Inclusion-Exclusion Principle, counting and partitions, Pigeon-Hole Principle

- Week 9-11: Basic Graph Theory (Sections 6.1-6.6, 7.1-7.5)
  graphs and subgraphs, Euler tours, Chinese Postman Problem, Traveling Sales Problem, planar graphs, Euler's Polyhedra Formula, Platonic solids, Depth-First Search, Breadth-First Search, Polish notations, Minimum spanning trees, digraph, page-rank problem

- Week 12: Discrete Probability

- Week 13: Boolean Algebra (Final exam: arranged by ARR)