MATH 2343 Discrete Structure
Course Outline - Spring 2024

Instr/Tutor	Office	Lecture/Tutorial Hour	Venue
Instructor			
Beifang Chen	Rm 3458	L: TuTh 15:00 - 16:20	Rm 2304
Email: mabfchen		Office Hour: Wed, 14:00-15:00	Lift 17/18
		Tue, 14:00-15:00	
Tutor			
Cao, Ying	Rm 4381	T: Wed, 17:00-17:50	Rm 6602
Email: ycaobf		Office Hour: Wed, 15:00-17:00	Lift 31/32

Course Description

Credit point: 4 credits

Prerequisite: A passing grade in AL Pure Mathematics / AL Applied Mathematics; or MATH 1014; or MATH 1018 (prior to 2023-24); or MATH 1020; or MATH 1024

Exclusion : COMP 2711, COMP 2711H

Brief Outline: This is an introductory course on Discrete Mathematics for Year One students. We will cover set theory, logic, binary relations, number theory, counting, recurrence relations, graph theory, Boolean algebra, and discrete probability, etc. If time permits, we may add some more details to each topic. There is no specific prerequisite for taking this course, though the A Level Math is required.

Intended Learning Outcomes

Upon successful completion of this course, students should be able to:

No.	ILOs
1	Develop understanding of the core ideas of discrete structures. Master the fundamental principles, counting formulas, algorithms, and other techniques on discrete mathematics.
2	Recognize the power of abstraction and generalization of discrete mathematics. Investigate problems logically and mathematically with independent judgment.
3	Apply principles, formulas, algorithms, and other techniques to formulate mathematical and computer science related problems and to solve them with skills.
4	Student should be able to write piece of work more logically, and to communicate problem solutions using correct mathematical terminologies.

Assessment Scheme

Assessment	Assessing Course ILOs
10% Attendance	1,2,3,4
15% Homework	1,2,3,4
30% Midterm	1,2,3,4
45% Final	1,2,3,4

Grading: Final letter grades will be given at the end, based on the results of attendance, homework, midterm and final exams, and their shares are counted 10%, 15%, 30% and 45% respectively. Attendance counts after drop/add.

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

Homework: Problem sets will be distributed from time to time. All of them will be collected by tutors in tutoring sessions before the due dates. Tutors will keep the records of all grades. Since we have no graders, the problems will be checked on the 0-1 base, that is, full mark for handed in problems and zero mark for not.

Test: There are midterm and final exams. Everyone must write the two exams without exception.

Question: For mathematical questions, whether they are about lectures or problem sets or exams, you may ask either the tutors or the instructor. But for solutions to problem sets and grading records of homework and exams, ask the tutor.

Tentative Schedule (further topics will be added in if time permits)

Week 1-2	Sets, Sequences, and Functions
1.1–1.7	Divisibility, Sets and Subsets, Operations on Sets
	Sets and Subsets, Operations on Sets
1.5, 1.6	Functions, Sequences
1.7	Properties of Functions
Week 3-4	Elementary Logic
2.1, 2.2	Propositional Calculus
2.3, 2.4	Methods of Proof
2.5, 2.6	Logic in Proofs, Analysis of Arguments
Week 4-5	Relations
3.1, 3.2, 3.3	Relations, Digraphs and Graphs, Matrices
3.4	Equivalence Relations and Partitions
3.5	Integers modulo n
Week 5-6	Induction and Recursion
4.1, 4.2	Loop Invariants, Mathematical Induction
4.3, 4.4	Big-Oh Notation, Recursive Definition
4.5, 4.6	Recurrence Relations, More Induction
4.7	Euclidean Algorithm, Linear Diophantine Equation
	Modular Linear Equation
Midterm Exam	Mar. 20, 2024; Wed, 19:00-20:00, open-book exam, online
Week 7-8	Counting
5.1	Basic Counting Techniques, Permutation, Combination
5.3	Inclusion-Exclusion Principle
5.4	Counting and Partitions
5.5	Pigeonhole Principle
Week 9-10	Basic Graph Theory
6.1, 6.2	Graphs, Euler Paths and Circuits

6.3 6.4	Trees and Rooted Trees
6.5*	Hamilton Path and Circuits, Planar Graphs
6.6	Minimal Spanning Trees
Week 10-11	Recursion, Trees, Algorithms, Probability
7.1–7.5	Depth-First Search, Breadth-First Search Polish Notation, Minimal Spanning Trees,
8.1–8.3	Digraphs
9.1– 9.4	Discrete Probability
Week 12-13	Boolean Algebra and Discrete Probability
10.1–10.5	Boolean Expressions
11.1--11.4	Probability Space, Bayes Formula, Random variables, Expectation and Variance