Course Objectives

This course introduces the students to discrete mathematical structures. Topics include sets, relations, functions, propositional and predicate logic, rules of inference, proof methods, number theoretic concepts such as mod, congruence, GCD, LCM, etc., mathematical induction, basic counting techniques such as product rule, sum rule, principles of inclusion and exclusion, division rule, permutation, combination, pigeon-hole principle, etc., as well as an introduction to graphs, trees, sequences, summations, and recurrence relations.

- construct mathematical arguments using propositions, predicates, logical connectives, quantifiers, and rules of inference as well as verify them,

- select appropriate proof methods (e.g. direct proof, proof by contradiction, proof by contraposition, existence proof, etc.) to build simple mathematical proofs,

- identify the types and properties of sets, relations, functions, graphs, and trees and prove simple mathematical properties of them,

- describe recursive function, sequence, or the sum of a series using recurrence relation and solve that using forward/backward substitution method,

- prove basic properties of number theoretic operations (e.g. congruence, mod, GCD, and LCM) and apply those to solve simple related problems,

- apply mathematical induction to prove properties of mathematical objects, series, etc.,

- apply the knowledge of summation notation and basic counting techniques to solve simple mathematical problems.

Course Name	Discrete Mathematics (CSE 173)
Instructor	Md. Shahriar Karim (MSK1)
Office	SAC, 10th Floor, Room: 1010 C
E-mail	shahriar.karim@northsouth.edu

Office Hours

Please see the course portal for updated office hours

Text Books

- Discrete Mathematics and its Application - by Kenneth H. Rosen (International 7th Edition)
- Discrete Mathematics with Application - by Susanna S. Epp (4th Edition)

Grading Policy

Course grading policy will follow the standard breakdown as used in NSU. However, curving may be applied if necessary.

Marks Distribution

Activities	Percentage
Attendance + Participation	5 + 5 %
Homeworks	10-15 %
Quizzes	15-20 %
Midterm(s)	30-35 %
Final Exam	30-35 %

Course Content

The core materials of the course evolve around the below topics:

Topics	Relevant Methods	# Lectures
Propositional and First Order Logic	Logic, propositions, and predicates. Compound statements, Truth Tables, The algebra of propositions, Rules of inference, Methods of proofs, Mathematical induction, Recursive definitions, Recursive algorithms, Proof by contradiction, Program correctness.	12
Counting	Basics of counting, Permutations and Combinations, Binomial Coefficients	4
Induction and Recursion	Basics of recursion, Recursive sets and functions.	4
Relations	Relations and their properties, Representing relations, Closures of relations, Equivalence of relations.	4
Sets, Functions, Sequences and Sums	Sets, Operations on sets, Functions, One-to-One and Onto functions, Inverses and composition of functions, One-to-One correspondence, Sequences and summations.	5
Graphs	Introduction to graphs, Directed and undirected graphs, graph terminology, Representation of graphs, Connectivity, Graph isomorphism, Euler and Hamilton paths, Shortest path problems.	4
Number Theory	Real and Complex Number System, Integers and Division, Growth of Functions, Primes and GCDs	3

Course Policies

This course will strictly follow the " NSU Code of Conduct, Revised- 2018". However, a few important points you all should always remember, and follow, are as below:

- Students should attend class lectures and take necessary notes. Unless specified otherwise, homeworks are generally due at the beginning of the class.

- Failure to attend an exam or failure to submit an assignment on time receives zero except when it is unavoidable because of some genuine emergency (requires proofs). In case of emergency, students should contact the instructor before the exam or before the stipulated date of assignment.

- Copying assignments are strictly prohibited; instead, discussion among students are encouraged. Please note down names of your peer classmates who you discussed during homework assignments. However, as the exams will largely follow the pattern of questions being asked in HW, solving those problems alone would help you during exams.

- Regrading requests for quiz, midterms should be conveyed within the 6 hours of the papers being returned in class.

- Unless the final grade is incorrectly computed, grade will NOT be changed once it is posted. There are no scopes of assigning additional works to improve your final grade.

- No electronic device during exams; if needed, calculator is allowed.

- No Facebooking, Texting etc. in class.

- Please do not distract others by your non-academic and non-professional behaviors. This is the bare minimum civility that we expect.

Class Participation: Important

- Attendance is important, but it is also important that you remain active as a class.

- Short questions will be asked at the end of each lecture. Your performance in these questions will be monitored to evaluate your class participation!

- **Questions are highly appreciated.**