한국외국어대학교
HANKUK UNIVERSITY OF FOREIGN STUDIES

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81, Oedae-ro, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 17035, Korea

Hankuk University of Foreign Studies

2023 Winter Session

MATH 400 Discrete Mathematics

Course Outline

Course Code: MATH 400

Instructor: Dr. Mahfuza Farooque

Home Institution: Pennsylvania State University

Office Hours: By appointment

Email: mff5187@psu.edu

Credit: 4

Class Hours:

This course will have 52 class hours, including 32 lecture hours, professor 8 office hours, 8-hour TA discussion sessions, 4-hour review sessions.

Course Description：

This course introduces undergraduate students to discrete mathematics and the foundations for modern computer science. Beyond learning a set of tools and techniques, a major goal of this course is to train students in how to think logically and mathematically when approaching a problem to solve. Students will learn proof techniques using mathematical logic and see how this informs algorithm design. Students will also learn combinatorial analytical techniques (i.e. counting or enumerating objects) in order to solve computational problems or analyze algorithms. Finally, students will be exposed to discrete data structures: implementations of mathematical structures useful for designing algorithms.
At the end of this course, a successful student will be able to:

- Formulate common language propositions into symbolic logical statements and assess their truth values
- Manipulate, simplify, restate, and relate symbolic logical statements
- Describe and apply different proof techniques such as induction, proof by contradiction, arguing contrapositive, utilizing the pigeon-hole principle, etc.
- Identify when different proof strategies are applicable to certain problems
- Describe mathematical sets, set operations, and functions and relate these to discrete data structures
- Utilize counting techniques (such as permutations, combinations, binomial coefficients, and their associated identities) in order to solve computational problems

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- Describe and apply core concepts in discrete probability and understand how these relate to the analysis of algorithms.

Utilize discrete data structures (like graphs and trees) to express and solve algorithmic and computational problem.

Required Course Materials:

This course will introduce you to a number of mathematical modeling concepts including:

1. Sets
2. Logic
3. Number Theory
4. Proofs
5. Sequence, Functions
6. Relations
7. Graph Theory
8. Probability
9. Combinatoric

Grading Policies:

- Attendance 10%
- Home Work 20%
- Quiz 25%
- Midterm 20%
- Final Exam 25%

Grading System (1 ~ 100)

The final score with be scaled and the scaled score with be used to assign a Course grade.

A+ : 96 - 100	A : 91 - 95
B+ : 86 - 90	B : 81 - 85
C+ : 76 - 80	C : 71 - 75
D+ : 66 - 70	D : 60 - 65
Pa : Pass	
Fa : Fail	

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Course Schedule

The course outline is tentative, and it will be modified depending on the pace of the class.

Week1

Session 1: Introduction to Sets Theory

Session 2: Propositional Logic and Truth table

Session 3: Predicate Logics

Session 4: Number theory

(Quiz1 and HW1)

Week2

Session 1: Cryptography

Session 2: Sequence, Relations

Session 3: Functions

Session 4: Midterm Exam

(Quiz2 and HW2)

Week3

Session 1: Combinatorics

Session 2: Probability

Session 3: Continue to Probability

Session 4: Proofs (Direct and Indirect)

(Quiz3 and HW3)

Week4

Session 1: Proofs by Inductions

Session 2: Graph Theory

Session 3: Continue to Graph Theory

Session 4: Final Exam