



Shih Chien University

STP Program (July 01-Aug 02)

MATH 410 Discrete Mathematics for Computer Science

Course Outline

Course Code: MATH 410

Instructor: Dr. Mahfuza Farooque

Home Institution: Pennsylvania State University

Office Hours: TBA

Email: mff5187@psu.edu

Credits: 4

Class Hours:

This course will have 144 class hours, including 50 lecture hours, professor 30 office hours, 20-hour TA discussion sessions, 10-hour review sessions, 34-hour extra classes.

Prerequisites: N/A

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

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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
- 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 & Evaluation:

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

Grading System (1 ~ 100):

Quality Points	Grade	Percentage %
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4	A	80-100
3	B	70-79
2	C	60-69
1	D	50-59
0	E	0-49

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: Logical Equivalence, Predicate Logics
Session 4: Direct Proof Method.

(Quiz #1 and HW

#1)

Week2

Session 1: Proof by Contrapositive and Contradiction
Session 2: Relations
Session 3: Functions
Session 4: Sequence

(Quiz #2 and HW

#2)

Week3

Session 1: Combinatorics
Session 2: Probability
Session 3: Continue to Probability
Session 4: Mid Term Exam

(Quiz #3 and HW

#3)

Week4

Session 1: Proofs by Inductions
Session 2: Continue to Proof by Inductions
Session 3: Number Theory
Session 4: RSA: Encryption and Decryption

(Quiz #4 and HW #4)

Week5

Session 1: Graph Theory
Session 2: Cont. Graph Theory
Session 3: Review for Final Exam
Session 4: Final Exam

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