

TKU211102

Discrete Mathematics
Matematika Diskrit

BASIC INFORMATION

Course Credit	3 / 150 minutes per Week
Course Type	Required
Course Classification	Basic Science
Prerequisites	High School Level Mathematics

STUDENT AND LEARNING OUTCOMES

Covered Student Outcomes

Fundamental and Engineering Knowledge (KP.1) Development of Engineering Solution (KP.2)

Learning Outcomes

- LO1** Students are able to explain the fundamental of logic in computer programming including compound propositions, logical operators, conditional and biconditional proposition, and etc.
- LO2** Students able to solve various problem related to set theory, Boolean algebra, minimum weights and shortest paths, and able to proof the truth of an argument by using inference methods and mathematical induction.
- LO3** Students are able to solve basic counting problems.
- LO4** Students are able to elaborate fundamental of graph and tree theory.

COURSE DESCRIPTION

This course will discuss the fundamental of discrete mathematics that applicable to solve complex problems in engineering.

TOPICS

1. Logic & Proof

- 1.1 Propositional Logic
- 1.2 Application of Propositional Logic
- 1.3 Propositional Equivalence
- 1.4 Predicate & Quantifier
- 1.5 Rules of Inference

2. Mathematical Proof

- 2.1 Direct Proof
- 2.2 Contrapositive Proof
- 2.3 Proof by Contradiction
- 2.4 Proof Involving Sets)*

3. Set, Function and Sequence

3.1 Sets

3.2 Sets Operation

3.3 Functions

3.4 Sequence & Summation)*

4. Relation

4.1 Relations

4.2 Property of Relations

4.3 Representing Relations

4.4 Equivalence Relations

4.5 Partial Ordering

5. Number Theory)*

5.1 Divisibility & Modular Arithmetic

5.2 Integer Representation

5.3 Primes & GCD

5.4 Congruencies

5.5 Application of Congruencies

5.6 Intro to Cryptography

6. Induction

6.1 Mathematical Induction

6.2 Strong Induction and Well-Ordering

7. Counting

7.1 Basic Counting

7.2 Pigeonhole Principle

7.3 Permutation & Combinatory

7.4 Binomial Coefficient

8. Graph Theory

8.1 Graphs and Graph Model

8.2 Graph Terminology

8.3 Special Type of Graphs

8.4 Representing Graphs

8.5 Graph Isomorphism

8.6 Connectivity

8.7 Euler and Hamilton Path

8.8 Shortest Path

8.9 Planar Graph

8.10 Graph Colouring

9. Tree

9.1 Introduction to Trees

9.2 Application of Trees

9.3 Tree Traversal

9.4 Spanning Trees

9.5 Minimum Spanning Tree

REFERENCES

- [1] Kenneth H. Rosen. 2019. Discrete mathematics and its applications (8th ed.). McGraw-Hill, Inc., USA.
- [2] Richard H. Hammack, Book of Proof., Virginia Commonwealth University