

Course Information

Prerequisite: High-school mathematics, Calculus (preferred).

Instructor: Chi-chao Chao, ccc@ee.nthu.edu.tw, ext. 31158, Delta 863.

Lecture Hours: Wednesday, 10:10am to 12:00pm; Friday, 11:10am to 12:00pm; Delta 215.

Instructor's Office Hours: To be announced.

Teaching Assistants: To be announced.

TAs' Office Hours: To be announced.

Course Contents: This course gives an introduction to the essentials of discrete and combinatorial mathematics.

- *Fundamentals*

- Logic
- Set theory
- Mathematical induction
- Functions: definitions, pigeonhole principle
- Relations: definitions and properties, equivalence relations, partial orders

- *Enumeration*

- Principles of counting
- Principle of inclusion and exclusion
- Recurrence relations: homogeneous recurrence relations, nonhomogeneous recurrence relations
- Generating functions: generating functions for solving recurrence relations, generating functions for enumeration, partitions of integers
- Complexity of algorithms

- *Graph Theory*

- Introduction: definitions and properties, graph isomorphism, Euler trails and circuits, planar graphs
- Trees: definitions and properties, rooted trees, spanning trees, trees and sorting
- Optimization and matching: shortest-path problem, minimal spanning trees, matching problem, maximum flow problem

Textbook: R. P. Grimaldi, *Discrete and Combinatorial Mathematics: An Applied Introduction*, 5th ed. Boston: Pearson Addison Wesley, 2004.

References:

1. R. J. McEliece, R. B. Ash, and C. Ash, *Introduction to Discrete Mathematics*. New York: Random House, 1989.
2. N. L. Biggs, *Discrete Mathematics*, 2nd ed. New York: Oxford University Press, 2002.
3. C. L. Liu, *Elements of Discrete Mathematics*, 2nd ed. New York: McGraw-Hill, 1985.
4. C. L. Liu, *Introduction to Combinatorial Mathematics*. New York: McGraw-Hill, 1968.
5. K. H. Rosen, *Discrete Mathematics and Its Applications*, 8th ed. New York: McGraw-Hill, 2019.
6. R. L. Graham, D. E. Knuth, and O. Patashnik, *Concrete Mathematics: A Foundation for Computer Science*, 2nd ed. Reading, MA: Addison-Wesley, 1994.

Exams:

- Midterm Exam No. 1: 7:00pm to 10:00pm, April 9, 2021.
- Midterm Exam No. 2: 7:00pm to 10:00pm, May 14, 2021.
- Final Exam: 7:00pm to 10:00pm, June 25, 2021.

Grading: Homework 20%, two midterm exams 50%, and final exam 30%.

Homework Collaboration Policy: You can discuss the homework problems with any number of students currently taking the course, the teaching assistants, and the instructor. However, solutions should not be exchanged. You should make sure that you understand what you turn in, and should of course write up every word of the solution by yourself. It is OK to compare your final answer with others currently enrolled in the course, but you should fix up any error by your own effort. If these sentences are still vague, just tell yourself “*I shall not take unfair advantage of any other student*” and this should answer other policy-related questions you have in your mind.

WWW Homepage: <https://www.ee.nthu.edu.tw/cc/eecs2060.html>

E-Learning: <https://lms.nthu.edu.tw>