Summary

• **Analysis Techniques**
  1. Asymptotic Analysis
     \( (\Theta, \Omega, O, \omega, \text{ and } o \text{ notations, recurrences and summations}) \)
  2. Amortized Analysis
     (aggregate, accounting, and potential)
  3. Adversary Arguments
     (better lower bounds)

• **Data Structure**
  1. Heap
  2. Hash table, List, Stack, Queue, Tree, and Graph

• **Basic Design**
  1. Sorting
     \( (\Theta(n \log n) \text{ algorithms, } \Theta(n) \text{ algorithms, lower bound, sorting networks}) \)

• **Advanced Design**
  1. Dynamic Programming
  2. Greedy Algorithms
  3. Randomized Algorithms
  4. Approximation Algorithms

• **Bonus Problems**
  1. Marriage Problems
     (stable marriage, seating problems, and mate-selection problems)
  2. Special numbers:
     (a) \( \phi \) (Fibonacci number and golden-ratio)
     (b) \( \pi \) (randomized algorithm)
     (c) \( e \) (compound interest rate and harmonic series)
Other Topics (not covered)

- Design
  1. Graph Algorithms
  2. Combinatoric Algorithms
  3. DNA Algorithms
  4. Genetic Programming (Algorithms)
  5. Others

- Data Structures
  1. B-Trees
  2. Binomial Heaps
  3. Fibonacci Heaps
  4. Others