

## COMP 2080 - Analysis of Algorithms

**Calendar Description:** Methods of analyzing the time and space requirements of algorithms. Average case and worst case analysis. Models of computation.

**Prerequisites:** MATH 1240 and COMP 2140

**Recommended:** STAT 1000 or STAT 1001 or STAT 2210

**This course is a prerequisite for:** COMP 3030, COMP 3170, and COMP 4310.

### Outline

- 1) Introduction to analysis of algorithms and review (1 ½ weeks)  
Includes review of logarithms, summations, and binomial theorem. Introduce concept of algorithm run-time analysis.
- 2) Asymptotic Notation (2 weeks)  
Introduction to Big-Oh, Big-Omega, Big-Theta and their properties.
- 3) Introduction to greedy algorithms (1 ½ weeks)  
Discussion of greedy algorithms and proof of correctness.
- 3) Recurrences (3 weeks)  
Introduction to linear recurrences. This includes homogenous, non-homogenous recurrences, characteristic equation, change of variable, and the Master theorem.
- 4) Divide and conquer algorithms (2 weeks)  
Introduce divide and conquer design technique, proof of correctness, and run-time analysis.
- 5) Dynamic Programming (2 weeks)  
Introduce the dynamic programming technique, principle of optimality, and runtime analysis.
- 6) Review (1/2 week)

**Recommended Text:** R. Neapolitan and K. Naimipour, *Foundations of Algorithms using C++ Pseudocode, third edition*, Prentice Hall, 2004.