

# COT 4400: Design and Analysis of Algorithms

## Catalog Description

This course introduces the mathematical notations, tools, and techniques used in algorithm analysis. You will study various algorithms for sorting, searching, and graph-based problems. You will study the algorithms in general and will analyze the algorithm run-time.

## Textbook

*Introduction to Algorithms*, 2nd edition, by T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, McGraw Hill, 2001, ISBN: 0262032937.

## Instructor Information

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## Goals

1. To enhance the students' problem solving abilities
2. To present algorithms using pseudocode
3. To determine the runtime complexity of a variety of algorithms
4. To apply greedy and dynamic programming techniques in problem solving
5. To apply a variety of algorithms for sorting, searching, and graph-based problems

**Class time:** MWF 13:00 – 13:50 PM

**Office hours:** MW 9:00 - 11:30 AM

## Prerequisites

1. MAD 2104 Discrete Mathematics
2. COP 3530 Data Structure
3. C/C++ programming

## Topics

1. Introduction
2. Foundations: Growth of Functions, Summations and Recurrences
3. Sorting: Heapsort, Quicksort, Sorting in Linear Time
4. Medians: minimum and maximum
5. Basic Data Structures
6. Dynamic Programming: Matrix-Chain Multiplication, Longest Common Subsequence
7. Greedy Algorithms: Activity-Selection Problem, Huffman Codes
8. Graph algorithms: Elementary Graph Algorithms, MST, Single-Source Shortest Paths