

COT 4400 Design and Analysis of Algorithms

Credits: 3

Text book, title, author, and year: *Introduction to Algorithms*, 3rd edition, by T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, The MIT Press, 2009, ISBN: 0262033844.

a. Supplemental materials: none.

Specific course information

- a. Catalog description:** Builds upon existing skills in the mathematical analysis of algorithm complexity, including lower bounds, worst-case and average-case behavior. General techniques in algorithm design (such as divide and conquer, greedy and dynamic programming approaches) in the context of problem domains like graph, sorting and optimization problems. Introduction to the topic of NP-complete problems.
- b. Prerequisites:** COP 3530
- c. Required, elective, or selected elective:** required

Specific goals for the course

- a. Specific outcomes of instruction:** This course introduces the mathematical notations, tools, and techniques used in algorithm analysis. Students will study various algorithms for sorting, searching, and graph-based problems. Students will study the algorithms in general and will analyze the algorithm run-time.

Brief list of topics to be covered:

- Introduction to the design and analysis of algorithms
- Foundations: Growth of Functions, Summations and Recurrences
- Sorting: Heapsort, Quicksort, Sorting in Linear Time
- Medians: minimum and maximum
- Basic Data Structures
- Dynamic Programming: Matrix-Chain Multiplication, Longest Common Subsequence
- Greedy Algorithms: Activity-Selection Problem, Huffman Codes
- Graph algorithms: Elementary Graph Algorithms, MST, Single-Source Shortest Paths