

## CS 4120 : DESIGN AND ANALYSIS OF ALGORITHMS

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<i>Semester Hours:</i>	3.0	<i>Contact Hours:</i> 3
<i>Coordinator:</i>	Tianyi Song	
<i>Text:</i>	Introduction to Algorithms	
<i>Author(s):</i>	CORMEN, LEISERSON, RIVEST, AND STEIN	
<i>Year:</i>	2009	

### SPECIFIC COURSE INFORMATION

#### *Catalog Description:*

Algorithms for solving problems that occur frequently in computer applications. Basic principles and techniques for designing and analyzing algorithms. Introduction to computational complexity, divide-and-conquer, dynamic programming, greedy approach, and graph algorithms. Prerequisites: MATH 2220 or MATH 3220 or equivalents and grade of C or better in CS 3350.

Course type:                   **REQUIRED**

### SPECIFIC COURSE GOALS

- I can determine the complexity of an algorithm.
- I can explain and implement different types of algorithms (e.g., Divide-and-Conquer, Dynamic Programming, Greedy Algorithms).
- I can explain and implement different graph algorithms.
- I understand the classes of algorithms (P, NP, and NP-complete) and the role of polynomial-reduction in establishing NP-completeness.
- I understand the implications of algorithm design in real-world applications.

### COMPUTER SCIENCE STUDENT OUTCOMES ADDRESSED BY THIS COURSE

- CS 1 Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions
- CS 6 Apply computer science theory and software development fundamentals to produce computing-based solutions

## LIST OF TOPICS COVERED

- Introduction (1 week)
- Algorithmic Complexity (1 week)
- Divide-and-Conquer Strategy (2 weeks)
- Binary Search Tress (1 week)
- Dynamic Programming (3 weeks)
- Greedy Algorithms (1 week)
- Graph Algorithms (3 weeks)
- NP-Complete Problems (3 weeks)