CS 5200 – Analysis of Algorithms

Course Description

The purpose of this course is to teach the techniques needed to analyze algorithms. The focus will be on complexity analysis of iterative and recursive algorithms, randomized algorithms, red-black trees, greedy algorithms, linear programming, NP-completeness and reducibility, approximation algorithms, and algorithms for matrix operations.

Textbook

"Introduction to Algorithms", by Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein, 3rd edition

Specific Topics Covered

- Review of algorithm complexity: asymptotic notation and functions, recurrence equations
- Review of basic graph definitions and algorithms: graph visits, topological sort, strongly connected components
- Randomized algorithms
- Red-black trees
- Greedy algorithms
- Linear programming
- NP-completeness: classes P and NP, reducibility, NP-complete problems and proofs, integer linear programming
- Approximation algorithms: vertex cover problem, traveling salesman problem, set-covering problem
- Matrix operations: solving systems of linear equations, inverting matrices