

Advanced Algorithms And Complexity

Syllabus Information

CS 3870 - Advanced Algorithms&Complexity

Associated Term: 2023/24 Academic Session

Learning Objectives:

This course samples topics from various aspects of algorithms construction and analysis, including the following: • Graphs, graph algorithms, and applications, e.g., directed and undirected graphs; directed acyclic graphs and acyclic orderings; and connectivity in directed graphs. • Algorithm design paradigms: General methods for designing and analysing efficient algorithms, such as dynamic programming, a more careful treatment of the divide and conquer method, and general strategies such as backtracking search or greedy approaches. • Further application areas, such as string algorithms, network flows, and logic problems. • Complexity and lower bounds: NP-hardness and NP-completeness; problem reductions; conjectural lower bounds, and lower bounds against problems in P; and methods for dealing with NP-complete problems, including heuristic approaches, exact algorithms, and tractable special cases. Learning Outcomes By the end of the course students should be able to: 1. implement and reason about fundamental algorithms for a range of problems 2. describe and apply various algorithm design strategies for the construction of efficient algorithms 3. understand the significance of NP-complete problems and know ways to deal with them, such as heuristic approaches

Required Materials: [Click here for the reading list system](#)

Technical Requirements: The total number of notional learning hours associated with this course is 150. These will normally be broken down as follows: 33 hour(s) of Lectures across 11 week(s) 117 hour(s) of Guided Independent Study Formative Assessment: Quizzes 1 hour Summative Assessment: Examination (80%) 2 hours Set Exercises (20%) 5 hours