COT 6401 - Analysis of Algorithms

- **Catalog Description**:

  The design and analysis of algorithms from several areas of Computer Science. Tipics will be chosen from advanced data structures, dynamic programming, greedy algorithms, dynamic programming, approximation algorithms, and probablistic algorithms.

- **Textbooks**:

  1. *Introduction to Algorithms*
     T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, McGraw Hill, 2001.

- **Reference book**:

  1. *Algorithm Design.* Kleinberg and Tardos, Addison-Wesley, 2006.
  2. *Computer Algorithms: Introduction to Design and Analysis.* Baase, Sara and Gelder, Allen Van, 3nd ed., Addison-Wesley Publishing Company, 2000.

- **Instructor**:

  Dr. Jie Wu, Distinguished Professor of Computer Science and Engineering
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- **Goals**: To acquire working knowledge of analysis and design techniques. To learn the importance of good choice of data structures for algorithm design. To learn different methods for designing algorithms for hard problems, including those in bioinformatics.

- **Class time**: M-W 9:30 AM - 10:50 AM

- **Office hours**: M-W 9:00 AM - 9:30 AM, 11:00 AM -12:00 PM, S&E 410

- **Prerequisite by topic**:

  1. MAD 2104 Discrete Mathematics
  2. COP 3530 Data Structure
  3. COT 4400 Design and Analysis of Algorithms

- **Topics**:

  1. Introduction
  2. Foundations: growth of functions and recurrences
  3. Graph algorithms
  4. Dynamic programming
  5. Greedy algorithms
  6. Approximation algorithms
  7. Probabilistic algorithms
  8. Local search and local algorithms

9. NP-complete problems
10. Computing patterns in strings and other algorithmic issues in bioinformatics
11. Advanced tools: amortized analysis and adversary arguments
12. Other topics: parallel algorithms and design by induction

- **Grading policy**:

  HW (4 assignments): 20%, Midterm: 30%, Programming Project: 20%, and Final: 30%.