CS 435 Advanced Data Structure & Algorithm Design

Dr. Yehoshua Perl

Course Syllabus
Tuesday: 11:30am - 12:55pm
Thursday: 11:30am - 12:55pm
GITC 5602

Professor: Yehoshua Perl
(perl@njit.edu)
Office: GITC 4316 (973-596-3392)
Website: http://web.njit.edu/~perl/cis435
Office Hours: Tuesday: 10:40AM – 11:25AM
4:00PM – 4:45PM

Thursday: 1:00PM – 2:15PM

Office: GITC 4316 (973-596-3392)
Office: GITC 4th Floor Conference Room
Office Hours: Tuesday: 4:00PM – 5:00PM
Thursday: 4:00PM – 5:00PM

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Policies on all Assignments:
1. Programming assignments must be done in C++.
2. You must do all assignments individually. No teamwork allowed, all work submitted must represent your own effort.
3. Homework assignments should be submitted a week after being assigned. No late submissions allowed. Programming assignments are given several weeks to complete.
4. Hand in all assignments at the beginning of the class period on the due date
5. Two large programming assignments are, late penalty: 10% per week

Prerequisites:
CS 114 (Intro to Computer Science II) or equivalent. MATH 326 (Discrete Math)
or CS 241 (Fundamentals of Computer Science I).

Textbook:

Additional References:

Evaluation:
Homework Assignments 10%-15% Programming Assignments 25%-30%
Midterm 25% Final 35%
Remark: We note that some of the subjects were already covered in previous courses. However, that coverage was at an introductory level, while in this course the coverage is an in-depth building on the knowledge gained in previous courses. For example, a thorough analysis of various sorting algorithms and in-depth learning of Abstract Data Types and the way they are used.

Analysis Techniques
- Induction, Recursion
- Recurrence Relations

Abstract Data Types
- Basic Data Structures
  - Linked Lists
    - Doubly Linked List
    - Circularly Linked List
  - Stacks
  - Queues
- Trees
  - Tree Traversals
    - Preorder
    - Postorder
- Binary Trees
  - Inorder Traversal
- Huffman Codes
- Priority Queues
- Heaps
- Search Trees
  - Binary Search Tree
- Union Find Algorithms
- Searching Algorithms
  - Sequential Search
  - Binary Search

Sorting Algorithms
- Basic Algorithms
  - Insertion Sort
  - Bubble Sort
  - Selection Sort
- Integer Sorting
  - Bucket Sort
  - Radix Sort
- Advanced Algorithms
  - Merge Sort
  - Heap Sort
  - Quick Sort
- Graph Algorithms
  - Graph Traversal
    - Depth First Search
    - Breadth First Search
  - Shortest Path Problems
    - Minimum Spanning Tree
- Algorithm Design Techniques
  - Divide and Conquer
  - Greedy Method
  - Dynamic Programming