RUTGERS
UNIVERSITY | NEWARK

DATA STRUCTURES & ALGORITHM DESIGN

21:198:335 (3 credits)

COURSE DESCRIPTION:
To explore Data Structures their needs and types, Algorithm Analysis, Lists, Stacks, Queues, Binary Trees, Non-Binary Trees, Sorting, Searching, Indexing, Graphs, Analyze the theory of Algorithms.

PREREQUISITE:
21:198:102 (Computers & Programming II)

TEXTBOOK:
"Data Structures & Algorithm Analysis in Java" (3rd edition) by Clifford A. Shaffer, published by Dover.

DEPARTMENT WEB SITE: http://www.ncas.rutgers.edu/math

THIS COURSE COVERS THE FOLLOWING TOPICS:

Data Structures

- Philosophy, Need, Benefits of Data Structures.
- Abstract Data Types (ADT)

Recursion

Fundamental Data Structures

- Lists
- Stacks
- Queues
- Dictionaries

Binary Trees

- Definitions & Properties
- Binary Tree Traversals
- Binary Search Trees
- Heaps and Priority Queues
- Huffman coding Trees

Non-Binary Trees

Sorting and Searching Algorithms

- Sorting Algorithms
    - Insertion, Bubble, Selection, Shell, Merge, Quick sort
- Search Algorithms

Algorithm Analysis

- Best, Worst and Average Cases
- Asymptotic Analysis
- Calculating the Running Time for a Program
- Analyzing Problems

Indexing

- Linear Indexing
- Tree Based Indexing, 2-3 Trees, B-Trees

Algorithm Analysis Techniques

Dynamic Programming

- Knapsack Problem
- All-Pair Shortest Path

Lower Bounds on Sorting and Searching Lists

Graphs and Graph Algorithms

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