

Lectures for the course: Foundations of Computing Systems (IT60101)

Week 1

Lecture 1 – 24/07/2006

- Introduction to the course
- Background knowledge of students
- Planned topics

Lecture 2 – 27/07/2006

- Insertion Sort
- Loop Invariant
- Time Complexity Analysis of Insertion Sort

Week 2

Lecture 3 – 31/07/2006

- Analysis of Bubble Sort
- Loop-invariant

Lecture 4 – 02/08/2006

- Divide and Conquer paradigm
- Merge Sort and its Analysis

Week 3

Lecture 5 – 07/08/2006

- Growth of functions
- O and o notations

Lecture 6 – 09/08/2006

- θ and Ω notations

Class Test 1 held on 10/08

Week 4

Lecture 7 – 14/08/2006

- Recurrence Relations
- Solution to recurrence relation using Substitution method

Lecture 8 – 16/08/2006

- Solution to recurrence relation using Iterative/Recurrence Tree method
- Solution to recurrence relation using Master method

Week 5

Lecture 11 – 21/08/2006

- Quick Sort

Lecture 12 – 23/08/2006

- Randomized Quick Sort
- Average Analysis of Randomized Quick Sort

Week 6

Lecture 13 – 28/08/2006

- Lower bound on comparison sorts
- Counting Sort

Lecture 14– 30/08/2006

- Radix Sort
- Introduction to Red-Black Trees

Week 7

Lecture 15 – 04/09/2006

- Red-Black Tree properties
- Bound on the height of a Red-Black Tree

Lecture 16– 06/09/2006

- BST Rotate
- Insert in Red-Black Tree

Week 8

Lecture 17 – 11/09/2006

- R-Tree

Lecture 18– 13/09/2006

- R-Tree Construction

Week 9

Mid-Sem exam was held at this time

Week 10

Lecture 19 – 25/09/2006

- R-Tree Insert
- Node Split

Lecture 18– 26/09/2006

- R-Tree Nearest Neighbor Search

Week 11

Autumn Break

Week 12

Lecture 20 –09/10/2006

- Graph Algorithms
- BFS

Lecture 21– 11/10/2006

- DFS
- MST
- Kruskal's Algorithm

Week 13

Lecture 22 –16/10/2006

- Prim's Algorithm
- Introduction to Shortest Paths problems

Lecture 23– 18/10/2006

- Dijkstra's SP
- Bellman-Ford

Week 14

Lecture 24 –23/10/2006

- Dynamic Programming – Assembly Line Problem

Lecture 25– 25/10/2006

- Holiday

Week 15

Lecture 26 –30/10/2006

- Dynamic Programming – Matrix Parenthesization Problem

Lecture 27– 01/11/2006

- No Class

Week 16

Lecture 28 –06/11/2006

- Greedy Approach
- Activity Selection Problem – Dynamic Programming formulation

Lecture 29– 08/11/2006

- Activity Selection Problem – Greedy formulation
- 0-1 Knapsack and Fractional Knapsack

Week 17

Lecture 30 –13/11/2006

- Introduction to P, NP and NP Complete Problems

Lecture 31– 15/11/2006

- Summary and Feedback