EC 504 Fall 2022 – Syllabus

Richard Brower: `in LSE B03 Mon and Wed 2:30 - 4:15PM`

This is a syllabus discussing what we will cover in class. References [CRLS] identify sections for source material in the required text: Cormen, Leiserson, Rivest, and Stein, Introduction to Algorithms (Third Edition), MIT press, 2009:

1. Fundamentals [CRLS] 1-4
   - Analysis of algorithms
     - Asymptotic notation
     - Recurrences
     - Average Case
     - Amortized analysis [CRLS] 17
   - Overview of C/C++ – Style vs Efficiency

2. Basic 1D data structures and algorithms
   - Searching and Sorting [CRLS] 6-9
     - Worst, best, average case analysis of algorithms
   - Stacks and queues [CRLS] 10
   - Execution of function calls.

3. Basic Trees and Data Structures [CRLS] 12,13,14
   - Balanced search trees
     - Insertion and Deletion in AVL
   - Priority queues CRLS] 18,19,20,21
     - Heaps, binomial heaps
     - Files systems
     - Huffman Coding.

4. 2D Graphs and Networks [CRLS] 22,23,24,25
   - Representations
     - Traversals
   - Minimum spanning trees
     - Shortest paths – Max Flow [CRLS] 26
     - MinCost flow
5. Optimization and Data Organization
   - Knapsack, Job Scheduling [CRLS] 16.2, 16.5
   - String Matching [CRLS] 32
   - Union Find [CRLS] 21

6. Possible Advanced topics [CRLS] 28, 30,32,35
   - Fast Fourier Transforms
   - Machine Learning
   - Quantum Computing