COSC 6320 Advanced Data Structures and Algorithms

Instructor: R.M. Verma, Office: PGH 532, Tel: 3-3348.

Textbook

- Introduction to Algorithms by T. Cormen, C. Leiserson, and R. Rivest, MIT Press/McGraw Hill, Third edition or later.

References

- Algorithm Design, by Kleinberg and Tardos, Pearson, 2005.

- Design and Analysis of Algorithms, by Aho, Hopcroft and Ullman, Addison-Wesley 1974.

- Algorithms from P to NP, Vol. 1, by B. Moret and H. Shapiro, Benjamin-Cummings, 1991.

- Computers and Intractability, by M. Garey and D. Johnson, Prentice Hall, 1979.

- Some Techniques for Solving Recurrences, G.S. Leuker, ACM Computing Surveys, 1980.

- A General Method and a Master theorem for Divide-and-Conquer Recurrences, R.M. Verma, Journal of Algorithms, Jan. 1994.

- Techniques for Analyzing Recursive Algorithms with Applications, R.M. Verma, SIAM Journal on Computing, April 1998.

- Speed Up in Dynamic Programming, F. Yao, SIAM J. on Alg. and Dis. Math., Dec. 1982.

Goals

- To provide computer science graduate students with a broad and deep understanding of the design and worst-case analysis of advanced data structures and algorithms including: sorting, selection, data structures for disjoint sets, binomial trees, graph algorithms, etc. To expose the students to hard problems and the theory of NP-completeness.

Topics

- Mathematical Foundations including Summations and Recurrences

- Sorting and Selection.

- Advanced Techniques (dynamic programming, greedy algorithms, amortized analysis)

- Data Structures for Disjoint Sets

- Graph algorithms

- Selected Symbolic computing algorithms (if time permits)

- NP-completeness

- Approximation Algorithms (as time permits)

Academic Honesty Policy: No collaboration with anyone or anything in or outside the course is allowed on any homeworks, exams and programming assignments (yes, that excludes the internet as well). The *appropriate* help of the instructor and, if applicable, the TA is of course allowed and encouraged.