CMSC 651: Advanced Algorithms

Spring 1995

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Office hours: Monday 11–12 and Thursday 4–5.

Class Time: Tu Th, 9.30–10.45, Room: CLB 0109.

Teaching Assistant: Mike Polek. E-mail: mcp@cs.umd.edu. Mike will have office hours only for discussing complaints regarding grading of homeworks.

Course Overview: The main paradigm in the course will be the design and analysis of algorithms. A majority of the problems considered will be graph theoretic. The following broad aims will be attempted.

- Understanding techniques to design and analyse data structures. These will find applications in combinatorial algorithms that we study.
- Learning and designing efficient algorithms for basic graph theoretic problems that are used as building blocks elsewhere. These include shortest paths, minimum spanning trees, matching, flow etc.
- An understanding of the inherent complexity of problems: Polynomial time, NP-completeness, Approximation Algorithms etc.
- A glimpse of the evolving theory of algorithms.

Texts: Thomas Cormen, Charles Leiserson, Ron Rivest, *Introduction to Algorithms*, McGraw Hill and MIT Press, 1990.

Robert Tarjan, *Data Structures and Network Algorithms*, SIAM, 1983.

I will also cover a few chapters from other books that will be made available in the program library. I will also make my lecture notes available on ftp.cs.umd.edu in /pub/faculty/khuller.

Many research papers will also be covered. We will make arrangements to distribute these.

Prerequisites: CMSC 451 or an equivalent course (ENEE 488D).

Course Work: Course work will consist of homework assignments, one in-class midterm and a comprehensive final. Homework problems will be mathematically oriented.

Homeworks are to be written neatly, stapled and turned in at the start of class on the due date. The homeworks should represent your own work, and not the work of anyone else. The only way to really learn the material is to do it yourself. Please keep this in mind while doing your homeworks. The homeworks at times may appear not to have any direct connection with the material covered in class. This is intentional! Attempting all problems on the homeworks is mandatory.

If you cannot come to class, please ask a friend to pick up copies of handouts from you. All homeworks will be kept on the ftp site as well, but possibly not all the handouts. **It is your responsibility to make sure that you pick up all handouts.**

Grading: Final grades will be based on homework assignments, the midterm exam, and the final exam. The relative weights of these will be 20% for the homework total, 30% for the midterm, and 50% for the final exam.

Syllabus: The topics listed below give a general idea about the course content.

1. Advanced Data Structures.
2. Graph Algorithms.
3. NP-completeness.
4. Approximation Algorithms.