CS 809
Mathematical Techniques for the Analysis of Algorithms
Fall 2018

Course description.

This course presents analysis techniques (sharp bounds on average performance, running time distributions, etc.), and probabilistic models (occupancy, random graphs, etc.) that are useful for the study of algorithms. This is a "methods" course, so it will focus on algorithms with mathematically interesting properties, rather than attempt to survey algorithms for particular problem domains. A major theme of the course will be methods by which calculus can be brought to bear on discrete problems.

Intructor.

Eric Bach (4391 CS). Phone 262-7997;
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Time/place.

MWF 9:55-10:45, 1257 CS.

Prerequisites.

Students should have some experience with algorithm analysis at the "big-O" level, as done in CS 577 or CS 787, and have some acquaintance with probability theory and analysis beyond calculus (e.g. Math 431, Math 321). I will try to make the course as self-contained as possible, and develop the necessary mathematical tools as the course proceeds. You can get an idea of the level of the course by looking at the books below.

References.

P. W. Purdom, Jr., and C. A. Brown, *The Analysis of Algorithms.*

D. H. Greene and D. E. Knuth, *Mathematics for the Analysis of Algorithms.*

M. Habib et al., *Probabilistic Methods for Algorithmic Discrete Mathematics.*

Papers from the literature will be distributed as needed.

Grading.

Based on occasional homework assignments (which will illustrate the methods in the course), and a final project. Students will be expected to write a paper summarizing their project work, which may involve literature survey, theoretical analysis, experimental study, or some combination thereof.