CSCI 1550  Probability and Computing II:
     Randomized Algorithms and Probabilistic Analysis

Meeting Time:  T,Th 2:30 - 3:50 pm.

Instructor: Prof. Upfal (CIT 319) - eli@cs.brown.edu

Teaching Assistants:
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Website: http://cs.brown.edu/courses/cs155/home.html

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Description:
Probability, randomness, and statistics play a key role in modern computer science. From the highly theoretical notion of probabilistic theorem proving, to the very practical applications of cryptography and web search ranking, sophisticated probabilistic techniques have been developed in the last two decades for a broad range of challenging computing applications.

This course introduces the basic probabilistic techniques used in the design of randomized algorithms and in probabilistic analysis of algorithms, as well as more advanced techniques and recent applications. The course covers the basic probability theory required for working with these techniques, and demonstrates their use in various computing applications.

Textbook:
The textbook for the course is Probability and Computing: Randomized Algorithms and Probabilistic Analysis by Michael Mitzenmacher and Eli Upfal.
Grading:
- 60% homework (including midterm). Midterm is a non-collaborative homework set.
- 40% take home final.

Assignments:
Assignments in this class include weekly or bi-weekly problem sets. All assignments will be posted on the course website. Assignments will be handed in class, according to the instructions on the assignment. Assignments must be typeset in Latex. Answers must be concise and correct. No late homework will be accepted without prior authorization from the instructor.

Collaboration policy:
Problem sets are collaborative. You may discuss the problems with other students, but you cannot take notes from discussions with other students, and the answers you turn in must be your own.

Schedule:
Week 1: Introduction, Discrete Probability Spaces, Min-Cut, Random Variables
   - Expectation
Week 2: Discrete Probability Distributions, Variance, Standard Deviation, Chebyshev Inequality, Coupon Collector
Week 3: Chernoff bounds
Week 4: Balls and Bins
Week 5: The Probabilistic Method
Week 6: Markov Chains
Week 7: The Monte Carlo method
Week 8: Entropy, Randomness, and Information
Week 9: Martingales