Syllabus for CPSC 469/569

Fall 2016

Instructor: James Aspnes

Description

A study of randomized algorithms from several areas: graph algorithms, algorithms in algebra, approximate counting, probabilistically checkable proofs, and matrix algorithms. Topics include an introduction to tools from probability theory, including some inequalities such as Chernoff bounds.

Meeting times

Monday and Wednesday 11:35–12:50 in WTS A53.

On-line course information

The lecture schedule, course notes, and all assignments can be found in a single gigantic PDF file at http://www.cs.yale.edu/homes/aspnes/classes/469/notes.pdf. You should probably bookmark this file, as it will be updated frequently.

For office hours, see http://www.cs.yale.edu/homes/aspnes#calendar.

Staff

The instructor for the course is James Aspnes. Office: AKW 401. Email: james.aspnes@gmail.com. URL: http://www.cs.yale.edu/homes/aspnes/.

The teaching fellow for the course is Lin Chen. Office: 17 Hillhouse, Room 333. Email: lin.chen@yale.edu. URL: http://campuspress.yale.edu/lchen/.

Textbook

The textbook for the class is: Michael Mitzenmacher and Eli Upfal. *Probability and Computing: Randomized Algorithms and Probabilistic Analysis*. Cambridge University Press, 2005. ISBN 0521835402. QA274 M574X 2005.

Reserved books at Bass library

These are other textbooks on randomized algorithms:

- Rajeev Motwani and Prabhakar Raghavan, *Randomized Algorithms*. Cambridge University Press, 1995. ISBN 0521474655. QA274 M68X 1995. Also

available at http://www.books24x7.com/marc.asp?isbn=0521474655 from Yale campus IP addresses.

A classic textbook in the field.

- Juraj Hromkovič, *Design and Analysis of Randomized Algorithms: Introduction to Design Paradigms*. Springer, 2005. ISBN 9783540239499. QA274 .H76X 2005 (LC). Also available at http://dx.doi.org/10.1007/3-540-27903-2 from Yale campus IP addresses.

  Intended to be a gentler introduction to randomized algorithms than Motwani and Raghavan, but not as comprehensive.

These are general references on probability theory:

- William Feller, *An Introduction to Probability Theory and Its Applications*, volumes 1 and 2. Wiley, 1968 (volume 1, 3rd edition); Wiley 1971 (volume 2, 2nd edition). QA273 F43 1968.

  The probability theory analog of Knuth's *Art of Computer Programming*: comprehensive, multiple volumes, every theoretical computer scientist of the right generation owns a copy. Volume 1, which covers discrete probability, is the most useful for computer science.

- Geoffrey R. Grimmett and David R. Stirzaker, *Probability and Random Processes*. Oxford University Press, 2001. ISBN 0198572220. QA273 G74X 2001.

  Similar in scope to Feller. A good alternative if you are on a budget.

Course requirements

Six homework assignments (60% of the semester grade) plus a final exam (40%).

Use of outside help

Students are free to discuss homework problems and course material with each other, and to consult with the instructor or a TA. Solutions handed in, however, should be the student's own work. If a student benefits substantially from hints or solutions received from fellow students or from outside sources, then the student should hand in their solution but acknowledge the outside sources, and we will apportion credit accordingly. Using outside resources in solving a problem is acceptable but plagiarism is not.

Clarifications for homework assignments

From time to time, ambiguities and errors may creep into homework assignments. Questions about the interpretation of homework assignments can be sent to

the instructor at james.aspnes@gmail.com. Clarifications will appear in an updated version of the assignment.

In some circumstances, you may be able to get a faster response using Piazza, at http://piazza.com/yale/fall2016/cpsc469. Note that questions you ask there are visible to other students if not specifically marked private, so be careful about broadcasting your draft solutions.

Late assignments

Late assignments will not be accepted without a Dean's Excuse.