Combinatorics and Discrete Probability – COMPSCI 174
Course Information
Spring 2014

Instructor: Guy Kindler
Office Hours: Mondays, 11:30-12:30, office 234 at the Calvin Lab (near the law school).
It is better to send me an email through Piazza or text me at 617-858-1717 before you come.

GSI: Di Wang
Office Hours: Tuesdays 10-11am and Fridays 2-3pm, at SODA 651

Contact: Please contact the course instructors through the Piazza system
(use private messages when necessary).

Pre-requisites:
• An upper division course on algorithms. (CS 170 or equivalent).
• A course on discrete mathematics including basic probability (CS 70, Math 55 or equivalent).

Course Description: This course will provide familiarity with basic tools in discrete probability and their applications to the design and analysis of randomized algorithms and data structures. You will learn how probabilistic ideas and techniques can lead to more efficient and conceptually simpler algorithms for many problems.

Textbook: The course will mostly follow the book “Probability and Computing: Randomized Algorithms and Probabilistic Analysis”, by Michael Mitzenmacher and Eli Upfal, Cambridge University Press, 2005. It is highly recommended that all students have regular access to this book. Pointers to the relevant sections of the book will be provided as we go along. (See http://www.eecs.harvard.edu/~michaelm/MUErrataPrint1.pdf for errata in the first printing of the book, some of which were corrected in the second printing.)

Topics Covered: A selection of topics from the text, in particular most of chapters 1-7, and additional topics from other chapters. We may also cover a few additional topics that do not appear in the text, in which case an alternative source will be provided if possible.

Grade Composition: The final grade will be computed using homework grades, midterm grades, and final exam grade using the following weighing:

• 15% Homework assignments. The lowest two problem set scores will be dropped.
• 40% Two Midterms, 20% each. The midterms will be held during regular classes – the first one will be on March 3rd, and the second will be on April 7th.
• 45% Final Exam (May 13, 8-11am).

Note that for some or all homework assignments we may choose to randomly select only some of the questions for grading. Also, be aware that often the level of difficulty of a homework assignment or a test is different from what we predicted – If we deem it necessary, we may decide to renormalize
grades before computing the final score. Since grading policy is applied equally to all students, what matters is your position in relation to other students in the class.

**Homework Policy:** Homeworks will be posted on Mondays and will be due typically on Monday the following week. There will be no homeworks during the weeks of the midterms. No late homeworks will be accepted (but see the section about grades).

Submission of homework will be done electronically through Panda Grader at https://www.pandagrader.com. You are **strongly encouraged** to use a typesetting system such as **\LaTeX** to submit your homeworks. However, if you do choose to hand-write your homeworks please submit a PDF file containing a scan or your work, and make sure that they are legible in order to receive credit.

**Regrading Policy:** Regrading of homeworks or exams will only be undertaken in cases where you believe there has been a genuine error or misunderstanding. Bear in mind that our primary aim in grading is consistency, so that all students are treated the same; for this reason, we will not adjust the score of one student on an issue of partial credit unless the score allocated clearly deviates from the grading policy we adopted for that problem. If you wish to request a regrading of a homework or exam, you must submit a clear explanation of what you think was the grader’s error – this is done through the Panda Grader system. The entire assignment may be regraded, so be sure to check the solutions to confirm that your overall score will go up after regrading. All such requests must be received within one week from the date on which the homework or exam was made available.

**Collaboration:** You are encouraged to work on homework problems in study groups of two or three people; however, you must write up the solutions on your own, and you must **never** read or copy the solutions of other students. For each homework you must write your group member names and SID. Similarly, you may (but not expected to) use books or online resources to help solve homework problems, but you must credit all such sources in your writeup and you must **never** copy material verbatim.

**Warning:** Your attention is drawn to the Department’s Policy on Academic Dishonesty. In particular, you should be aware that copying solutions, in whole or in part, from other students in the class or any other source without acknowledgment constitutes cheating. Any student found to be cheating risks automatically failing the class and being referred to the Office of Student Conduct.

**Some Helpful Hints**

The following tips are offered based on our experience with Upper Division classes in CS Theory. If you follow these guidelines, you will make life much easier for yourself in this class.

**Don’t fall behind!** In a conceptual class such as this, it is particularly important to maintain a steady effort throughout the semester, rather than hope to cram just before homework deadlines or exams. This is because it takes time and practice for the ideas to sink in. Make sure you allocate a sufficient number of hours every week to the class, including enough time for reading and understanding the material as well as for doing assignments. (As a rough guide, you should expect to do at least one hour of reading and two hours of problem solving for each hour of lecture.) Even though this class does not have any major projects, you should plan to spend as much time on it as on any of your other Upper Division technical classes.

**Take Homeworks seriously!** The homeworks are explicitly designed to help you to learn the material as you go along. Although the numerical weight of the homeworks is not huge, there is usually a
strong correlation between homework scores and final grades in the class. Also, regardless of how well you did on the homework, read the sample solutions, even for the problems you got right. You may well learn a different way of looking at the problem, and you may also benefit from emulating the style of the solutions. (In science people learn a lot from emulating the approach of more experienced scientists.)

Make use of office hours! The instructor and TA hold office hours expressly to help you. It is often surprising how many students do not take advantage of this service. You are free to attend as many office hours as you wish. You will also likely get more out of an office hour if you have spent a little time in advance thinking about the questions you have, and formulating them precisely. (In fact, this process can often lead you to a solution yourself!)

Take part in discussion sections! Discussion sections are not auxiliary lectures. They are an opportunity for interactive learning, through guided group problem solving and other activities. The success of a discussion section depends largely on the willingness of students to participate actively in it. As with office hours, the better prepared you are for the discussion, the more you are likely to get out of it.

Form study groups! As stated above, you are encouraged to form small groups (two or three people) to work together on homeworks and on understanding the class material on a regular basis. In addition to being fun, this can save you a lot of time by generating ideas quickly and preventing you from getting hung up on some point or other. Of course, it is your responsibility to ensure that you contribute actively to the group; passive listening will likely not help you much. And recall the caveat above that you must write up your solutions on your own.