CS 70 Discrete Mathematics for CS
Summer 2009 Aria Haghighi
Handout 1

Course Staff

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The course website will be run from *bspace* (bspace.berkeley.edu). The handouts, forums, announcements, and even *chat* can be found on the CS70 Summer 2009 page. We encourage you to put questions under the public messaging boards on *bspace* so everyone can benefit from staff responses.

Course Overview

CS70 is a course on "Discrete Mathematics and Probability Theory for Computer Scientists". The purpose of the course is to teach you about:

- **Fundamental ideas in computer science:**
  - Boolean logic
  - Uncomputability and the halting problem
  - Modular arithmetic, error-correcting codes, secret sharing protocols
  - The power of randomization and probability theory in computation
- **Problem solving skills:**
  - Develop clear thinking and creative problem solving skills
  - Familiarity and ease with mathematical rigor and argumentation - Communicating technical content with precision and clarity.

Course outline (abbreviated)

- **Mind your *P*s and *Q*s**: Propositions, propositional logic and proofs.
- **Recursion's Revenge**: Mathematical induction and recursion.
- **Real-Life Algorithms**: The stable marriage and cake-cutting problems.

- **Number Theory**: Modular arithmetic, polynomial fields, and applications to error-correcting codes and secret sharing.
- **Graph Theory**: Eulerian and Hamiltonian paths, gray codes, planar geometry, and map coloring.
- **Probability and probabilistic algorithms**: load balancing, hashing, expectation, variance, Chebyshev and Chernoff bounds, conditional probability, Bayesian inference, law of large numbers.
- **Gödel, Escher, Bach**: Diagonalization, self-reference, and uncomputability.

Grades, Grades, Grades

The grades for the class will be broken down as follows:

- Homework: 1 per week [**30%**]
  You will have 2 slip-days for late homework. 10% deduction per-day thereafter. Homework will go out, typically, Tuesday at the end of class, and due at the **start** of class on Monday.
- Midterm: 2 midterms [**35%**]
  July 9th (changed, used to be 7th) and 27th during class.
- Final: 1 Final [**30%**]
  August 14th, cumulative
- Participation [**5%**]
  bspace forum as well as in-class participation will count

Homework may be done individually or in groups. Each submission should acknowledge any collaborators and sources consulted. We're trusting each of you not to cheat – we will enforce the EECS Policy on academic dishonesty.

Course Materials

The primary material for the course will be handouts distributed in class as well as on *bspace*. Supplementary to this material is the primary course textbook:

- *Discrete Mathematics and its Applications*, by Kenneth H. Rosen, McGraw-Hill, Inc., New York.

The optional textbook which is much more theoretical, but in the staff's opinion, better written

- *A First Course in Discrete Mathematics*, by Ian Anderson. Spinger, London.

Attitude

The staff is a big believer in interactive learning and the importance of asking questions. The material in this course has earned a justifiable reputation of being abstruse and difficult. It is important to *aggressively* ask questions to make sure you don't fall behind. Another common trap is to let the homework *float* by, meaning you manage to finagle the answer out of a friend or member of the course staff without actually absorbing it. It's essential that you be frustrated, at least temporarily, with not 'getting it' for a while. The course staff and myself will also always be there to help you figure things out for yourself.