This list of topics is meant to convey the course organization and the range of subjects covered in the course. With each topic we give some sub-topics and applications that we will discuss. Applications come from a wide range of computer science areas, including Artificial Intelligence, Systems, Cryptography, and the Word-Wide-Web. The details are subject to change.

Warning: the text book will serve as a background, but we will cover substantial material material not in the book.

Web page. For basic course information, such as homeworks, exam dates, TAs, office hours, grading, etc. see the course Web page at http://www.cs.cornell.edu/Courses/cs280/2005sp/

1. Boolean Circuits

   - Circuits, decision rules, decision trees
   - Game playing, and winning strategies

2. Numbers

   - Proofs by induction
   - modular arithmetic
   - RSA crypto system and it uses

3. Sets

   - Counting Arguments
   - Data Mining

4. Probability

   - Independence, expectation, union bound, law of large numbers
   - Load balancing, and coupon collectors

5. Graphs and Relations

   - Connectivity, trees, distance, directed and undirected graphs
   - Symmetry, transitivity, equivalence relations
   - Properties of the Web graph, and Web searches

6. Mathematical Logic

   - Automated Theorem proving
   - Axioms, and Arrow's impossibility theorem for social choice