6.895 Randomness and Computation	February 6, 2008

Course Information
Lecturer: Ronitt Rubinfeld

Lectures: MW 2:30-4:00, Room 34-304.

Instructor: Ronitt Rubinfeld, `ronitt@csail.mit.edu`, G32-698, 253-0884.

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Course Website: `http://people.csail.mit.edu/ronitt/COURSE/S08/index.html`

Course topics The course will consist of a subset of the topics mentioned below. The list is subject to change due to my personal whims, class interest and timing issues. The topics will not be covered in the order given below.

- Some uses of randomness: algorithms (Polynomial zero testing, small space algorithms for graph connectivity, uniform generation and approximate counting, property testing), probabilistic proofs and constructions of combinatorial objects (e.g., expander graphs, efficient codes).
- Randomness vs. predictability:
  - Computational learning theory (predictability): learning vs. predictability, learning constant depth circuits, learning decision trees, learning noisy parity functions, weak learning, boosting.
  - Pseudorandomness (unpredictability): pseudorandomness vs. unpredictability, pseudorandom generators (prg's) based on hard problems, derandomization, randomness from weak random sources, randomness extractors, extractors vs. prg's, techniques for recycling randomness, derandomizing space bounded computation, sample spaces with limited independence, deterministic connectivity in logspace.
- Tools: Influence of a variable on a function, random walks on graphs, expander graphs, list decoding, Fourier representation of a function.

Course Requirements Approximately 5-6 homework sets (70%). Scribe notes(25%). Class participation (5%).

Prerequisites 6.046, 6.045 or 6.840 (or permission of instructor).

Office hours By appointment.