May 7, 2007

Probability Theory Syllabus

1. Limit Theorems: Laws of large numbers; central limit theorems; characteristic functions and weak convergence
2. Random Walks: stopping times, recurrence, transience
3. Stochastic processes: Basic definitions and Kolmogorov's extension theorem
4. Martingales: Conditional expectation, almost sure convergence; Doob's inequality; exchangeable sequences
5. Brownian motions
6. Markov chains and Markov property
7. Entropy

Reference:

R. Durrett, Probability: Theory and Examples, , 2nd Edition, Duxbury Press, 1995.

Suggested additional references:

G. B. Folland, Real Analysis: Modern Techniques and Their Applications, 2nd Edition, Wiley, 1999, (Chapters 1 and 2)

D. J. Aldous, Exchangeability and Related Topics. Ecole d'Eté de Probabilités de Saint-Flour XIII - 1983, p. 1-198, Lecture Notes in Math., 1117, Springer, Berlin 1985

Note: The above should be construed as a sample syllabus. Should this exam be offered in the future, the selection of topics may be modified, for example depending on the coursework of a particular student, or to ensure the breadth and non-overlap requirements.