Course outline for G63.2911 Fall 1999

1. Measure Theory: A quick review of facts from measure theory that are needed for the course. Extension theorem, Integration and convergence Theorems, Product Measures and Fubini's Theorem, Distribution functions on the line.(1.5 lectures)

2. Characteirstic functions, inversion formula, weak convergence, continuity theorem and Bochner's theorem.(1.5 lectures)

3. Sums of independent variables, convolutions, the weak law of large numbers and the central limit theorem.(1 lecture)

4. Infinite product measures, Kolmogorov's consistency theorem, Kolmogorov's three series theorem, strong laws of large numbers and the laws of the iterated logarithm. (2 lectures)

5. Infinitely divisible distributions and convergence in distribution of sums of independent random variables. Levy-Khintchine representation, central limit theorem under Lindebrgh's conditons. (2 lectures)

6. Conditioning, Radon-Nikodym Theorem, conditional expectation and regular conditional probabilities. (1 lecture)

7. Markov Chains: finite state space, invariant measures, ireducibility, convergence theorems, countable state spaces, recurrence and transience.(2 lectures)

8. Martingales, sub- and super- martingales: Doob's inequality, stopping times and convergence theorem. (2 lectures)

9. Martingales and Markov chains (1 lecture)

References for G63.2911 Fall 99

1. Breiman, Leo. Probability. Addison-Wesley Publishing Company, Reading, Mass.-London-Don Mills, Ont. 1968

2. Chow, Yuan Shiha and Teicher, Henry. Probability theory. Independence, interchangeability, martingales. Third edition. Springer Texts in Statistics. Springer-Verlag, New York, 1997.

3. Chung, Kai Lai. A course in probability theory. Second edition. Probability and Mathematical Statistics, Vol. 21. Academic Press, New York-London, 1974.

4. Chung, Kai Lai Elementary probability theory with stochastic processes. Third edition. Undergraduate Texts in Mathematics. Springer-Verlag, New York-Heidelberg, 1979.

5. Durrett, Richard. Probability: theory and examples. Second edition. Duxbury Press, Belmont, CA, 1996

6. Fristedt, Bert and Gray, Lawrence . A modern approach to probability theory, Birkhauseer, Boston, 1997

7. Galambos, Janos. Advanced probability theory. Second edition. Marcel Dekker, Inc., New York, 1995.

8. Gnedenko, B. V. The theory of probability. Translated from the fourth Russian edition by B. D. Seckler, Chelsea Publishing Co., New York 1967.

9. Grimmett, G. R.; Stirzaker, D. R. Probability and random processes. Second edition. The Clarendon Press, Oxford University Press, New York, 1992.

10. Kallenberg, Olav Foundations of modern probability. Probability and its Applications. Springer-Verlag, New York, 1997.

11. Stroock, Daniel W. Probability theory, an analytic view. Cambridge University Press, Cambridge, 1993.

12. Varadhan, S.R.S. Lecture Notes for the course. Please see

http://www.math.nyu.edu/faculty/varadhan

for .dvi files.

Items 1), 2), 3), 6), 7) and 9) are on the reserve list at CIMS library or will be soon.