Stat 831 – "Advanced Probability"

Fall 2007

Tuesday-Thursday 2:00 – 3:15 P.M.

Prerequisite: STOR 634,635 (or permission of instructor) **Location:** Peabody 217

Instructor: Amarjit Budhiraja **Office:** Smith 305 **Telephone:** 962-2189

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Course site can be found at www.blackboard.unc.edu

Office Hours: *Monday* 2:30-3:30, *Tuesday 12.30-1.30*, *Friday 3:00-4:30*, or by *Appointment*.

Textbook: Patrick Billingsley(1999) *Convergence of Probability Measures*, 2nd edition.

- **Other References**: Ethier & Kurtz, Van Der Waart & Wellner, Stroock & Varadhan, Whitt.
- **Probability Background**: Durrett (*Probability: Theory and Examples*), Williams (*Probability with Martingales*), Chung (*A Course in Probability Theory*).
- **Topology, Analysis and Functional Analysis Background**: Royden (*Real Analysis*), Munkres (*Topology*), Kolmogorov & Fomin.

Syllabus (in the order to be covered**):**

- Motivating examples: Random Walks to Brownian motion, Functional Central Limit Theorems, Markov Chains to Diffusions, Empirical Distributions to Brownian Bridge, Discretization Schemes for PDEs and Stochastic Control, Heavy Traffic Analysis of M/M/1 queue.
- Review: Convergence in Distribution, Weak Convergence, Tightness, Skorohod Representation Theorem…
- Some Elementary Topology.
- Portmanteau's Theorem and Prohorov's Theorem.
- The Space C.
- The Space D.
- Some Applications.

Homework:

- Assigned daily, collection for each week is due Tuesday of the following week. For example, homework assigned on Tuesday, Sept. 11th and Thursday Sept. 13th will be due on Tuesday Sept. 18th.
- Each homework will be graded as: Poor, Good or Excellent.

Grades:

- At least 50 % of the HWs earning a grade of Good or better will earn a grade of P or better.
- 100% of HWs earning a grade of Good or better and at least 50% earning an Excellent will be an H.