

## *Course Announcement – Spring 2013*

### **Statistics 991-301: Data-based Modeling and Analysis of Service Systems**

Instructors: Larry Brown, Wharton  
Avi Mandelbaum, Technion, visiting Wharton in spring 2013  
Haipeng Shen, UNC, visiting Wharton 2012-2013

Scheduled Time: Monday & Wednesday 10:30-12, Room F96 JMHH

Alternate Time: To fit with instructor schedules we contemplate usually meeting Monday at 4:30 (Room TBA) instead of Monday at 10:30. This plan will be subject to change if the time it is not convenient for students. (Please let L. Brown know if you plan to attend the course, but have a conflict on Mondays at 4:30.) Some lectures or other course activities may still occasionally use the Monday at 10:30 classroom.

The course is about statistics and operations of queueing-prone service systems. Particular examples include telephone call centers, hospitals and internet services. Being different from traditional (manufacturing) queueing applications, service systems are challenging to model and analyze as they involve human factors (e.g. impatience, fairness, risk) and non-traditional characteristics (e.g. daily peaks in demand, many-servers).

Service systems have been naturally analyzed via queueing theoretical models. However, over the last decade or so, the availability of large amount of transaction-level or flow-level data has enabled researchers and practitioners to supplement the theoretical queueing modeling with data-driven statistical analysis. Such combination has resulted in new insights, and prompted exciting research progresses in both disciplines.

The course will be built around several large databases from telephone call centers (log-files), hospitals (patient flow) and internet services (click-stream). The plan is to cover the following three categories of topics:

1. Basic queueing models and their contemporary modifications, for example fluid and diffusion models.
2. Statistical techniques that are useful for analyzing service data, selected from multivariate analysis, functional data analysis, time series modeling and survival analysis.
3. Recent research that combines statistical and queueing modeling, in support of analyzing service systems.

In addition to the conceptual contents, the course also aims at

1. Exposing students to techniques from both Statistics and Operations Research.
2. Teaching skills of formulating statistical/operational models for real world problems, and developing appropriate techniques for their analysis.