

Outline

The focus of the course is on *stochastic networks* — a set of discrete events interacting with one another in a network configuration, following some probability laws of motion. This is a basic mathematical model for a wide range of engineering and service systems, from internet to inventory. The course consists of a set of lectures and student presentations.

Prerequisite:

Basic probability models and stochastic processes (preferably at the level of IEOR6709, and minimally at IEOR4606).

Text:

- CHEN, H. AND YAO, D.D., *Fundamentals of Queueing Networks: Performance, Asymptotics and Optimization*, Springer-Verlag, New York, 2001.

Topics (subject to changes):

1. birth-death queues;
 2. Jackson networks, reversibility, quasi-reversible queues ;
 3. stochastic comparisons: single-station models;
 4. GI/G/1 queue, random walk;
 5. Brownian motion, preliminaries on convergence and limit theorems;
 6. limits and convergence: single station models;
 7. multiclass networks: stability;
 8. conservation laws and polymatroid optimization, dynamic scheduling.
- Student presentations will be scheduled for the last four weeks of the class.

Topics for assigned reading and presentation:

Chapters in the text not covered by lectures, and selected papers from the literature (to be distributed).

Evaluation:

Based on a term paper and an oral presentation.

Contact:

Office Hours: Monday, 1:30-3:30p, or by appointment (302 Mudd; 4-2934; yao@columbia.edu).