

**26:960:580 STOCHASTIC PROCESSES**

**Place:** 1 Washington Park, Newark

**Time:** Thursdays 5:00-7:50 PM.

**Instructor:** Michael N. Katehakis, <http://www.rci.rutgers.edu/~mnk/>

**Office:** 1 Washington Park, 1070

**Phone:** Office 973-353-5295,

**E-Mail:** [mnk@rutgers.edu](mailto:mnk@rutgers.edu)

**Office Hours:** Thursday s 4:00 – 5:00, after class, and by appointment.

**Textbooks**

1. **Sheldon M. Ross:** Stochastic Processes, J. Wiley, New York, 1995. Available at Rutgers Bookstore in Newark and at on-line booksellers
2. **Sheldon M. Ross:** Introduction to Probability Models, Tenth Edition, Elsevier

**Other resources**

I will provide some additional readings and lecture materials during the course.

**Description**

The course covers the theory and modeling of stochastic processes. Topics include, martingales, stopping theorems, elements of large deviations theory, Renewal Theory, Markov Chains, Semi-Markov Chains, Markovian Decision Processes. In addition, the class will cover some applications to finance theory, insurance, queueing and inventory models.

**Grading** for this class will be based on the bi-weekly homework assignments (10%), a mid-term (30%) and a final examination (60%).

**Preliminary Schedule**

Lecture #	Topic
1	Basic concepts, Conditional Expectations.
2	Markov Chains, - Transient probabilities, Stationary probabilities.
3	First Passage times and Stopping times.
4	Markov Chains and Optimization.
5	More on Optimization of Markov Chains.
6	Optimal Stopping.
7	The Poisson Process.
8	Renewal Theory, renewal equation, limit theorems, Wald's equation.
9	The Continuous time Markov Processes.
10	Reversibility, Uniformization, Queues.
11	Semi Markov Chains and applications to Supply Chains, and Finance
12	Markov Chains, Statistical Inference.
13	Large Deviations for i.i.d. Random Variables
14	Large Deviations Theory for Markov Chains