

IE 505
Stochastic Processes

This course presents an introduction to stochastic processes and their applications in operations research, management science and industrial engineering. Introduction to stochastic processes is motivated by simple branching and Bernoulli type processes. We will discuss Poisson process, renewal and regenerative processes, discrete and continuous time Markov chains. We also make a brief introduction to continuous time, continuous state space processes. Applications in queueing, inventory, finance and reliability/maintenance models will be emphasized.

Topic	Topic
1	Introduction, Definition of state space and process
2	Generating Functions and Branching Processes
3	A Simple Random Walk and Bernoulli Processes
4	Discrete Time Markov Chains (Definition, classification of states, Fundamental matrix)
5	Discrete Time Markov Chains (Ergodic Markov Chains, Limit and Stationary distributions)
6	Poisson Processes
7	Continuous Time Markov Chains (Definition, Kolmogorov Differential Equations)
8	Continuous Time Markov Chains (Limit Probabilities, Hitting Times)
9	Continuous Time Markov Chains (Queueing Applications)
10	Renewal Theory and Regenerative Processes

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Lecture Hours: Wednesday 11:00-13:00, Thursday 10:00-11:00.

Office Hours: Wednesday 13:30-14:30, Thursday 13:00-14:00.

Course Assistant: Esra Çınar, cinare@boun.edu.tr

Office Hours : Tuesday 13:00-14:00, Thursday 11:00-12:00.

Course Prerequisites: IE 255 or MATH 343 or equivalent

References:

1. E. Çınlar (1975). *Introduction to Stochastic Processes*. Prentice Hall.
2. Resnick, S. (1992), *Adventures in Stochastic Processes*, Birkenhauser.
3. S. M. Ross (1983). *Stochastic Processes*. John Wiley.
4. H.M. Taylor and S. Karlin (1998). *An Introduction to Stochastic Modeling*. 3rd Edition. Academic Press.
5. H. C. Tijms (2003). *A First Course in Stochastic Models*. John Wiley.
6. S. M. Ross (2003) *Introduction to Probability Models*. 8th Edition. Academic Press.

Grading: Homework Assignments (20 %), Midterm (40 %), Final (40 %).

Midterm Date: November 26, 2009.