Stochastic Processes and Applications

This course presents an introduction to stochastic processes and their applications in operations research, management science and industrial engineering. Stochastic processes will initially be discussed on basic branching processes and random walks following a basic probability theory review. Subsequently, Markov chains, Poisson processes and Markov processes will be presented. As the last topic renewal theory will be discussed. Problems from queueing theory, reliability theory and inventory theory will be analyzed as examples.

Week 1	Introduction and review of necessary concepts
Week 2	Convolution and Generating Functions
Week 3	Simple Branching Process
Week 3 - 4	Simple Random Walk
Week 5 - 7	Markov Chains
Week 8 - 9	Poisson Processes
Week 10 - 12	Markov Processes
Week 13	Renewal Processes

Tuesday 11:00-12:00, Thursday 11:00-13:00 on Zoom

Course Prerequisites:

A basic probability course like IE 255 or MATH 343.

References:

1. S. Resnick (2005). *Adventures in Stochastic Processes*. Birkhäuser.
2. E. Çınlar (1975). *Introduction to Stochastic Processes*. Prentice Hall.
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. S. M. Ross (2008) Introduction to Probability Models. 8th Edition. Academic Press.
6. H. C. Tijms (2003). *A First Course in Stochastic Models*. John Wiley.

Grading:

In-term exams: 50%, Final: 50%.

In order to qualify for the final exam a student has to collect a minimum total of 40/100 points from in-term exams. Missing more than two in-term exam results in an automatic F. Make-up exams for in-term exams will not be provided.

The course will be held over zoom during lecture hours. Each session will last approximately 40-45 minutes. A Q&A session of 10 minutes will be held after each session and a break of 5-10 minutes will be given between two consecutive lectures. All lectures (not the Q&A sessions) will be recorded and posted on the course Moodle page assigned by the university at https://moodle.boun.edu.tr/. The zoom link and any related material will be posted on the Moodle page. During exams students must be prepared to turn on their cameras.

The office hours will also be conducted over zoom. Please send an e-mail ahead of time in order to establish a joint zoom connection.

Instructor:

Aybek Korugan,

Email: aybek.korugan@boun.edu.tr, Office Hours: Tuesday 12:00-14:00

Teaching Assistant:

Bahadır Pamuk,

Email: bahadir.pamuk@boun.edu.tr Office Hours: TBA