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

Monday 13:00-15:00 (M2180), Wednesday 13:00-14:00 (M2171)

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:
Midterm: 40 %, Quizzes: 20%, Final: 40%.
In order to qualify for the final exam a student has to collect a minimum total of 30/100 points from quizzes and midterms. Missing two or more quizzes and the midterm results in an automatic F. Make-up exams for quizzes will not be provided.

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