



Master Course (exceptionally acknowledged for max. 5 PhD students)

Fundamentals of Stochastic Models for Decision Support

Block Course: 16 through 25 June, 2026 (2 SWS)

UHH, Moorweidenstr. 18, Room 0005.1; in presence

The course consists of total 7 classes scheduled as follows:

		Lecture	Tutorial	Room
1	June 16, 2026 (Tue)	09:00 – 12:00	16:30 – 18:00	0005.1, Mo18
2	June 17, 2026 (Wed)	09:00 – 12:00	16:30 – 18:00	0005.1, Mo18 / tbc
3	June 18, 2026 (Thu)	09:00 – 12:00	16:30 – 18:00	0005.1, Mo18
4	June 22, 2026 (Mon)	09:00 – 12:00	16:30 – 18:00	0005.1, Mo18
5	June 23, 2026 (Tue)	09:00 – 12:00	16:30 – 18:00	0005.1, Mo18
6	June 24, 2026 (Wed)	09:00 – 12:00	16:30 – 18:00	0005.1, Mo18
7	June 25, 2026 (Thu)	09:00 – 12:00	16:30 – 18:00	tbc

Course Instructor:

[Prof. Zhe George Zhang, Western Washington University](#)

Course Value:

2 SWS or 5 credit points in “specialization/Vertiefung”

Assessment/Student evaluation:

Multiple Exams (mehrere Teilprüfungen), all obligatory for doctoral students:
participation and attendance (10 %), homework assignments (40 %), final exam (50 %)

Course Language:

English

Prerequisites/Literature:

Zhe George Zhang, 'Fundamentals of Stochastic Models', CRC Press, 2023.

Registration:

Registration must be effected via STINE, deadline June 13, 2026. Participation is afterwards selected by random (restricted places for doctoral students: 5!)

Please inform lscm.bwl@uni-hamburg.de (if your registration was accepted) in order to ask for course confirmation for your doctorate at the end of the course, and for all other organizational matters.

Course Overview:

This course provides an introduction to stochastic modeling, focusing on discrete-time and continuous-time Markov chains, as well as foundational probability theory. It is designed to cover essential concepts from Chapter 1 (Introduction), Chapter 2 (Discrete-Time Markov Chains), Chapter 3 (Continuous-Time Markov Chains), and Chapter A (Basics of Probability Theory) of the book 'Fundamentals of Stochastic Models' by Z.G. Zhang. Additional topics may be added depending on time and student background. The course balances theory with practical examples, providing a foundation for advanced studies in stochastic processes and applications.

Note: Some sessions may be delivered online via ZOOM.

Course Objectives

By the end of this course, students will be able to:

1. Understand the basics of stochastic models and processes.
2. Analyze and apply discrete-time and continuous-time Markov chains.
3. Master foundational probability theory as it applies to stochastic systems.
4. Solve real-world problems using stochastic modeling techniques.

Course Outline – Topics to be covered

1. Sessions 1-2 Course Introduction; Overview of Stochastic Models; Classification of Stochastic Processes (Chapter 1); Basics of Probability Theory: Probability Space (Chapter A)
2. Session 3-4: Basics of Probability Theory: Random Variables and Their Distributions (Chapter A)
3. Session 5-6: Discrete-Time Markov Chains: Dynamics of Probability Measures; Formulation of Discrete-Time Markov Chains; Performance Analysis of Discrete-Time Markov Chains: State Classification; Performance Analysis of Discrete-Time Markov Chains: Steady State and Transient Analysis (Chapter 2)
4. Session 7-8: Continuous-Time Markov Chains: Formulation and Birth-and-Death Processes.
5. Session 9-10: Transition Probability Functions for Continuous-Time Markov Chains; Stationary Distributions and Applications (Chapter 3)
Midterm Exam
6. Session 11-12: Poisson Processes and Their Extensions (Chapter 3).
7. Session 13-14: Simulations of Stochastic Models & Review, Wrap-Up
Final Exam