

**Contents:** Various classes of stochastic processes both in discrete and continuous time are introduced, and corresponding results are proven rigorously. The course is a follow-up of an introduction to measure-theoretic probability theory, and it will be followed next winter term by the „Introduction to Stochastic Analysis“. Topics to be covered:

- Measure-theoretic definition of conditional expectations in a general context
- Markov chains: Potential theory and long-time behaviour
- Basic theorems on martingales
- Brownian motion: Construction and sample paths
- Markov jump processes (Markov chains in continuous time)

Lecture Notes from the same course in 2014 are available on my webpage, see

<http://wt.iam.uni-bonn.de/eberle/skripten/>

**Language:** The lectures are in english. We will offer tutorials both in english and in german.

**Prerequisites:** I will assume basic measure-theoretic probability as covered for example in:

- R. Durrett: Probability: Theory & Examples, Chapters 1 and 2
- D. Williams: Probability with martingales, Part A and C (the martingale theory in Part B is not assumed and will be covered partially during this course)
- A. Eberle: Einführung in die Wahrscheinlichkeitstheorie, Lecture notes WT 2017/18, see <http://wt.iam.uni-bonn.de/eberle/skripten/>

