Prof. Dr. N. Perkowski
Institute of Mathematics
Stochastics

In the winter term 2017/18 I shall read the following lecture:

Interacting particles and Stochastic PDEs

This course will be taught in English to facilitate participation of international students.

Content:

The aim of the lecture is to understand the behavior of interacting particle systems (a special class of time-continuous Markov chains which model e.g. interacting molecules or members of a population) on large spatial and temporal scales. We will first construct continuous time Markov chains and interacting particle systems and study some of their basic properties. By formal manipulations we will see that many particle systems should converge to partial differential equations or stochastic partial differential equations under rescaling. Then we will develop the solution theory for the specific equations that arise in our problem, and finally we give a rigorous proof of convergence.

Prerequisites:

Stochastics I and II. Recommended: Stochastic Analysis and basic knowledge of Functional Analysis.

References:

Lecture notes will be made available as the course progresses.

- C. Kipnis, C. Landim. *Scaling Limits of Interacting Particle Systems*. Springer (1999); through HU Network available at SpringerLink: https://link.springer.com/book/10.1007%2F978-3-662-03752-2

- H. Spohn. *Large Scale Dynamics of Interacting Particles.* Springer (1991)

- T.M. Liggett. *Continuous Time Markov Processes: An Introduction.* AMS (2010)

- J.B. Walsh. *An introduction to stochastic partial differential equations*. Springer (1986); through HU Network available at SpringerLink: https://link.springer.com/chapter/10.1007/BFb0074920

Lectures:

Monday, 9 – 11, RUD 25, room 4.007

First lecture: October 23, 2017

Exercises:

Monday, 11 – 13, RUD 25, room 4.007

Office hours: by agreement.

Course webpage: https://www.mathematik.hu-berlin.de/de/forschung/forschungsgebiete/stochastik/stoch-employees/hp-perkowski/teaching/InteractingParticles