Stochastic Calculus

Description. This course is an introduction to stochastic calculus based on Brownian motion. Topics include: construction of Brownian motion; martingales in continuous time; the Itô integral; localization; Itô calculus; stochastic differential equations; Girsanov's theorem; martingale representation; the Feynman-Kac formula.

Prerequisites. Measure-theoretic probability with martingales (ORF 526 or equivalent).

Textbooks. We will largely follow the required textbook:

- *Stochastic Calculus and Financial Applications*, by J. M. Steele.

Additional references include:

- *Stochastic differential equations*, by B. Øksendal.
- *Brownian motion and stochastic calculus*, by I. Karatzas and S. Shreve.
- *Continuous martingales and Brownian motion*, by D. Revuz and M. Yor.
- *Stochastic integration and differential equations*, by P. Protter.
- *Stochastic integrals*, by H. von Weizsäcker and G. Winkler.

Grading. A homework set will be due every week. There will also be a midterm and a final exam. The final grade breakdown is: homework 40%; midterm 20%; final 40%.

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