



Announcement SoSe 2015 Lecture in Mathematical Finance

Partial Differential Equations in Finance

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Area / Modulnr.: Mathematical Finance / MA5720

Course Structure: Lecture: 2h Exercises: 2h

Content: Numerical techniques are widely used in mathematical finance and financial engineering, since most problems arising in this context do not lead to explicit formulas. We concentrate on PDE methods for option pricing. The Black-Scholes PDE serves as a basic equation to study numerical, application-oriented as well as theoretical aspects, such as

- Feynman-Kac formula
- Different types of options such as European, barrier and lookback options
- Weak formulation as parabolic equation in Hilbert spaces and basic theoretical results (e.g. existence and regularity)
- Galerkin methods: finite elements and basic convergence results

Audience: MSc Mathematical Finance and Actuarial Science

Prerequisites: MA4405 (Stochastic Analysis) or MA3702 (Continuous Time Finance), basic skills in Matlab

Literature: **Norbert Hilber, Oleg Reichmann, Christoph Schwab, Christoph Winter (2013):** Computational Methods for Quantitative Finance, Springer Finance
Rüdiger Seydel (2009): Tools for Computational Finance, Springer
Yves Achdou and Olivier Pironneau (2005): Computational Methods for Option Pricing, SIAM series in Applied Math
Dietrich Braess (2007): Finite Elements: Theory, fast solvers and applications in elasticity theory, Cambridge University Press
Lawrence Evans (2010): Partial Differential Equations, American Mathematical Society

Certificate: Exam or oral Exam, 6 CP

Location and Time: see TUMonline

Exercises: see TUMonline