Albert-Ludwigs-Universität Freiburg

Department of Quantitative Finance

Topics Course on Continuous Time Finance

Outline:

The second revolution in mathematical finance following the Markowitz mean-variance theory of risk and return and the capital asset pricing model, concerns the option pricing theory of Black, Scholes, and Merton from 1973 and the risk-neutral valuation theory that grew from it. In this course, we introduce financial models in continuous time, explain the basic principles of risk-neutral valuation of derivatives, and study various applications.

The first part of the course consists of a lecture introducing the mathematical methods and concepts that are necessary for analysing continuous time models of financial markets. For this part some exercise sessions will be included in the lecture which should be solved and presented by the participants of the course. In the second part, participants can work in groups of 2-3 students on various topics ranging from pricing of exotic options, interest rate derivatives, or credit risky instruments, analysing dynamic hedging strategies to more theoretical problems as studying the implications of market incompleteness in continuous time.

Instructor:

Prof. Dr. Eva Lütkebohmert-Holtz, Department of Quantitative Finance, Institute for Economic Research, University of Freiburg

Participants:

This course is primarily intended for students in the second year of the master program, and can be regarded as preparation for potential master theses.

Pre-registration is required. Interested students are asked to register via email to Mrs. Manzoni until ***September 30th, 2015*** (claudia.manzoni@finance.uni-freiburg.de). Applications should indicate the course of studies, the number of terms, and should include a recent transcript.

Prerequisites:

Principles of Finance, Futures and Options.

Course Schedule:

The course will take place on a weekly basis on *Mondays from 10-12 am in lecture hall HS 1221* (KG I). The first meeting will take place on Monday, October 19th, 2015.

ECTS (credit points):

6 ECTS points based on

- solving an individual exercise during the first part of the course and presentation of its solution to the rest of the course.
- presentation of a seminar topic in a team of 2-3 students
- a precise and meaningful set of slides together with a well documented implementation of the performed numerical simulations in the software R or Matlab if the topic involves any numerical implementations
- an active participation during the whole course

The course can be dropped without penalty until October 31st. Thereafter, withdrawal will count as a failed examination attempt!

Main References:

Bingham, Kiesel (2004): *Risk-Neutral Valuation: Pricing and Hedging of Financial Derivatives*. 2nd ed., Springer Finance.

Brigo, D. and F. Mercurio (2006): *Interest Rate Models – Theory and Practice*, Springer Verlag: Heidelberg.

Hull, J. (2011). *Options, Futures and other Derivatives*, Prentice Hall.

Neftci, S. N. (1999), *An Introduction to the Mathematics of Financial Derivatives*, Academic Press: San Diego.

Nelken, I. (1996), *The Handbook of Exotic Options*, IRWIN Professional Publishing: Chicago.

Sandmann, K. (2000): *Einführung in die Stochastik der Finanzmärkte*, Springer: Heidelberg.

Shreve, S. (2005): *Stochastic Calculus for Finance I: The Binomial Asset Pricing Model*, Springer Finance.

Shreve, S. (2004): *Stochastic Calculus for Finance II: Continuous-Time Models*, Springer Finance.

Strong, R.A.: *Derivatives. An Introduction*, 2nd ed., South-Western, 2004

Additional Information:

http://www.finance.uni-freiburg.de/studium-und-lehre-en