

Invitation to a Course on Mathematics of Finance

Summer Semester 2012
Salzburg University

- Lecturer:** Prof. Dr. Uwe Schmock
Vienna University of Technology
Visiting professor at Salzburg University
- Dates:** On the following weekends Friday from 4 p.m. to 7 p.m. and Saturday from 9 a.m. to 12 noon:
2nd and 3rd March 2012
16th and 17th March 2012
30th and 31st March 2012
27th and 28th April 2012
11th and 12th May 2012
1st and 2nd June 2012
- Contents:** The course covers all aspects of modern mathematics of finance required to become a fully qualified actuary according to the education syllabus of the International Actuarial Association and the core syllabus of Groupe Consultatif as well as according to the regulations of the Actuarial Association of Austria (AVÖ), which correspond to the regulations of the German Actuarial Association (DAV). For continuing professional development (CPD) the course counts as 30 hours. The emphasis lies on stochastic models in discrete time in order to present the fundamental principles without the mathematically more challenging theory of stochastic analysis. Basic knowledge of probability theory would be of great advantage. Please find the structure of the course below.
- Course fees:** €444 without hotel accommodation, €984 with 6 overnight accommodations (from Friday to Saturday) in the Castellani Parkhotel including breakfast. Coffee breaks are included in the fees for all participants.
- Information:** For further information, please contact Sarah Lederer by e-mail (sarah.lederer@sbg.ac.at) with your telephone number. Your questions will be answered as soon as possible.

Registration: Please send the attached registration form by post or by e-mail (sarah.lederer@sbg.ac.at), or fax it to +43 662 8044 155, and arrange for the amount to be transferred (at no cost to the recipient) to the following account before 10th February 2012:

Salzburg Institute of Actuarial Studies (SIAS)
IBAN: AT 792 040 400 000 012 021 BIC: SBGSAT2S

Location: Faculty of Science, Lecture Hall 402
5020 Salzburg, Hellbrunner Straße 34

Course Structure

1 Mathematics of finance in discrete time

- Bank account, numéraire, stock price processes, discounting
- Trading strategies
- Arbitrage and its localization
- Price systems
- Conditional expectations, martingales, sub- and supermartingales
- Stopping times and their sigma-algebras
- Equivalent martingale measures (with bounded density)
- Theorem of Dalang, Morton and Willinger
- Minimal and maximal prices of financial instruments
- Complete and incomplete financial markets
- Call and put options in the binomial model (CRR model)
- Limit in the scaled binomial model
- Black-Scholes formula
- Call-put parity
- American options, Snell envelope

2 Actuarial modelling of dependent credit risks

- Variants of the Bernoulli and Poisson model
- Poisson approximation and approximation quality
- Poisson-gamma mixture distribution, negative binomial distribution
- Compound Poisson distribution
- Specification of the extended CreditRisk+ model
- Recursive calculation of the portfolio loss distribution
- Coherent risk measures and risk contributions
- Application to operational risk modelling

For any necessary preparation Chapters 1–10, 17 and 18 of the book by David Williams, *Probability with Martingales* (Cambridge University Press), are recommended.

From 16th March 2012 the course lectures on Fridays are accompanied by exercises from 2.30 p.m. to 4 p.m. Registration to the exercises will be made on 2nd March 2012. There is no extra cost for the exercises.