Financial Mathematics 1

Course Syllabus

Spring Term 2013 — SNU

Course Title   Financial Mathematics 1 (in English)

Course number   3341.451

Instructor   Gerald Trutnau

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Course homepage   http://www.math.snu.ac.kr/∼ trutnau/teachingFinance12013.html

Course Objective   The purpose of this course is to understand basic concepts of probability and stochastic analysis and basic concept of functional analysis in order to finally present and to understand the Black and Scholes formula in the second semester.

References   Here are some references on probability, stochastic analysis, and measure theory:

- Bauer, H.: Measure and integration theory, Walter de Gruyter & Co., ISBN: 3-11-016719-0
- Billingsley, P.: Probability and measure, third edition. Wiley, 1995. ISBN: 0-471-00710-2
- Chung, K. L.: A Course in Probability Theory, Third EditionAcademic Press;
- Chung, K. L.; Williams, R. J. Introduction to stochastic integration, second edition. Birkhäuser, ISBN: 0-8176-3386-3
- Durrett, R.: Probability: theory and examples, fourth edition. Cambridge University Press, ISBN: 978-0-521-76539-8
- Jacod, J.; Protter, P.: Probability essentials, second edition. Universitext. Springer, ISBN: 3-540-43871-8
- Klenke, A.: Probability theory. A comprehensive course. Universitext. Springer, ISBN: 978-1-84800-047-6

References   Here are some references on financial mathematics:

- Baxter, Martin, Andrew Rennie: *Financial Calculus: An Introduction to Derivative Pricing*, Cambridge University Press, 1996.
- Chung, K. L., AitSahlia, F.: Elementary Probability Theory: With Stochastic Processes and an Introduction to Mathematical Finance,Springer;
- Lamberton, Damien; Lapeyre, Bernard: *Introduction to stochastic calculus applied to finance*. Second edition. Chapman & Hall/CRC Financial Mathematics Series, Boca Raton, FL, 2008.
- Mikosch, Thomas: Elementary stochastic calculus with finance in view, World scientific (1998)
- Shreve, Steven E.: *Stochastic Calculus for finance I, II*, Springer, 2004.

Description   In the first semester we will introduce basic concepts of probability and measure theory like:
probability spaces, transformation of probability spaces, random variables, inequalities (Jensen, Chebychev, Markov, ...), variance and covariance, laws of large numbers, convergence and uniform integrability, distribution of random variables, weak convergence of probability measures, Dynkin systems and uniqueness of probability measures, indeoopendence, joint distribution and convolution, characteristic functions, central limit theorem, conditional probabilities, etc (to be updated)

Evaluation   - Attendance (10 % of final score).

- Assignment sheets (30 % of final score);

Students must solve exercises regularily, and will be given assignment sheets mostly every week.

- Midterm (8th week, 75 minutes, 30 % of final score);

- Final exam (15th week, 75 minutes, 30 % of final score);