GÖTEBORG UNIVERSITY

Faculty Board of Science

MMA710 Financial Derivatives and Stochastic Analysis

7.5 higher education credits

Second Cycle

This syllabus is the binding document.

1. Confirmation

The syllabus was confirmed by the Department of Mathematical Sciences on June 15, 2007 to be valid from July 1, 2007.
Field of education: Science. Responsible department: Mathematical Sciences.

2. Position in the educational system

The course Financial Derivatives and Stochastic Analysis, 7.5 higher education credits, is one of several single subject courses included in the two-year Masters Program in Mathematical Sciences. The course is also open for eligible students outside the program.

3. Entrance qualifications

The prerequisite for the course Financial Derivatives and Stochastic Analysis is the equivalent of the course MMA700 Options and Mathematics or in all 90 higher education credits in Mathematics and Mathematical statistics.

No previous knowledge of Lebesgue integration or stochastic calculus is required.

4. Course content

Probability and Measure Theory. Brownian Motion and Stochastic Calculus. The Ito-Doeblin and Feynman-Kac Formulas. Wiener Measure and Girsanov's Theorem. Risk-Neutral Pricing. Self-Financing Portfolio Strategies and Arbitrage. Martingale Representation and Complete Markets. The Black-Scholes Model. Puts and Calls. Several underlying Assets. Path-dependent Options. American Derivative Securities. Currency Derivatives. Term-Structure Models and Option Prices in Gaussian Models.

5. Learning outcomes

After completing the course the student will be able to

- master applications of the Ito-Doeblin and Feynman-Kac formulas to option pricing

- understand risk-neutral pricing

- derive the Black-Scholes differential equation for the price of a simple European derivative when there are several underlying stocks

- price European barrier options in the Black-Scholes model

- use domestic and foreign risk neutral measures to price derivatives on currencies.

6. Required reading

List of required reading enclosed.

7. Assessment

The examination consists of assignments and a written examination. Some of the assignments are based on Matlab. A student who has failed a test twice has the right to change examiner, unless weighty arguments can be invoked. For this, the student must send a written request to the board of the department.

8. Grading scale

The grades are Fail (U), Pass (G), and High Pass (VG).

Students who are contractually entitled to ECTS grades should inform the examiner about this no later than one week after the start of the course.

Students without such entitlement will not be awarded ECTS grades. Grades will be converted into ECTS terminology according to a standard model approved by the University President.

9. Course evaluation

Oral and/or written course evaluation will be performed. The results of the evaluation will be communicated to the students and will serve as a guide for the development of the course.

10. Additional information

The language of instruction is English unless all involved are Swedish speakers.