

AIM OF THE COURSE

The course offers an introduction to the main pricing principles used in the quantitative finance.

PROGRAM

1. Preliminaries
 - Bonds, stocks
 - The pricing problem
 - Stochastic calculus
2. Principles of Asset Pricing
 - Pricing under uncertainty: discrete models
 - Consumption-based pricing: the stochastic discount factor
 - Risk-neutral pricing
3. Principles of Derivatives Pricing
 - The Black-Scholes model
 - Risk hedging
 - Pricing of European options and of forward contracts

Important knowledge for a successful learning: linear systems, real functions of one or more real variables (in particular: continuous functions, composition of functions, partial derivatives), basic concepts of financial mathematics (interest rate, return of an investment, difference between bonds and shares of a firm, discount factor), fundamental concepts of probability theory (sigma algebra, random variables, expected values, covariance, space L^2 of rv, independence, conditional probabilities and expected values, equivalent probability measures, probability density, distribution function, Gaussian law, convergence in distribution, in probability, in L^2 , almost certain equality)

Preparatory courses: Mathematics, Probability, Statistics

Skills necessary for successful learning: willingness and ability to conduct logical reasoning in a rigorous way, and to motivate each step and the conclusions

Organization of teaching activities: lectures

EXAM

The exam consists of a written test. Also an oral examination could be compulsory, in case the teacher needs for specific insights

The written test consists of practical exercises and theoretical questions, and can cover the whole programme of the course. Using notes or books or similar material during the test is forbidden

The exam is not passed if the mark in the written test is less than D.

The final exam mark is awarded considering mainly the outcome of the written test.

In case of oral exam, the mark may become insufficient if inconsistencies are found with what is written. The mark score may increase if parts of exercises have not been evaluated for doubt of interpretation.

Requests for further questions to increase the score are not accepted. The necessity of further questions will be only established by the teacher. Such questions may only increase the grade marginally

Characteristics of the expected performance. The student is required to demonstrate a critical and in-depth knowledge of the topics covered in the course. The concepts must not be exposed mechanically but in a reasoned way, connections among different parts of the program may be required and advanced level exercises (marginally) can be proposed. The concise but comprehensive exposure, the rigor, the direct pointing towards the core of the matter will be particularly appreciated. Vague, inaccurate, poorly justified or incorrect answers will be penalized

TEXTBOOKS

- 1) Bjork, T., Arbitrage theory in continuous time, 3rd Edition, Oxford University Press, 2009.
- 2) John H. Cochrane, "Asset Pricing", Princeton University Press; Revised edition (January 23, 2005)
%Module 14, Portfolio Theory