UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Finanza Matematica M

2526-2-F8204B024

Learning objectives

The aim of the course, in accordance with the goals of CLAMSES, is to introduce students to continuous time financial models and the necessary mathematical tools.

Contents

Continuous time stochastic processes and applications to financial modeling

Detailed program

1. Probability essentials: probability spaces, properties of the expected value, construction of the conditional expected value;
2. Finite variation processes: definition and properties. The stochastic integral with respect to a finite variazion process;
3. Martingales: definition and main properties. Brownian motion and its properties. The quadratic variation of a martingale;
4. Ito integral: the elementary stocahstic integral; Ito extension theorem; properties of the stochastic integral with respect to a martingale;
5. Ito's Lemma and exponential martingale: Ito's expansion and its use in the solution of some stochatsic differential equations;
6. Tanaka's formula and change of measure: integration by parts formula and the change in process charateristics arising from a change of the underlying probability;
7. Black & Scholes: main strictural characteristics; Black & Scholes PDE; the equivalent martingale measure approach

8. Fundamental Theorem of Asset Pricing: the existence of risk neutral measures and their applciation to asset pricing;
9. Stochastic volatility models: stochastic components of volatility and market completeness; Hull and White model; Heston model..
10. Some derivatives

Prerequisites

Probabiltiy, statistics and mathematical methods.

Teaching methods

Lectures (42 hours) and classes (on-line)

Assessment methods

Written exam with exercises aiming at verifying the knowledge of the mathematical tools as well as of some simple financial models in continuous time.

Textbooks and Reading Materials

S. Shreve, Stochastic Calculus for Finance, Springer, 2004.

Lecture Notes

Semester

First semester

Teaching language

Italian (English)

Sustainable Development Goals

QUALITY EDUCATION