

## Course syllabus (for MSc students in Economics and Finance (MEF))

### Title:

"Stochastic Calculus and Statistics: Lévy-driven Models"

### Abstract:

This short course presents introductory stochastic calculus, simulation, and estimation related to Lévy-driven stochastic differential equations (SDE). We start with overviewing the basics of Lévy processes, stochastic integration and stochastic differential equations (SDEs). The lecture covers selected topics related to the statistics for the SDE models and also some general theories behind them. Additionally, I will briefly demonstrate the simulations using the YUIMA package, an R package for statistical inference and simulation of stochastic processes, giving access to several advanced results in the statistics of stochastic processes via YUIMA.

### Keywords:

Lévy processes (Wiener process, Compound Poisson process, Variance gamma, Normal inverse Gaussian, etc.)

Stochastic integrals

Stochastic differential equations

Quasi-likelihood inference

Model assessment

YUIMA package

Related topics

### Prerequisites for admission:

The students are expected to have preliminary knowledge of calculus, basic probability theory, and statistics.

### Textbooks (optional):

1) Iacus, S.M. "Option Pricing and Estimation of Financial Models with R", Wiley.

2) Iacus, S.M. and Yoshida, N. "Simulation and inference for stochastic processes with YUIMA. A comprehensive R framework for SDEs and other stochastic processes", Springer, 2018.

### Assessment methods and criteria:

A report assignment will be given for credit.