UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Business Intelligence for Financial Services

2627-3-E3101Q117

Aims

Training participants to be able to professionally use and/or implement business intelligence/analytics and data science applications with particular emphasis on management and analysis of fdinancial data, both batch and online.

More precisley, the course will provide competences for the development of solutions aimed at supporting financial market analysis.

Contents

- Financial markets: organization, micro-structures and technologies (Limit Order Book & Matching Engine)
- Financial markets as "data generators"
- Asset allocation: Markowitz's model and Capital Asset Pricing Model
- Pricing of derivatives
- High Frequency Trading (HFT): arbitrage techniques
- Statistical and Machine Learning methods for stocks prices/returns forecasting
- Python for finance: an introduction
- Design of applications for Predictive analytics and Algorithmic Trading

Detailed program

- Introduction to financial assets (debts, stocks, derivatives)
- Financial markets: types of orders
- Risks of financial activities, returns, and utility functions

- Correlation, covariance, and mean-variance of returns
- Asset and Portfolio management: Markowiz's model and Capital Asset Pricing Model
- Digitalization of Financial Markest: Limit Order Book and Matching Engine, extended types of orders
- Forecasting financial time series
- Statical methods for forecasting: ARMA and its extensions (ARIMA, S-ARIMA, ARIMA-X, S-ARIMA-X), GARCH
- Some Machine Learning methods for forecasting: KNN for time series forecasting, Neural Networks, Support Vector Machines

- Introduction to Python
- Data download and analysis (with Python)
- Representing and Handling financial data with Python

Prerequisites

- Data Bases;
- Statistics;
- Coding

Teaching form

The training will consist of lectures, tutorials that will present the details of computational methods needed for the development of a project and support activites in laboratory.

The course is taught in Italian and are organized as follows:

- 32 hours of in-person lessons
- 42 hours of in-person laboratory

Textbook and teaching resource

- Slides provided by the teachers
- Papers suggested during the course
- Book:
"Machine Learning for Algorithmic Trading: Predictive models to extract signals from market and alternative data for systematic trading strategies with Python", Stefan Jansen, Packt Publishing Ltd. (2020)
or
"Computational Finance - An Introductory Course with R", Argimiro Arratia, Atlantis Press (2014)

Semester

Bachelor degree - third year - second period

Assessment method

The exam will be organized as follows:

1) An intermediate test consisting of 5 questions requiring an "open-answer" and 1 exercise related to the topics of the course
Evaluation of the intermediate test will be reported through a quali-quantitative rating:

- Not sufficient [<18]
- Sufficient [18->22]
- Good [23->26]
- Excellent [27->29]
- Top [>30]

The intermediate test is NOT mandatory: a rating at least "sufficient" allows the student to avoid questions on the same topics at the final exam.

2) The final exam will be organized as follows:

- **Oral examination:** On topics presented during lessons by teachers.

- Topics of the intermidiate test will not be part of the oral examination for students who pass the test.

- **Project**:
  Development of an application, in R, for the analysis of financial data. In addition to a report, the project will be discussed , through a set of slides.
  Deadlines for submitting the project will be indicated on Moodle.

Office hours

On appointment

Sustainable Development Goals

QUALITY EDUCATION