1SC4410 – Time series and agent-based modeling in finance

Instructors: Damien Challet, Christian Bongiorno
Department: DÉPARTEMENT MATHÉMATIQUES
Language of instruction: ANGLAIS
Campus: CAMPUS DE PARIS - SACLAY
Workload (HEE): 60
On-site hours (HPE): 34,50

Description

This course is an introduction to financial markets and the modeling of asset prices. Two types of market modeling are studied: econometrics of financial time series on the one hand, agent-based modeling on the other hand. The course focuses on numerical methods. The lessons and the TPs are given 100% in English.

Quarter number

ST4

Prerequisites (in terms of CS courses)

CIP EDP, Algorithmique and Complexité

Syllabus

- Econometrics of financial time series: Stylized facts of financial time series. Stationarity, covariance, correlation. ARMA linear models. Estimation. Prediction. Introduction to non-linear ARCH/GARCH models.
- Agent-based models: Design of agent-based models. Simulation of financial markets. Reproduction of financial stylized facts.

Class components (lecture, labs, etc.)

Temporal Series: Frontal Lessons (12h) + tutorial/labs (9h)
Agent-based Models: Frontal Lessons (6h) + labs (6h)

The course requires high confidence to code in Python.
Labs are in Python. The final exam is in Python in an exam room under time constraints.

Grading

Labs (60%), Final exam (40%). Both the labs and the final exam will be checked with anti-plagiarism algorithms.

Course support, bibliography

- Brockwell, P.J. and Davis, R.A. (1991) Time Series : Theory and Methods, Second edition, Springer Series in Statistics.
- Tsay, R.S. (2010) Analysis of Financial Time Series, Third edition, Wiley.

Resources

Teaching faculty : Christian Bongiorno (CentraleSupelec) Damien Challet (CentraleSupelec).