

# QUANTITATIVE METHODS IN FINANCE (PYTHON)



Niveau  
d'étude  
BAC +5



Composante  
Ecole  
d'économie  
de la  
Sorbonne  
(EES)



Volume  
horaire  
18h



Période de  
l'année  
Automne

## En bref

- > **Langue(s) d'enseignement:** Anglais
- > **Méthodes d'enseignement:** En présence
- > **Forme d'enseignement :** Cours magistral
- > **Ouvert aux étudiants en échange:** Non

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### Description

**Summary:** This course will bring students quantitative skills to be deployed at Fintechs, traditional financial entities and/or regulators.

**Objective:** Reviewing recent advances in econometric theory and economic modelling. Application of those concepts in Python and/or R.

1. Students will be asked to gather financial data from traditional as well as alternative sources.
2. Students will be invited to develop advanced models to propose economic narratives and to exploit results in order to suggest choices to policy makers or investment professionals.

**Professor:** Eric Vansteenberghe (Economist and Researcher - Banque de France)

**Student assessment:** Exam + Quantitative project (in Python)

## Pré-requis obligatoires

**Course prerequisites:** Undergrad econometrics and statistics, undergrad mathematics and matrix algebra, Financial Econometrics for the last parts.

## Syllabus

1. (3 hours) Review of basic quantitative methods with python and R: empirical data import and cleaning, returns, functions, derivatives, Taylor expansions, matrix algebra, optimization...
2. (3 hours) Probability and statistics: distributions, central limit theorem, hypothesis testing, confidence interval...
3. (3 hours) Traditional econometrics on financial time series: regressions, outliers detection, Gauss-Markov hypotheses, unit-root processes...
4. (3 hours) Multiple regressions and tests.
5. (3 hours) Cointegration: tests and trading strategies.
6. (3 hours) Extreme Value Theory and its application to risk management.
7. (3 hours) Agent-Based Models, an introduction.
8. (3 hours) Panel data.
9. (3 hours) Panel data continued and GMM.
10. (3 hours) Macroeconomic and stress test scenario.
11. (3 hours) Black-Scholes-Merton model for Credit Risk.
12. (3 hours) Credit Risk with a network perspective.

## Infos pratiques

### Campus

› Maison des Sciences Économiques