

Machine Learning : empirical applications for finance (prerequisite : Python for Finance) (This course corresponds to the bloc 2/3 of the Certificate "Fundamentals of Data Science")

**ECTS** : 3

**Description du contenu de l'enseignement :**

**Basics of ML**

- Definitions, approaches and applications.
- Data mining (DM) : definitions and links with ML.
- Classification and regression problems.
- Building and evaluating an ML model.
- Presentation of the main approaches of ML/DM.
- Application I.

**Decision Trees :**

- Definitions and algorithms.
- Advanced methods based on DL : Bagging, Boosting and Random forests.
- Application II : Making a decision in finance.

**Neural networks:**

- Definitions.
- Learning in NN : gradient descent and Backpropagation.
- Advanced methods based on NN (Deep learning).
- Application III : : Stock pricing.

**Reinforcement Learning :**

- Definitions : Agents and environments.
- Markovian Decision Process (MDP).
- Policies and optimal policies.
- Q-learning.
- Application IV : Trading.

**Compétence à acquérir :**

Building Machine Learning (ML) models for Finance problems. Using ML Python library (and in particular sickit-learn).

**Mode de contrôle des connaissances :**

Two/Three assignments (building a model + Python programming).

**Document susceptible de mise à jour - 30/05/2026**

**Université Paris Dauphine - PSL - Place du Maréchal de Lattre de Tassigny - 75775 PARIS Cedex 16**