

## Machine Learning

Course title - Intitulé du cours	Machine Learning/Apprentissage automatique
Level / Semester - Niveau /semestre	M2 / S1
School - Composante	Toulouse School of Economics/ Ecole d'Economie de Toulouse
Teacher - Enseignant responsable	Thierry MAGNAC
Lecture Hours - Volume Horaire CM	15
TA Hours - Volume horaire TD	0
TP Hours - Volume horaire TP	6
Course Language - Langue du cours	English/Anglais
TA and/or TP Language - Langue des TD et/ou TP	English/Anglais

### Teaching staff contacts - Coordonnées de l'équipe pédagogique :

Thierry Magnac: after the class or prior appointment by email

thierry.magnac@tse-fr.eu, T.520, Office hours, Thursdays 5-6pm

### Course's Objectives - Objectifs du cours :

**Objectives:** The main goal of the course is to familiarize students with machine learning methods for quantitative and qualitative prediction (regression and classification). Both supervised and non-supervised methods will be studied.

Content of the course: Overview, Lasso and Ridge Regression, Trees, Random forests and Boosting, Neural Networks, Support-Vector Machines, Principal Component Analysis

Content of the tutorial sessions: computer classes in which empirical applications are worked out using R.

### Prerequisites - Pré requis :

Econometrics of the linear model and discrete variables.

### **Grading system - Modalités d'évaluation :**

Assessment:

- 50% Empirical or Simulation home exam
- 50% Oral presentation

+ Bonus for participation in classes

### **Bibliography/references - Bibliographie/références :**

- Susan Athey, The Impact of Machine Learning on Economics, Working paper, 2018.
- Susan Athey and Guido Imbens, Machine Learning Methods Economists should know about, Working paper, 2019.
- James, G., D. Witten, T. Hastie, and R. Tibshirani, An Introduction to Statistical Learning, Springer, 2013.
- Efron, B. and T. Hastie, Computer Age Statistical Inference, Cambridge University Press, 2016
- Hastie, T., R. Tibshirani, and J. Friedman, The Elements of Statistical Learning, Springer, 2016
- Goodfellow, I., Y. Bengio and A. Courville, Deep Learning, MIT Press, 2016.

### **Distance learning – Enseignement à distance :**

Distance learning can be provided when necessary by implementing, for example: / En cas de nécessité, un enseignement à distance sera assuré en mobilisant:

- Interactive virtual classrooms / Classe en ligne interactive
- MCQ tests and other online exercises and assignments / QCM et exercices en ligne
- Remote (online) tutorials (classes) / TP/TD à distance