Nonparametric Models

Course title - Intitulé du cours	Nonparametric models
Level / Semester - Niveau /semestre	M2 / S3
School - Composante	Ecole d'Economie de Toulouse
Teacher - Enseignant responsable	DAOUIA ABDELAATI
Other teacher(s) - Autre(s) enseignant(s)	
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Other teacher(s) - Autre(s) enseignant(s)	
Lecture Hours - Volume Horaire CM	18
TA Hours - Volume horaire TD	
TP Hours - Volume horaire TP	
Course Language - Langue du cours	Anglais
TA and/or TP Language - Langue des TD et/ou TP	Anglais

Teaching staff contacts – Coordonnées de l'équipe pédagogique :

E-mail: Abdelaati.daouia@tse-fr.eu, TSE
Office number: T216
Office Hours: by appointment
Preferred means of interaction: after lectures, by email

Course Objectives – Objectifs du cours :

This course is designed to introduce flexible methods of estimation that do not rely on strong assumptions about functional forms and distributions of random variables in statistical models. The course provides a modern view of the most popular nonparametric methods, especially on the important topics of density and regression estimation. It sheds light on the statistical properties of the estimators, but the proofs will be skipped. We will spend more time on the cultural aspects (knowledge of the methodology and interpretation of statistical results) and computational aspects (implementation using R software) of nonparametrics. The course will take place in a computer room so that we can immediately illustrate the ideas covered during lecture through simulated and real datasets. The objective of the course is to enable students to evaluate the merits and drawbacks of nonparametric estimators and assess where they can benefit from applying such methods. They should also be able to apply the estimation methods to some simple datasets by the end of the course.

Prerequisites – Pré requis :

Prerequisite is Mathematical Statistics (M1) or Intermediate Econometrics (M1). The main concepts that students should be familiar with are methods of estimation (e.g. MLE) and their properties. Basic programming skills in R are required.

Grading system – Modalités d'évaluation :

One final exam (50%), one project (50%). The objectives of the project are to enable students to explore other related topics in nonparametric statistics that could not be covered in the course (due to time constraints) and to teach them how to make a small bibliography by themselves, since that skill is normally expected in work environments. Late submission requests will not be entertained.

Bibliography/references – Bibliographie/références :

Lecture slides will be given throughout the course. There will also be supplementary notes where needed. No textbook is officially required. A list of references and recommended readings will be provided in class.

Session planning – Planification des séances

- 1.5 h Course : Parametric versus nonparametric models
- 3 h Course : Nonparametric density estimation
- 1.5 h TD : Estimation of density functions
- 1.5 h Course : Nonparametric density estimation
- 1.5 h Course : Review of polynomial spline functions
- 1.5 h TD : Density estimation, Smoothing splines
- 3 h Course : Nonparametric regression estimation
- 1.5 h TD : Polynomial vs local polynomial regression on simulated and real data
- 1.5 h Course : Nonparametric regression estimation
- 1.5 h TD : Least squares splines, spline smoothing