

Mathematical statistics 2

Course title – Intitulé du cours	Mathematical statistics 2
Level / Semester – Niveau /semestre	M1 / S2
School – Composante	Ecole d'Economie de Toulouse
Teacher – Enseignant responsable	Paindaveine Davy
Other teacher(s) – Autre(s) enseignant(s)	Christine Thomas-Agnan
Other teacher(s) – Autre(s) enseignant(s)	Eve Leconte
Other teacher(s) – Autre(s) enseignant(s)	Abdelaati Daouia
Other teacher(s) – Autre(s) enseignant(s)	
Other teacher(s) – Autre(s) enseignant(s)	
Lecture Hours – Volume Horaire CM	30
TA Hours – Volume horaire TD	15
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 :

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Preferred means of interaction : after the classes, prior appointment

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Preferred means of interaction : prior appointment, email

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Preferred means of interaction : after the classes, prior appointment, email

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Preferred means of interaction : after the classes, prior appointment, email

Course Objectives – Objectifs du cours :

The first part of the course is dedicated to the theory of point estimation of a parameter in a parametric statistical model with an introduction to the Fisher information theory. The second part of the course is about the theory of interval estimation and testing theory.

The aim of the course is to give students theoretical tools to compare estimators and tests and have arguments to defend their choices.

As in Mathematical Statistics 1, a project is proposed to introduce complementary notions (depending upon year) and to confront theory to practice.

The course outline is the following:

- Elements of information theory.
- Point estimation (maximum likelihood, method of moments, asymptotic behavior, optimality, efficiency).
- Interval estimation.
- Hypothesis testing: rejection region, first and second kind risk, level, power, empirical significance level. Classical tests (about means, variances, proportions, independence)
- Neyman theory: uniformly most powerful tests for a simple hypothesis. Likelihood ratio tests, tests of a one-sided hypothesis in a monotone likelihood ratio model, Wald tests, score tests.

Prerequisites – Pré requis :

Mathematical Statistics 1

Practical information about the sessions – Modalités pratiques de gestion du cours :

Laptops and tablets are accepted in the class

Grading system – Modalités d'évaluation :

- One midterm exams (40% of the final grade)
- One project (20%)
- One final exam (40%)

Bibliography/references – Bibliographie/références :

- Mathematical Statistics, Jun Shao, Springer texts in Statistics, 1999.
- Theory of Statistics, Mark Schervish, Springer series in Statistics,1995.
- A course in mathematical statistics, G. Roussas, Academic Press, second edition, 1997.
- Initiation à la statistique avec R, Bertrand et Maumy-Bertrand, Dunod, 2010.

Distance learning – Enseignement à distance :

- Interactive virtual classrooms
- MCQ tests and other online exercises and assignments
- Remote (online) tutorials (classes)