

Probability Modeling

Course title - Intitulé du cours	Probability Modeling
Level / Semester - Niveau /semestre	M1 / S1
School - Composante	Ecole d'Economie de Toulouse
Teacher - Enseignant responsable	VOLTCHKOVA EKATERINA
Other teacher(s) - Autre(s) enseignant(s)	
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Lecture Hours - Volume Horaire CM	15
TA Hours - Volume horaire TD	0
TP Hours - Volume horaire TP	0
Course Language - Langue du cours	Anglais
TA and/or TP Language - Langue des TD et/ou TP	

Teaching staff contacts - Coordonnées de l'équipe pédagogique :

Ekaterina Voltchkova

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Office T.109 Preferred means of interaction: forum, email, office hours on appointment.

Course's Objectives - Objectifs du cours :

The objective of this course is to recall main notions of probability theory and deepen some important topics such as conditional probability and expectation, in order to prepare the ground for advanced courses in mathematical finance, statistics, and econometrics. In particular, this course prepares students for studying stochastic processes.

At the end of this course, students must :

- Understand the notion of probability measure.
- Use and understand Bayes' formula.
- Understand the notion of conditional expectation with explicit computation in the discrete, continuous and Gaussian variables cases.
- Handle discrete sequences of independent random variables.
- Model simple economic situations using probability tools.

Hereafter is a more detailed description of the course content:

- Sigma-algebras: definition, properties, examples, classes of events, relationship with the information in a random experiment.

- Random variables measurable with respect to a sigma-algebra.
- Conditional probability and expectation w.r.t. an event; a random variable; a sigma-algebra. Application to stochastic processes.

Prerequisites - Pré requis :

Basic notions of the probability theory should be known. A probability refresher course is provided prior to the beginning of the semester and is highly recommended.

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

Teaching is mainly based on solving exercises and examples in order to illustrate application of probability theory in concrete situations. It is recommended to work on exercise sheets before the in-class session. Oral participation is highly valued.

Grading system - Modalités d'évaluation :

The evaluation consists of a mid-term homework (50%) and a final written exam (50%).

Distance learning – Enseignement à distance :

This course is taught using Zoom. There will be 10 sessions of 1h30 on a weekly basis. All course materials are available on the Moodle. They are organized in problem sets that contain lecture notes and exercises on a particular notion. There is a forum for interaction between Zoom sessions.