

Mathematical Game Theory

Course title - Intitulé du cours	Mathematical Game Theory
Level / Semester - Niveau /semestre	M1 / S2
School - Composante	TSE
Teacher - Enseignant responsable	RENAULT JEROME
Lecture Hours - Volume Horaire CM	30
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	

Teaching staff contacts - Coordonnées de l'équipe pédagogique :

Jérôme Renault (Office T589, <https://sites.google.com/site/jrenaultsite/>, e-mail: jerome.renault@tse-fr.eu). Please address your questions during or at the end of the class, or by appointment and if necessary by email.

Course's Objectives - Objectifs du cours :

This course is an introduction to strategic optimization, the mathematical aspects of game theory. It first focuses on zero-sum games, which are essential to the understanding of : worst-case analysis in one person decision making, games of total conflict and general-sum games (where cooperation can be sustained via zero-sum games strategies). Then some aspects of data sciences, such as Approachability, No-Regret Learning and Calibration, are presented.

Prerequisites - Pré requis :

Analysis (compact metric spaces, continuous functions,...), elementary Probability Theory and interest in mathematics and strategic thinking.

Grading system - Modalités d'évaluation :

a mid-term exam (40 %) and a final exam (60%)

Bibliography/references - Bibliographie/références :

Lecture notes will be given to the students, see <https://sites.google.com/site/jrenaultsite/lecturenotes>

- An Introductory Course on Mathematical Game Theory. Gonzalez-Diaz, Garcia-Jurado, Fiestras-Janeiro, Graduate Studies AMS 2010.
- A first course on zero-sum repeated games. Sorin, SMAI 2002.
- Game Theory. Maschler, Solan and Zamir, Cambridge UP 2013.
- Mathematical Foundations of Game Theory. Laraki, Renault, Sorin. Springer 2019

Session planning - Planification des séances :

Distance learning: can be provided when necessary by implementing

- Interactive virtual classrooms / Classe en ligne interactive
- Remote (online) tutorials (classes) / TP/TD à distance