

## Strategic Optimization

Course title - Intitulé du cours	Strategic Optimization
Level / Semester - Niveau /semestre	M1 / Semestre 1
School - Composante	TSE
Teacher - Enseignant responsable	RENAULT_JEROME
Other teacher(s) - Autre(s) enseignant(s)	
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Other teacher(s) - Autre(s) enseignant(s)	
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 MF414, <https://sites.google.com/site/jrenaultsite/> , e-mail: [jerome.renault@ut-capitole.fr](mailto:jerome.renault@ut-capitole.fr)).

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.
- Bases mathématiques de la théorie des jeux (in French). Renault, Sorin and Laraki, Editions de l'Ecole Polytechnique 2013.

**Session planning - Planification des séances :**

Tuesday and Wednesday, from 2 to 3.30 pm in MD005