Stochastic Methods for optimization and sampling

Course title – Intitulé du cours	Stochastic Methods for optimization and sampling
Level / Semester – Niveau /semestre	2
School – Composante	Ecole d'Economie de Toulouse
Teacher – Enseignant responsable	Julien Chhor
Other teacher(s) – Autre(s) enseignant(s)	
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Other teacher(s) – Autre(s) enseignant(s)	
Lecture Hours – Volume Horaire CM	15
TA Hours – Volume horaire TD	12
TP Hours – Volume horaire TP	
Course Language – Langue du cours	English
TA and/or TP Language – Langue des TD et/ou TP	Python

Teaching staff contacts – Coordonnées de l'équipe pédagogique :

J. Choor

Course Objectives – Objectifs du cours :

The course is splitted into three parts.

- The first part introduces and motivates the need to use stochastic methods for solving optimization and statistical problems, commonly encountered in data science problems.
- The second part of the course is dedicated to stochastic gradient methods (with an emphasis to the theoretical side) and recent modern improvements (with an emphasis to the practical side).
- The third part of the course is about methods for sampling, especially posterior distributions in a Bayesian framework to produce Bayesian estimators in some very general framework.

Prerequisites – Pré requis :

Probability and Statistics for Data Science

Introduction to Convex Optimization for machine learning

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

Personal laptops and tablets are accepted in the class

Grading system – Modalités d'évaluation :

Final exam or Project (not fixed yet)

Bibliography/references – Bibliographie/références :

Learning theory from first principles, F. Bach,
https://www.di.ens.fr/%7Efbach/ltfp_book.pdf
Lecture notes, S. Gadat https://www.tse-fr.eu/master-1-econometrie-et-statistique-standard-track?lang=en

Lecture notes, S. Bubeck http://sbubeck.com/book.html

Session planning – Planification des séances

Distance learning – *Enseignement à distance :*

Distance learning can be provided when necessary by implementing:

- *Interactive virtual classrooms*

- *Recorded lectures (videos)*

- *MCQ tests and other online exercises / assignments*

- *Remote (online) tutorials (classes)*

- *Chatrooms*

En cas de nécessité, un enseignement à distance sera assuré en mobilisant:

- *Classe en ligne interactive*

- *Vidéo enregistrée de la présentation du matériel pédagogique*

- *QCM et exercices en ligne*

- *TP/TD à distance*

- *Forum...*