

## Computational methods and MCMC

**ECTS** : 4

**Volume horaire** : 21

### **Description du contenu de l'enseignement :**

Motivations

Monte-Carlo Methods

Markov Chain Reminders

The Metropolis-Hastings method

The Gibbs Sampler

Perfect sampling

Sequential Monte-Carlo methods

### **Compétence à acquérir :**

This course aims at presenting the basics and recent developments of simulation methods used in statistics and especially in Bayesian statistics. Methods of computation, maximization and high-dimensional integration have indeed become necessary to deal with the complex models envisaged in the user disciplines of statistics, such as econometrics, finance, genetics, ecology or epidemiology (among others!). The main innovation of the last ten years is the introduction of Markovian techniques for the approximation of probability laws (and the corresponding integrals). It thus forms the central part of the course, but we will also deal with particle systems and stochastic optimization methods such as simulated annealing.