

Mixing times of Markov chains

**ECTS** : 4

**Volume horaire** : 24

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

How many times must one shuffle a deck of 52 cards? This course is a self-contained introduction to the modern theory of mixing times of Markov chains. It consists of a guided tour through the various methods for estimating mixing times, including couplings, spectral analysis, discrete geometry, and functional inequalities. Each of those tools is illustrated on a variety of examples from different contexts: interacting particle systems, card shuffling, random walks on groups, graphs and networks, etc. Finally, a particular attention is devoted to the celebrated cutoff phenomenon, a remarkable but still mysterious phase transition in the convergence to equilibrium of certain Markov chains.

**Compétence à acquérir :**

See the [webpage](#) of the course.

**Mode de contrôle des connaissances :**

Final written exam, in class.

**Bibliographie, lectures recommandées :**

See the [webpage](#) of the course.

**Document susceptible de mise à jour - 09/12/2025**

**Université Paris Dauphine - PSL** - Place du Maréchal de Lattre de Tassigny - 75775 PARIS Cedex 16