

Bayesian statistics

ECTS : 6

Volume horaire : 24

Description du contenu de l'enseignement :

The course will cover different aspects of Bayesian statistics with an emphasis on the theoretical properties of Bayesian methods. The course starts with an introduction Bayesian decision theory from point estimation, to credible regions, testing and model selection and some notion on Bayesian predictive inference. The second part will cover the most important results on Bayesian asymptotics.

Part I. Bayesian decision theory : an Introduction

- Prior / Posterior , risks and Bayesian estimators.
- Credible regions.
- Model selection and tests.

Part II: Bayesian asymptotics; in this part, both well and mis-speci?ed models will be considered.

- Asymptotic posterior distribution: in this part we will study asymptotic normality of the posterior, the penalization induced by the prior and the Bernstein von - Mises theorem. Regular and nonregular models will be treated.
- marginal likelihood and consistency of Bayes factors/model selection approaches.
- Empirical Bayes methods. This part will review some results on the asymptotic posterior distribution for parametric empirical Bayes methods.
- Bayesian bootstrap.
- Posterior consistency and posterior convergence rates. This part will first cover the case of statistical loss functions using the theory introduced by L. Schwartz and developed by Ghosal and Van der Vaart

Compétence à acquérir :

Understanding of Bayesian inference and Bayesian decision theory. Understanding and being able to manipulate the asymptotic theory in Bayesian inference : main tools and what they mean.

Mode de contrôle des connaissances :

examen sur table

Bibliographie, lectures recommandées :

- C. P. Robert (2021). The Bayesian Choice.
- S. Ghosal and A. van der Vaart (2017): Fundamentals of Bayesian Nonparametrics.
- A. van der Vaart (1998): Asymptotic Statistics.

Document susceptible de mise à jour - 02/04/2026

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