

PhD School in Statistics  
cycle XXVIII, 2013  
Theory and Methods of Statistical Inference

PART II — Bayesian Inference

(L. Ventura, B. Liseo)

**Syllabus**

Statistical models and prior information. Inference based on the posterior distribution. Choice of the prior distribution. Point and interval estimation.

Hypothesis testing and the Bayes factor.

Linear models. Model selection.

Monte Carlo methods. MCMC.

Generalized linear models. Hierarchical models and exchangeability.

**References**

- Albert, J. (2009). *Bayesian Computation with R*. (Second edition). Springer, New York.
- Ghosh, J.K., Delampady, M., Tapas, S. (2006). *An Introduction to Bayesian Analysis*. Springer, New York.
- Hoff, P.D. (2009). *A First Course in Bayesian Statistical Methods*. Springer, New York.
- Lee, P. (2004). *Bayesian Statistics: an Introduction*. Oxford University Press, New York.
- Liseo, B. (2007). *Introduzione alla Statistica Bayesiana*.
- O'Hagan, A. and Forster, J. (2004) *Bayesian Inference*. 2-nd ed.. Edward Arnold, London.
- Robert C.P. and Casella G. (2004) *Monte Carlo Statistical Methods* (Second edition). Springer, New York.

## Lectures and topics

<b>date</b>		<b>topic</b>	<b>instructor</b>
24/04/13	10.00–13.00	Bayesian inference. Introduction: prior and posterior distributions	LV
29/04/13	10.00–13.00	choice of priors; noninformative priors	LV
02/05/13	10.00–13.00	linear models; model selection	LV
06/05/13	14.00–17.00	Exchangeability and Hierarchical Models	BL
07/05/13	09.30–12.30	Model selection	BL
14/05/13	15.30–17.30	Monte Carlo Integration	AT
15/05/13	10.30–12.30	MCMC methods. Metropolis-Hastings Algorithms	AT
15/05/13	14.30–16.30	Lab session	AT
21/05/13	15.30–17.30	Gibbs sampler	AT
22/05/13	10.30–12.30	Approximate Bayesian Computation (ABC)	AT
22/05/13	14.30–16.30	Lab session	AT

Instructors: LV is Laura Ventura, BL is Brunero Liseo, AT is Andrea Tancredi