

Course: Introduction to Applied Bayesian modeling

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Introduction

This course will provide an introduction to Bayesian statistics, which will be applied for the construction of models and its implementation in R and JAGS code. The course will also provide information on how to transform prior probabilities into posterior probabilities. In addition, the course will introduce commonly used sampling and simulation methods, credible regions, and inference using models such as linear regression, generalized linear models, and hierarchical models.

The course includes sessions on Bayesian modeling and inference, alternating conceptual and practical hand-on sessions.

By the end of the session participants will be able to start applying Bayesian statistical models in their field, developing a core understanding of Bayesian inference.

Target public: people from various fields (e.g. mathematics, psychology, medicine, biology) with no previous knowledge of Bayesian statistics with some concrete motivation for seeking to improve their quantities capacities.

Prerequisites

Basic knowledge of probability and statistic.

Basic knowledge of the R language for statistical computing.

Programme

Session 1

Foundations of Bayesian statistics

- Introduction to Bayes' theorem
- Introduction to Bayesian inference

Session 2

Bayesian analysis

- Binary data
- Count data
- Continuous data

Session 3

Sampling from distributions using MCMC

- Gibbs sampling and Metropolis-Hastings algorithm
- Convergence diagnostics

Session 4

Bayesian linear models

- Implementation, analysis, comparison, and interpretation

Session 5

Bayesian generalized linear models

- Implementation, analysis, comparison, and interpretation

Session 6

Bayesian hierarchical models

- Implementation, analysis, comparison, and interpretation

Monday 16: Session 1, 2, 3

Tuesday 17: Session 4, 5, 6.

Venue:

Escola de Ciências e Tecnologia.

Conceptual session. Monday 17:30h – 19:30h CLAV 066

Conceptual session. Tuesday 17h – 19h CLAV Anf 3

Practical session. Monday 20:30h – 22:30h CLAV 066

Practical session. Tuesday 20h – 22h CLAV 066

Note: The course will be held in standard classroom, so participants will need to bring their own laptops. The Instructor will inform participants in advance of software needs and R libraries to be installed beforehand.