

Statistics: Introduction to simulation-based inference

First Semester 2012/2013

Lecture times and locations

Monday 1100-noon 1020 Aras de Brun (ADB 1020)

Wednesday 1300-1400 (ADB 1020)

Course lecturer

Dr. Milovan Krnjajić

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office hours: Thu 1600-1800 or by appointment (also open door policy)

Course web page

All information will be communicated through the Blackboard or during the lectures.

Course description

This is an introductory course to statistical modelling focusing in part on simulation-based inference and Bayesian methods. A prerequisite for this course is basic knowledge of probability and a year of calculus. Helpful but not necessary for successful study would be if students have already taken an introductory course in statistics or regression analysis. As a programming tool we shall use and learn statistical package R.

Topics will include: Review of basic probability concepts (events, sample spaces, concept of random variable, distributions, expectation and variance, central limit theorem); Likelihood based inference; Priors, posteriors, predictive models. Bayesian inference in models with a single parameter; Basic sampling techniques; Markov Chain Monte Carlo and Gibbs sampling; Bayesian hierarchical models;

Course work and examination

Final mark will be based on an exam and continuous assessment (CA) which may include a combination of homework problem assignments, take-home projects and in-class quizzes. Details will be given as we progress through the semester.

Reference books

Peter Hoff, *A First Course in Bayesian Statistical Methods*, Springer (2009).

William Bolstad, *Introduction to Bayesian Statistics*, Wiley (2007).

Gelman, Carlin, Stern and Rubin, *Bayesian Data Analysis*, Chapman & Hall / CRC (2004).

Michael Lavine, *Introduction to Statistical Thought*

NOTE: Available online:

<http://www.math.umass.edu/~lavine/Book/book.html>