



STAT 891

Spatial Modeling and Simulation-aided Inference

Summer 2008
Day Course

Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca

Instructor: Dr. David Higdon

Prerequisite: Some familiarity with R or matlab; alternatively, familiarity with a lower level computing language such as C, FORTRAN or JAVA will be fine. If you haven't done much computing, I suggest you download R and become with basic commands and graphics with R. Also some basic statistical theory will be required. An upper level undergraduate or masters level theory will be fine.

Textbook: There is no required textbook. I think the course notes should be sufficient. What follows is a list of textbooks that may be useful supplements:

- T. Santner, B. J. Williams and W. I. Notz (2003) *The Design and Analysis of Computer Experiments*, Springer.
- Walter R. Gilks, Sylvia Richardson, D. J. Spiegelhalter (1996) *Markov Chain Monte Carlo in Practice*, CRC Press.
- Cressie, N. (1992) *Statistics for Spatial Data*, Wiley.
- M. West and J. Harrison (1997) *Bayesian Forecasting and Dynamic Models* (Second Edition), Springer-Verlag.
- Arnaud Doucet, Nando de Freitas, N. Gordon (2005) *Sequential Monte Carlo Methods in Practice*, Springer

Calendar Description: We'll meet Tuesdays 1:30-4:20, For the first six weeks of the term.

Outline: The course will focus on methods for utilizing simulation models in statistical inference, largely from a Bayesian perspective. The course will cover Markov chain Monte Carlo, Bayesian inference, spatial models(Markov random field models, Gaussian process models, spline models) and their application to systems for which simulation models exist. Although the application to simulation models is rather specific, the course should also give a useful introduction to Markov chain Monte Carlo, spatial modeling and Bayesian inference.

Grading Scheme: Course grades will be determined by homework and a class project which will be presented to the class in the final classes of the term.

Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.

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