



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. Brad McNeney](#)

Prerequisite:

Statistics 830 or equivalent or permission of the instructor

Textbook:

Required:

Monte Carlo Statistical Methods, 2nd ed. by Christian P. Robert and George Casella. Publisher: Springer

Supplementary:

1. *Numerical Optimization* (2nd ed.), by J. Nocedal and S.J. Wright, published by Springer-Verlag, 2006;
2. *Introducing Monte Carlo Methods with R*. By C. Robert and G. Casella, published by Springer, 2010
3. *Numerical Analysis for Statisticians* (2nd ed.), by K. Lange, published by Springer, 2010;

Calendar Description:

An introduction to computational methods in applied statistics. Topics can include: the bootstrap, Markov Chain Monte Carlo, EM algorithm, as well as optimization and matrix decompositions. Statistical applications will include frequentist and Bayesian model estimation, as well as inference for complex models. The theoretical motivation and application of computational methods will be addressed.

Outline:

1. Review of likelihood and Bayesian inference
2. Foundations of statistical computing: finite precision arithmetic, pseudorandom number generation, approximations. Numerical analysis: matrix computations, optimization and root-finding, and approximating derivatives and integrals
3. Monte Carlo
4. Markov chain Monte Carlo

Grading Scheme:

Assignments 25%

Projects 75%

Grading is subject to change.

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. Students are encouraged to review policies pertaining to academic integrity available on Student Services webpage at <http://students.sfu.ca/academicintegrity.html>
