Course Syllabus: BIOSTAT/STAT 535 Statistical Computing
Autumn Quarter 2008

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September 30, 2008

Class room

The class meets Tuesday and Thursday between 11:30am and 12:50pm in MGH 254.

Office Hours

Wednesdays between 9:00am and 12:00pm in Padelford Hall C-14B, or by appointment.

Textbooks

Robert, C. .P. and Casella, G. (2004). *Monte Carlo Statistical Methods* (Second Edition). Springer-Verlag.
Whittaker, J. (1990). *Graphical Models in Applied Multivariate Statistics*. New York: Wiley.
Liu, J. S. (2001). *Monte Carlo Strategies in Scientific Computing*. Springer-Verlag.

Prerequisites

Students are expected to have a basic understanding of statistics. Some familiarity with Markov chains is welcomed but not required. Students need to be proficient in a high level programming language such as R, Matlab or C++.

Class requirements

The students will have to complete four homeworks (70% of final grade) and a final take-home exam (30% of the grade).

Preliminary schedule

Week 1. Foundations. Reading: Robert-Casella, chapters 1, 2; Liu, chapters 1, 2.

Week 2. Monte Carlo integration. Reading: Robert-Casella, chapters 3, 4.

Week 3. Monte Carlo optimization. Reading: Robert-Casella, chapter 5; Liu, chapter 10.

Week 4. Sequential Monte Carlo. Reading: Liu, chapter 4.

Week 5. The Metropolis-Hastings algorithm. Reading: Robert-Casella, chapter 7; Liu, chapter 5.

Week 6. The Gibbs sampler. Reading: Liu, chapter 6; Robert-Casella, chapters 9, 10.

Week 7. Foundations of graphical models: graph theory, Markov properties of graphs. Reading: Whittaker, chapters 1, 2, 3, 12.

Week 8. Graphical Gaussian models. Reading: Whittaker, chapter 6.

Week 9. Graphical log-linear models. Reading: Whittaker, chapters 7, 8.

Week 10. Other topics. Reading: Whittaker, chapters 9, 10, 11.