University of Manitoba
Department of Statistics
STAT 7270

Bayesian Inference

Winter Term 2017

Class Time: M.W.F. 1:30 p.m. - 2:20 p.m.
Location: 419 Machray Hall
CRN: 54790

Instructor: Saman Muthukumarana
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Office Hours: Monday 10:00 - 11:30 a.m.
Friday 10:00 - 11:30 a.m.
(Or by appointment.)

Calendar Description: Bayesian decision problems, priors, Jeffrey's Rule, robustness of posteriors, Bayesian justification of ANOVA.

Prerequisite: Consent of instructor: Students are assumed to be acquainted with the basic principles of Probability and Statistical theory.

Assignments: Assignments are due at the beginning of class on the due date. Late assignments will not be accepted. You are encouraged to discuss your problems with your classmates and me, but final submission must be written independently. Your grades for assignments will be returned within two week of the due date.

Exams: The final exam will be 3 hours in length and will be scheduled by the Registrar office. The mid-term test is scheduled for **March 13, 2017**. Note that there are no make-up tests for any reason.

Grading Scheme: The final grade will be determined as follows.

Assignments	20%
Mid Term	30%
Final Exam	50%

Course web site: The course website is accessible through the University of Manitoba UM Learn system Desire2Learn.

Computing: R and BUGS will be used to illustrate the theory and methods introduce in the class. R is freely available for both Windows and Unix. You can download your own copy from R Project (CRAN) homepage at http://www.r-project.org/. The BUGS can be downloaded from here.

Recommended Texts: The following textbooks are recommended for reading and the additional material will also be borrowing from journal papers which are accessible from UoM Library server.

- *Bayesian Theory* (Second Edition),
  José M. Bernardo and Adrian F. M. Smith, Wiley Series (1994).
- *Bayesian Data Analysis* (Second Edition),
  Andrew Gelman, John B. Carlin, Hal S. Stern and Donald B. Rubin, Chapman and Hall/CRC (2003).
- *The Bayesian Choice*, Christian P. Robert, Springer (1994).
- *Bayesian computation with R* (Second Edition),
  Jim Albert, Springer (2009). A copy of e-book is available from SpringerLink via UoM Library server.

List of Topics: Basic review and some history, Prior and posterior distributions, Likelihood principle, Predictive distributions, Types of priors, Numerical integration, Monte Carlo approaches, MCMC and related algorithms, Exchangeability and hierarchical models, Model selection, Robustness and sensitivity analysis, Bayesian Decision-theoretic methods

Other Important Information:

- **Academic Dishonesty:** It is important that you understand what constitutes academic dishonesty and that you are familiar with the very serious consequences. Links to resources that describe academic dishonesty (including plagiarism, cheating, inappropriate collaboration and examination impersonation, as well as typical penalties) can be found at:
  www.umanitoba.ca/science/undergrad/resources/webdisciplinedocuments.html.
- **Student Accessibility Services:** If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation. The details can be found at http://umanitoba.ca/student/saa/accessibility/.
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- **Use of Electronics in the Classroom:** It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. A student may use technology in the classroom setting only for educational purposes approved by the instructor and/or the University of Manitoba Student Accessibility Services.
- **ROASS Schedule:** Schedule A of the Responsibilities of Academic Staff with regards to Students (ROASS) policies of the University of Manitoba lists resources and policies for students. It is important that you familiarize yourself with these resources and policies. Schedule A is available at http://www.stats.umanitoba.ca/files/pages/2016/09/Schedule-A-ROASS-Statistics.pdf.