University of Manitoba
Department of Statistics
STAT 7240
Advanced Computational Statistics
Fall Term 2016

Class Time: M.W.F. 11:30 a.m. - 12:20 p.m.
Location: 500A Machray Hall
CRN: 14748

Instructor: Saman Muthukumarana
Office: 371 Machray Hall
Telephone: 204-474-6274
Email: Saman_Muthukumarana@UManitoba.CA

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

Prerequisite: You must have a fair knowledge of Statistical theory and basic familiarity with the use of the computer and computer softwares.

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 answers and computer codes 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.

Final Exam: The final exam will be 3 hours in length. It will also have a take-home component which require computing.

Grading Scheme: The minimum percentage grades required to receive each of the various letter grades are A^+ (90%), A (80%), B^+ (75%), B (70%), C^+ (65%), C (60%), D (50%). The final grade of the course will be based on the assessment items below, with the weights indicated.

Assignments	30%
Project	20%
Final Exam	50%

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

Computing: You must have an account on statistics computational cluster in order to complete this course and you can obtain a user account from Dave Gabrielson at Dave.Gabrielson@UManitoba.CA. You will have access to the software package R through the cluster. The cluster is accessible at web interface and Secure Shell (SSH) via command-line interface. R is freely available for both Windows and Unix. You can also download your own copy from R Project (CRAN) homepage at http://www.r-project.org/.

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.

- *The Elements of Statistical Learning: Data Mining, Inference, and Prediction* (Second Edition), Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer (2009).
- *Bayesian Reasoning and Machine Learning*,
  David Barber, Cambridge University Press (2010).
- *Bayesian Nonparametrics*,
  Nils Lid Hjort, Cambridge University Press (2010).

Course Description: This course aims to cover the topics including: Concepts of Inference in Probabilistic Models, Belief Networks, Naive Bayes, Graphical Models, Machine Learning Concepts and Methods, Neural Networks, Clustering and Classification Methods, Dimension Reduction, Dirichlet Process, Inference using Simulations and Model Assessment and Selection.

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/.
- **Copyrighted Material:** All course notes, assignments, tests, exams, practice exams and solutions are the intellectual property of your instructor or the Department of Statistics. Reproduction or distribution of these materials is strictly forbidden without their consent.
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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.