STAT 7080 Section A01
Advanced Statistical Inference
Winter 2023

Time M/W/F 12:30 p.m. – 1:20 p.m.
CRN 21252

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Web Pages UMLearn: `http://umanitoba.ca/umlearn`

Office Hours: M/W/F/ 11:30 a.m. - 12:00 noon

If the above times are not convenient for you, please email or speak to me after class to arrange an alternate time to meet. I will do my best to return all email messages within 24 hours.

Evaluation

Test 1	25%
Test 2	25%
Test 3	25%
Project on Inference using Estimating Functions and presentation	25%

The following are the minimum percentage grades required to receive each of the various letter grades: A^+ (90%), A (80%), B^+ (75%), B (70%), C^+ (65%), C (60%), D (50%).

Exam Information

Test 1 will be held on **Friday Feb.3rd, 2023 in class**,Test 2 will be held on **Friday March 10th, 2023 in class**. and Test 3 will be held on **Monday April 3rd, 2023 in class. Projects are due on April 3rd in class**.

All tests will be closed book but formula sheets are allowed. If statistical tables or anything else is needed, it will be provided during the tests. All other resources, web browsing and communication with other individuals are strictly prohibited. Inappropriate collaboration, plagiarism, or contract cheating of any kind will be dealt with severely and forwarded to the appropriate disciplinary committee at the University of Manitoba.
Should you miss one test, you will be assigned a grade of zero unless you provide valid documentation. The other two tests would then be worth 75%. Should you miss two tests,

you be assigned a grade of zero unless you provide valid documentation and if you provide valid documentation the third test and the project would then be worth 100%. **There are no make up tests.**
Students who miss all three tests, with or without valid documentation, will be reported to the Dean's office as having completed no term tests. This will have repercussions on their ability to write a deferred exam for the course, should such a deferral be requested.

If there is a need to change any of these tools or instructions, I shall let you know well in advance.

Practice Problems

There will be no assignments in this course. Moreover, numerous practice problems (some with solutions) will be distributed in class. Students are strongly encouraged to try these practice problems on a regular basis.

Supplementary Resources

No text book required for this course. The following books/papers are highly recommended for reading and extra practice.

- Quasi-Likelihood And Its Application: A General Approach to Optimal Parameter Estimation by Chris Heyde (1997), Springer.
- Mathematical Statistics: Exercises and Solutions by Jun Shao, Springer(available through U of M library).
- Melody Ghahramani, PhD thesis (2007). "Analysis of financial time series via estimating functions" PDF Link
- Thavaneswaran, A. and Ravishanker, N. (2016). Estimating Equation Approaches for Integer-Valued Time Series Models. Handbook of Discrete-Valued Time Series Analysis, Chapman Hall CRC.
- Thavaneswaran A, Paseka A, Frank J. (2019). Generalized Value at Risk Forecasting (May 15, 2019). Communications in Statistics Theory and Methods.
- A. Thavaneswaran and M. E. Thompson, "Nonnormal filtering via estimating functions", In N. Balakrishnan, editor, Aspects of Probability and Statistics, pp. 173 -183, CRC Press, London, 2019.
- Liang, Y. , Thavaneswaran, A. and Abraham,B. (2011)Joint Estimation using Quadratic Estimating Functions, Journal of Probability and Statistics.
- Y. Zhang, J. Zou, N.Ravishanker and A. Thavaneswaran(2019).Modeling financial durations using penalized estimating functions. Computational Statistics and Data Analysis.

Note that these textbooks are provided for extra reference and practice only. Coverage and notation may differ somewhat from the course notes. (Notes may cover topics that are not covered in the textbooks or vice-versa.) **Where there are any discrepancies between the way topics are covered in the course notes and in the textbook, please refer to the course notes**.

Voluntary Withdrawal

The voluntary withdrawal date is **March 22** (by which time you will have received your marks for the two term tests).

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:

`http://umanitoba.ca/science/undergrad/resources/webdisciplinedocuments.html`

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.

Recording of Class Lectures

Your instructor and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission from your instructor.

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 Accessibility Services. Students should not engage in electronic messaging/posting activities (e-mail, texting, video or voice chat, social networking (e.g. Facebook)) or electronic gaming during scheduled class time.

Class Communication

The University requires all students to activate an official University email account. Please note that all communication between your instructor and you as a student must comply with the Electronic Communication with Students Policy. Please see

`http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html`

You are required to obtain and use your U of M email account for all communication between yourself and the university.

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.

`http://umanitoba.ca/student/saa/accessibility/`

ROASS Schedule A

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 will be posted on your instructor's UMLearn page.

Course Outline

This course will cover some topics in inference. After briefly reviewing the standard regression theory and the maximum likelihood estmation, the theory and application of inference based on esitmating function techniques will be studied. Topics will be selected from the following list (and with luck, will include them all):

- Convergence Theory
- Estimation Theory(Maximum liklihood Estimation,Methods of Moments etc)
- Regression(LASSO,Ridge)
- Introduction to Estimating Function Theory
- Optimal Estimation
- Quadratic Estimating Functions
- Bayesian Estimating Functions

Appendix For Winter 2023 Course Syllabi (attached)