STAT 4200: Statistical Inference II, Winter 2018 (A01)
Tentative Course Outline

Course Details

Course Title & Number:	Statistical Inference II (STAT 4200)
Credit Hours:	3
Class Times:	Monday & Wednesday 1:00 p.m. – 2:15 p.m.
Location for Lectures/Labs:	124 Machray Hall
Pre-Requisites:	STAT 4100 (Not to be held with the former STAT 4140 (005.414)).
Course Description:	Introduction to methods of hypothesis testing, including asymptotic and Bayesian methods.

Instructor Contact Information

Instructor:	Mohammad Jafari Jozani
Preferred Form of Address:	I'll answer to just about anything.
Office:	365 Machray Hall
Office Hours & Availability:	Monday & Wednesday 11:00–12:00 or by appointment.
Office Phone Number:	(204) 272-1563
E-mail:	m_jafari_jozani@umanitoba.ca (**Note**: I will only respond to e-mail from UMNet ID's)
Contact:	I prefer contact by e-mail or in person contact.

Tutorial

Instructor:	Anh Tran
Office:	354 Machray Hall
E-mail:	trana@myumanitoba.ca
Lab:	MH124, Fridays 1:00–2:15 p.m.
Comment:	January 5th and 12th will be used for teaching and the Lab starts on January 19th.

Textbook, Readings, Materials

Textbook:	There is no textbook for this course. However, I recommend to use the following textbooks for further reading and exercises. I will make lecture notes available through the UM Learn system (see below).
Other Resources:	Not required. Available from the Science Library

Mathematical Statistics (Second Edition). Jun Shao. Springer Texts in Statistics (2003). ISBN 0-387-95382-5.

Probability and Statistical Inference. Nitis Mukhopadhyay. Marcel Dekker (2000). ISBN 0-8247-0319-0.

Statistical Inference (Second Edition). G. Casella and R.L. Berger. Duxbury/Thomson Learning (2002). ISBN 0-534-24312-6.

Introduction to Mathematical Inference (Sixth Edition). R.V. Hogg, J.W. McKean and A.T. Craig. Pearson/Prentice Hall (2005). ISBN 0-13-008507-3.

Readings:	In order to prepare for class, I will normally ask you to read about the topics to be covered before the lecture. I am not expecting you to learn the material on your own, only to familiarize yourself with the main ideas and vocabulary so that the lectures are easier to follow. Do not get bogged down in formulae or minute details. If you come across something that is confusing or troubling, don't despair. If your questions are not resolved during the lecture, please ask. As you work on the problem sets, it will be helpful to re-read the material on a more detailed level.

Topics

This is a tentative list of topics to be covered.

- Interval Estimation:
    - Methods of finding interval estimators (Pivotal quantities, Pivoting the CDF, General Methods);
    - Equal-tail, shortest-tail and unbiased confidence intervals;
    - Large sample and asymptotic interval estimation;
    - Credibility intervals: Interval estimation from the Bayesian perspective
    - Confidence intervals for the quantiles of the (finite and infinite) population using large and small sample sizes.
- Testing Hypothesis
    - Most powerful tests;
    - Likelihood ratio tests (LRT);
    - Uniformly most powerful tests; Monotone likelihood ratio property.
    - Asymptotic distribution of LRT.
    - Wald test; Score test, Permutation test, and related topics.
    - Multiple testing, Bonferroni correction, False Discovery Rate (FDR), and related topics.
    - Bayesian Tests (if time permits).
- Model selection procedures
- Bootstrap and Resampling methods for interval estimation and testing hypothesis.

Course Technology

Course web-page:	Course materials will be made available through the University of Manitoba's UM Learn system (`umanitoba.ca/d2l`).
Software:	We will also be making use of the software package R in this course. It is freely available for Linux, Macintosh and Windows from *The Comprehensive R Archive Network* at `http://cran.r-project.org/`. Please download and install.
Other Technology:	It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. Students should restrict their use of technology to those approved by the instructor and/or University of Manitoba Accessibility Services for educational purposes only. Electronic messaging, e-mail, social networking, gaming, etc. should be avoided during class time. Cell phones should be off. If a student is on call for emergencies, their cell phone should be on vibrate mode and the student should leave the classroom before using it.

Important Dates

These dates are tentative and subject to change at the discretion of the instructor and/or based on the learning needs of the students but such changes are subject to Section 2.8 of the ROASS Procedure.

Date	Information
January 3	Classes Begin
March 9	**Midterm Test** Rooms MH 315 and 316 (Time: 12:30–3:30)
March 16	Last Day for VW
April 6	**End of Classes**

Course Work, Examinations & Grading

Midterm and Final Exams: There will be one mid-term exam, worth 40% of your final grade. The tentative date is March 9th, 2018 in Rooms 315 and 316 Machray Hall (12:30–3:30). The midterm test and the final examination are closed book. Statistical tables will be provided if required. A non-programmable calculator might be necessary (graphing calculators are not permitted). However, other electronic devices, such as cell phones and MP3, are strictly prohibited.

Note: There will not be any makeup (deferred) mid-term exam for this course. If you miss the mid-term exam, you will be assigned a mark of zero for the test, unless you **have a valid excuse**, and you **notify me within 48 hours of the scheduled exam**. Students who miss the term test with legitimate reasons will have the midterm weight added to the final examination. The Final Exam will be held on a date to be selected later by the Department of Statistics and will be 3 hours in duration.

Assignments: There will be several questions which most of them need to be done with R and you might be asked to answer some theoretical parts associated with each questions. I have dedicated 5% of your final mark to these questions, which will be posted on the UM Learn system and will be marked. The distributed lecture notes have a number of theoretical exercises and questions, which I may add to. You are free (and encouraged) to work in groups on these but you must be able to complete the work individually on tests/examinations. Additional problems may be posted to the UM Learn system (umanitoba.ca/d2l).

Assignments are due at the start of the Lab (time will be announced). Assignments submitted late will be severely penalized. Assignments submitted after the solutions are posted or after the graded assignments are return to students will not be marked and receive a grade of 0. Obviously, exceptions can be made to the above policy if special/exceptional circumstances warrant them (e.g., serious illness).

Students are encouraged to discuss and work together on the solutions to the assignments. However, each student must hand in his or her own copy of each assignment with personalized solutions, including comments, discussions and interpretations. Note that actions will be taken against students who are found guilty of acts of academic dishonesty.

Your assignments should conform to the following standards:

- Assignments are to be done on 8.5×11 paper, writing on one side only and they are to be stapled.

- Write your name at the top of each page.

- Assignments should be accompanied with the R codes and I should be able to get your answer by running your codes. If your R code doe not work you will not get any mark.

- Revise your assignments so they are reasonably free of grammatical and typographical errors.

- Make sure each step in your solutions is well justified: I mark what is written on paper and should not have to guess what you mean.

- Messy or unreadable assignments will be returned with a mark of zero.

Grading Scheme: 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%). There is an additional requirement for obtaining a C or a D in the course: to obtain a grade of C or better, you must obtain at least 50% on the final examination; to obtain a D you must obtain at least 40% on the final examination.

Item	Percent
Mid-term Test	40%
Assignments	5%
Final Exam	55%
Total	100%

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM Learn), or any website, unless an exception to the Copyright Act applies or written permission has been confirmed. For more information, see the Universitys Copyright Office website at `http://umanitoba.ca/copyright/` or contact `um_copyright@umanitoba.ca`.

Recording Class Lectures

Mohammad Jafari Jozani 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 of Mohammad Jafari Jozani. Course materials (both paper and digital) are for the participants private study and research.

Class Communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit: `umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf`

Please note that all communication between myself and you as a student must comply with the electronic communication with student policy (`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.

Academic Integrity

It is important that you understand what constitutes academic dishonesty and that you are familiar with the very serious consequences. Please familiarize yourself with the information contained in *Academic Calendar > General Academic Regulations> SECTION 8: Academic Integrity*. (see `http://umanitoba.ca/calendar`) The Faculty of Science home page at www.umanitoba.ca/science also contains links regarding academic and disciplinary matters.

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. This document will be posted to the Department of Statistics web page and to the UM Learn system.