STAT 2000 Section D01
Basic Statistical Analysis 2
Winter 2020

CRN 50650

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Web Pages UM Learn: `http://umanitoba.ca/umlearn`
Statistics: `http://umanitoba.ca/statistics`

Office Hours: Monday 10:00 a.m. – 11:00 a.m.
Tuesday 1:30 p.m. – 2:30 p.m.
Friday 10:00 a.m. – 11:00 a.m.

You do not need an appointment to talk to to me during my office hours; just stop by my office. If the above times are not convenient for you, please contact me to arrange an alternate time to meet. I will do my best to return all email or telephone messages within 24 hours.

I am also available to meet for office hours through video chat by appointment. You can contact me on Skype (username: doshistats), FaceTime (Apple ID ankit.doshi@umanitoba.ca), or through Cisco Webex (see the instructions in the Course Information folder on UM Learn).

Calendar Description

This course is not recommended for students in certain programs (see the description of STAT 2150). The study of estimation and hypothesis testing procedures for means and proportions in one, two and multiple sample situations, introduction to the analysis of variance; regression and correlation analysis; optional topics may include nonparametric procedures, design of experiments, probability models. Not to be held with STAT 1150, STAT 2001. Prerequisite: STAT 1000 (C), or STAT 1001 (C).

Teaching Philosophy and Goals

It is the desire of the Department of Statistics to present this course in a manner that emphasizes and illustrates the statistical analysis arising from "real-world" applications. Whenever possible, we will attempt to bring real-life examples and data into the classroom. Upon completion of this course students can proceed in many directions: to further intensive study of statistics, to one or more additional courses in statistics, to the use of statistical

methods in other fields of study, or to being a consumer of statistical information in daily life. It is our objective to serve all of these diverse directions.

The course is designed to include basic topics deemed crucial for problem formulation and understanding of the foundations of statistical thinking and reasoning. The concepts of statistical analysis will be stressed. The course will place an emphasis on the development of critical thinking skills.

Software will be used in this course to aid in the analysis of data. The computer program that has been selected for this course, Microsoft Excel, is easy to use and is available free for use with Mac or Windows systems. The program also has many advanced statistical features that you will find useful in subsequent courses.

We are interested in feedback from you. If you can think of ways in which this course could be improved, please let us know.

Evaluation

Assignments	15%
Midterm Test	35%
Final Examination	50%

Marks will be posted on UM Learn (see the web link on Page 1).

Subject to the caveat in the paragraph below, 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 in the course: **to obtain a grade of C or better, you must obtain at least 50% on the final examination**.

Exam Information

For students who live within 2 hours of Winnipeg, the midterm test will be held **Monday, March 9, 2020 from 5:30 p.m. to 7:30 p.m.** All other students will write their midterm online with more information forthcoming. The midterm will cover Units 1, 2, 3 and part of Unit 4 in the course outline and will consist of only multiple-choice questions. Students missing the midterm test for a valid reason (and with documentation) will be permitted to write a deferred midterm test at a later date.

The final exam will be 3 hours in duration and will be scheduled by the Registrar's Office for students who live within 2 hours of Winnipeg. Students who live more than 2 hours from Winnipeg must use the **Final Exam Location Management** widget on UM Learn to request an off-campus exam location by **January 24**. More details about off-campus final exams can be found at `http://intranet.umanitoba.ca/academic_support/catl/`

flexible/exams.html. The final exam will cover Units 1 – 6, with emphasis on the material covered after the midterm. It will contain both multiple-choice questions and a written component, in an approximate 60:40 ratio.

For the midterm test and the final examination: (i) nonprogrammable handheld calculators are permitted (graphing calculators are **not** permitted), (ii) electronic devices, such as cell phones or headphones, are prohibited, (iii) statistical tables will be provided, and (iv) a formula sheet with selected formulas will be provided. The formula sheet you will receive on exams is posted on UM Learn; you are required to memorize any formulas not listed on this formula sheet.

Assignments and Practice Questions

There will be 5 assignments in this course, which students will access via UM Learn. The material covered on each assignment and the due dates are described in the **Course Schedule and Calendar** on the course homepage on UM Learn. Assignments submitted past the due date will not be accepted; however, only your **best four out of five** assignment marks will count toward your final grade (your lowest assignment mark will be dropped).

You may discuss assignment problems with your classmates and me. However, you should think about the problems yourself before discussing them with others. Good marks for assignments that you have not thought through will translate to poor marks on exams.

Numerous practice questions (with solutions) will be posted for each unit. Students are strongly encouraged to try these practice questions on a regular basis.

Software Download

If you already have an older version of Microsoft Excel on your computer, you don't need to download it again.

In order to download Microsoft Excel 2016, you will first have to "claim" this resource from the IST Help & Solutions Centre at https://signum.umanitoba.ca. After about 1 hour, you will have access to the Office 365 resource. To download Excel, log into your university email at http://365.myumanitoba.ca, click on the gear icon  in the top right corner, and then select Office 365. On the webpage that opens in a new tab, click on Software in the Settings group and follow the instructions from there.

The Analysis ToolPak for Excel 2016 is referenced in the Practice Questions for some units of this course. To install this add-in to Excel, please follow the instructions found at the following link: https://support.microsoft.com/en-ca/kb/2431349

Supplementary Resources

The course notes completely cover all topics in this course. Supplementary online resources will be provided throughout the course and posted on UM Learn.

Online resources are provided only as an extra resource. They do not comprehensively cover the material needed for the course and they may cover topics differently than the course notes. **Where there are any discrepancies between the way topics are covered, please refer to the course notes**.

Statistics Help Centre

In room 311 Machray Hall (which contains a number of computers), graduate students and senior undergraduate students in statistics are available to help you at the following times (from January 13 to April 9):

Monday	9:30 a.m. – 3:30 p.m.
Tuesday	9:30 a.m. – 7:00 p.m.
Wednesday	9:30 a.m. – 2:30 p.m.
Thursday	9:30 a.m. – 7:00 p.m.
Friday	9:30 a.m. – 12:00 p.m.

Note: The help centre will be closed on holidays and during the Winter term break (February 18 – 21).

Voluntary Withdrawal

The voluntary withdrawal date is **March 18** (by which time you will have received your marks for the first three assignments and the midterm test).

Academic Integrity

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 integrity and academic dishonesty (including plagiarism, cheating, inappropriate collaboration and examination impersonation, as well as typical penalties) can be found at:

`https://www.sci.umanitoba.ca/undergraduate-students/academic-resources/academic-integrity-2/`

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.

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 UM Learn page.

Course Outline

Unit 1 – Inference for the Mean of a Single Population

- Review of principles of statistical inference: testing and estimation, confidence intervals
- Statistical decisions: Type I and Type II errors and their probabilities, power of a test

- Review of t-distribution (comparison with normal distribution), tests and confidence intervals, robustness of t-procedure

Unit 2 – Inference for the Means of Two Populations

- Matched pairs t procedures
- Inference for the equality of means in two populations when population variances are equal and when population variances are unequal, assumptions of normality and independence

Unit 3 – Inference for the Means of Two or More Populations

- Graphical comparison of distributions
- Inference for the equality of means in two or more populations: introduction to ANOVA
- The F-distribution
- Equivalence of pooled two-sample t-test and F-test

Unit 4 – Probability and Discrete Distributions

- Review of probability concepts and rules
- Conditional probability
- Random variables, probability distributions, mean and variance of a random variable
- Review of binomial distribution

Unit 5 – Analysis of Categorical Data and Goodness-of-Fit Tests

- Inference for a population proportion
- Inference for comparing two population proportions
- Inference for $(r \times c)$ two-way tables: tests of independence and homogeneity of proportions, chi-square test, expected values, degrees of freedom
- Equivalence of Z-test and Chi-square test
- Goodness-of-fit tests
- Binomial goodness-of-fit test

Unit 6 – Regression and Correlation

- Inference in simple linear regression (slope, confidence intervals)
- Analysis of residuals and use of diagnostic tools
- Multiple regression (time permitting)