STAT 2000 Section D01
Basic Statistical Analysis 2
Winter 2017

CRN	50650
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Web Pages	UM Learn: `http://umanitoba.ca/umlearn` Statistics: `http://umanitoba.ca/statistics`
Office Hours:	Monday 5:30 p.m. – 6:30 p.m.: in-person or via Skype (username doshistats) Wednesday 10:30 a.m. – 12:00 p.m. Friday 10:30 a.m. – 12:00 p.m.

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

Calendar Description

(Formerly 005.200) 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 2001. Prerequisite: STAT 1000 (005.100)(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. It should be noted that this is a 2000 level course. As such, a certain level of maturity is expected.

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 **Wednesday March 15, 2017 from 5:30 p.m.–7:30 p.m.** All other students will write their midterm online with more information forthcoming. The material to be covered on the midterm will be announced in class. The final exam will be 3 hours in duration and will be scheduled by the Student Records Office. The final exam will cover Units $1 - 6$, with emphasis on the material covered after the midterm. 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 midterm will consist of only multiple-choice questions. The final examination will contain both multiple-choice questions and a written component, in an approximate 70:30 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, if required, and (iv) a formula sheet with selected formulas will be provided.

Assignments and Practice Questions

There will be 3 assignments in this course, which students will access via UM Learn. The due dates are Wednesday February 8, Wednesday March 8, and Wednesday April 12. Assignments submitted past the due date will not be accepted.

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

The latest version of Microsoft Excel (2016) can be downloaded to your computer by logging into your university email at `http://365.myumanitoba.ca`, clicking on the gear icon ⚙ in the top right corner, and then selecting Office 365. On the webpage that opens in a new tab, click on Software in the Settings group and follow the instructions from there.

Supplementary Resources

The following books are recommended for reading and extra practice. They are available for download free of charge.

- Introductory Statistics, OpenStax College, Rice University (2013)
  `http://www.stats.umanitoba.ca/book/intro-stats/`

- Basic Statistics, Rand R. Wilcox, Oxford University Press (2009)
  `http://www.stats.umanitoba.ca/book/basic-stats/`

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**.

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 23 to April 21):

Monday	9:30 a.m. – 4:30 p.m.
Tuesday	9:30 a.m. – 7:00 p.m.
Wednesday	9:30 a.m. – 7:00 p.m.
Thursday	9:30 a.m. – 4:30 p.m.
Friday	9:30 a.m. – 12:00 p.m.

Note: The lab will be closed on holidays and during the midterm break (February 21 – 24).

Voluntary Withdrawal

The voluntary withdrawal date is **March 31** (by which time you will have received your marks for the first two assignments and the midterm test).

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.

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

Unit 1 – Inference for the Mean of a Single Population when σ is Known; Inference for the Mean of a Single Population when σ is Not Known

- 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 procedures

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 2-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
- Mean and variance of the sum and difference of two independent random variables
- Distribution of the sum and difference of two independent normal random variables
- Review of binomial distribution
- Poisson distribution

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

- Inference for a population proportion
- Power calculations
- 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, prediction intervals
- Analysis of residuals and use of diagnostic tools
- Correlation: inference, correlation vs. regression
- Equivalence of testing for zero correlation and testing for zero slope
- Multiple regression