

STAT 1000 Section A02
Basic Statistical Analysis
Winter 2017

Time TR 10:00 a.m. – 11:15 a.m.
Location 172 Schultz Theatre
CRN 50081

Instructor Jenna G. Tichon
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Web Pages UMLearn: <http://umanitoba.ca/umlearn>
Statistics: <http://umanitoba.ca/statistics>
Gradebook: <http://www.stats.umanitoba.ca/gradebook>
i-Clicker: <http://www.stats.umanitoba.ca/register/iclicker>

Office Hours: Monday 2:30 p.m. – 3:30 p.m.
Tuesday 1:00 p.m. – 2:00 p.m.
Wednesday 10:30 a.m. – 11:30 a.m.
Friday 10:30 a.m. – 11:30 a.m.

(Or by appointment. Please email me to set up an alternate time if necessary.)

Calendar Description

(Formerly 005.100) An introduction to the basic principles of statistics and procedures used for data analysis. Topics to be covered include: gathering data, displaying and summarizing data, examining relationships between variables, sampling distributions, estimation and significance tests, inference for means. Not to be held with STAT 1001, STAT 2220 (005.222). Prerequisite: Any grade 12 or 40S Mathematics, or equivalent.

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 Macintosh 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

i►clicker Questions/Participation	5%
Quizzes	10%
Midterm Test	35%
Final Examination	50%

Marks for i►clicker sessions, quizzes and the midterm test will be posted on the gradebook (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

The midterm test will be held **Saturday March 18, 2017 from 9:30 a.m.– 11:30 a.m.** and will cover Units 1 – 5 in the course outline. 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 – 9, with emphasis on Units 6 – 9. 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 60:40 ratio.

For quizzes, 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 (for the midterm test and final examination only).

i►clickers

Throughout the course, extensive use of the i►clicker classroom response system will be made in order to enhance your understanding of the material and promote classroom participation. Note that i►clicker participation constitutes a portion of your grade in this course and as such you are required to bring your i►clicker to each class and to ensure that it has functional batteries. i-Clickers can be registered at <http://www.stats.umanitoba.ca/register>.

For every i►clicker response you give, you will be awarded 1 point. For questions with a correct answer, an additional point will be awarded for selecting the correct response. Full marks (5/5) will be given if you receive at least 75% of the total possible i►clicker points. Partial marks (3/5) will be given if you receive between 50% and 75%. No marks (0/5) will be given if you receive less than 50%.

The use of another student's i►clicker constitutes impersonation and is strictly forbidden under the University of Manitoba's academic dishonesty policy. (See page 4.)

Quizzes


There will be three short quizzes over the course of the term. The instructor will inform students of the material covered on each quiz at least one week in advance. The quizzes will be given in class on the following dates: Tuesday February 7, Tuesday March 7 and Tuesday, April 4.

Quizzes account for 10% of your final grade. Your percentage grade for quizzes will be calculated using the **best two of three quiz marks**. Quizzes must be written in your own section. They will be graded within one week and marks will be posted on the Gradebook. There will be no make-up quizzes.

Assignments

There will be no formal assignments in this course. However, numerous practice problems (with solutions) will be posted for each unit. Students are strongly encouraged to try these practice problems 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 Winter term break (February 21 – 24).

Classroom Courtesy

Please be respectful of the instructor and your fellow students while attending class. This includes arriving on time, refraining from speaking to your neighbours during class time, and turning all electronic devices to silent. While I will make an effort to arrive to class early and stay around for a few minutes afterwards to answer questions, as I need time to set up/clean up and must make room for the next class, I will not always have time to answer involved questions. If I am unable to answer your question, I will direct you to come and speak with me in my office or to send me an email. I value giving students complete answers and am not dismissing your question if I request you to ask it later.

Course Website

All course material and news announcements will be posted on UMLearn. You will also be able to access the course discussion forums from this website.

Discussion Forum: On the course website you will find a discussion forum section. Each class I will start a thread listing any announcements made, overviewing what was covered in class, and listing suggested readings and practice problems for next class. This is the appropriate location to ask any questions that would be of general interest to the entire class, either about announcements or content from the course.

All discussion will be monitored closely by the Instructor. Please be courteous in posing questions and replying to questions on the board. Your best effort should be made to make clear questions in complete English sentences.

E-mail

To schedule an appointment outside of office hours or to ask a question that would not be suitable for the discussion forums (it involves your personal information or the answer would not be of interest to other students) you may email me at my university email address. Please note that if your question is answered on the course outline (which will be posted on UMLearn) I will simply direct you to find the answer yourself. The subject line of your emails should contain "STAT 1000 A02". All emails should start with an opening salutation, be written in complete English sentences and be signed with your name and student number. Please note that I will not divulge grades over email. All emails received during the work week will be replied to within 24 hours. While I will generally check my work emails over the weekend in case there is an emergency, you can expect a reply to non-urgent matters received over the weekend by Monday at noon.

Office Hours

My office hours are listed at the top of the course outline. You do not need to make an appointment and may just show up to ask any questions that you may have. This is the perfect time to ask questions about course material, your assignment, review your coursework, or receive help with Excel. If you can not make my scheduled office hours, please email me to make an appointment.

Voluntary Withdrawal

The voluntary withdrawal date is **March 31** (by which time you will have received your marks for the first two quizzes, the midterm test and several i►clicker sessions).

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.

Note Sharing

Please note that all course materials are the intellectual property of the instructor and are not to be shared or altered without the explicit permission of the instructor. You do not have permission to upload any course notes, tests, assignments, or handouts to any note sharing websites. Please see the following site for more information: https://umanitoba.ca/student/resource/student_advocacy/media/Message_note_sharing_December_2013.pdf

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

Unit 1 – Examining Distributions

- types of variables: quantitative, categorical, nominal, ordinal
- graphs for categorical variables: bar charts, pie charts
- graphs for quantitative variables: stemplots, histograms
- examining distributions, dealing with outliers
- time plots
- describing distributions with numbers: mean, weighted mean, median, quartiles, percentiles, interquartile range, range, variance and standard deviation
- five-number summary and boxplots
- the $1.5 \times \text{IQR}$ rule for suspected outliers, outlier boxplots
- resistant measures

Unit 2 – Scatterplots, Correlation and Regression

- association, response variable, explanatory variable
- examining scatterplots
- correlation
- least-squares criterion and least squares regression line
- r^2
- residuals, outliers, influential observations
- cautions about correlation and regression
- association vs. causation, lurking variables
- extrapolation

Unit 3 – Sampling Design

- populations and samples
- voluntary response sample
- convenience sample
- simple random sample
- census
- stratified random sample, multistage sample
- undercoverage, nonresponse

Unit 4 – Design of Experiments

- observations vs. experiment
- experimental units
- factors, factor levels, treatments
- placebo effect, control group, bias
- principles of experimental design
- completely randomized design
- randomized block design
- matched pairs design

Unit 5 – Density Curves and Normal Distributions

- continuous random variables, density curves
- normal distributions
- 68–95–99.7 rule
- standardizing observations (z -scores)
- normal distribution calculations
- normal quantile plots

The midterm test covers material in Units 1 – 5.
The test is on **Saturday March 18, 2017**
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Unit 6 – Randomness and Probability

- randomness, the language of probability
- probability models, sample space, events, unions, intersections
- some probability rules, independence, general addition rule
- discrete random variables
- binomial setting and binomial distribution

Unit 7 – Sampling Distributions

- sampling distribution of a sample mean
- bias and variability
- Central Limit Theorem
- sampling distributions for proportions

Unit 8 – Confidence Intervals

- estimating with confidence
- margin of error
- effect of sample size, confidence level, standard deviation
- effect of population size
- assumptions
- choosing the sample size
- one-sample t procedures — confidence intervals
- robustness of the t procedures
- confidence intervals for a population proportion

Unit 9 – Tests of Significance

- tests for a population mean (σ known and σ unknown)
- tests for a population proportion
- hypotheses, test statistic, P -value, statistical significance
- two-sided tests and confidence intervals

Final Examination covers material in Units 1 – 9, with emphasis on Units 6 – 9.
The exam is 3 hours in duration and will be scheduled by the Student Records Office.
