

STAT 1000 Section A01
Basic Statistical Analysis 1
Summer 2020

Time Monday and Wednesday 9:00 a.m. - 10:30 a.m.
Location Cisco Webex
CRN 1209

Instructor Inesh Munaweera
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Web Pages UM Learn: <http://umanitoba.ca/umlearn>
Statistics: <http://umanitoba.ca/statistics>

Office Hours: Tuesday & Friday 10 a.m. – 11:00 a.m.
(Or by appointment.)

Live lectures and office hours will be conducted over Cisco Webex. You do not need a Cisco Webex account; you simply access it from our UM Learn webpage. Live lectures will be recorded, but you are encouraged to attend instead of watching the lecture later. See the Course Information folder on UM Learn for instructions on using Cisco Webex.

You do not need an appointment to talk to me during my office hours; just join the Cisco Webex Office Hours event. 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 within 24 hours.

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 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	25%
Midterm Test	30%
Final Examination	45%

Marks for assignments and the midterm test will be posted on the UMLearn 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 online on **Thursday, July 16, 2020 from 5:30 p.m.– 7:30 p.m.** and will cover Units 1 – 5 in the course outline. The midterm 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 Student Records Office **between August 17 and August 21**. The final exam will cover Units 1 – 11, with emphasis on Units 6 – 11. The final examination will contain both multiple-choice questions and a written component, in an approximate 80:20 ratio.

Due to the COVID-19 situation, the midterm test and the final exam are unproctored, open-book, open-notes exams. **However, you must work on the exams on your own. No form of communication with anyone is permitted.** Students should have a copy of the formula sheet and the statistical tables, writing utensils, some blank scratch paper, and a scientific calculator.

Tutorials

You will attend a tutorial once per week (beginning on June 15). Your T.A. will go through practice questions, which will be posted in advance on UM Learn. It is recommended that you attempt the questions in advance.

Assignments and Practice Questions

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

There will be 6 assignments in this course, which students will access via UM Learn. Assignments submitted past the due date will not be accepted; however, only your **best five out of six** 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, the work you submit must be your own. 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.

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 your initials in the top right corner, select My Account, and then click on Install Office.

Voluntary Withdrawal

The voluntary withdrawal date is **July 27** (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 (including plagiarism, cheating, inappropriate collaboration and examination impersonation, as well as typical penalties) can be found at:

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.

The class recordings provided by the instructor are for your own personal use only. It is not permitted to copy or distribute the recordings.

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.

<https://umanitoba.ca/student/accessibility/about-us.html>

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, histograms, time plots
- examining distributions, dealing with outliers
- 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

The midterm test covers material from Units 1 – 5.
The test is on **Thursday, July 16, 2020 from 5:30 p.m.– 7:30 p.m.**

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 for a Population Mean (σ known)

- estimating with confidence
- margin of error
- effect of sample size, confidence level, standard deviation
- effect of population size
- assumptions
- choosing the sample size

Unit 9 – Tests of Significance

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

Unit 10 – Inference for One Population Mean (σ unknown)

- one-sample t procedures — confidence intervals and tests
- matched pairs t procedures (time permitting)

Unit 11 – Inference for a Population Proportion

- confidence intervals and tests for a population proportion
- choosing the sample size

The final examination covers material from Units 1 – 11, with emphasis on Units 6 – 11.
The exam is 3 hours in duration and will be scheduled by the Student Records Office.
