STAT 1000 Section D01
Basic Statistical Analysis 1
Winter 2019

CRN 51177

Instructor Ankit Doshi
323 Machray Hall
Telephone: 204-474-8205
Email: Ankit.Doshi@umanitoba.ca

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

Office Hours: Monday 10:00 a.m. – 11:00 a.m.
Monday 6:00 p.m. – 7:00 p.m. **(Online only*)**
Tuesday 1:30 p.m. – 2:30 p.m.
Wednesday 10:00 a.m. – 11:00 a.m.
Wednesday 6:00 p.m. – 7:00 p.m. **(Online only*)**

*I will conduct online only office hours from my home on Monday and Wednesday evenings at the times listed above through video chat. You can contact me on Skype or FaceTime. My Skype username is doshistats. My FaceTime Apple ID is ankit.doshi@umanitoba.ca.

You do not need an appointment to talk to to me during my office hours. Just stop by my office or call me on Skype or FaceTime. 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.

Calendar Description

This course is not recommended for students in certain programs (see the description of STAT 1150). 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. May not be held with STAT 1001, STAT 1150, STAT 2220. 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	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 4, 2019 from 5:30 p.m. to 7:30 p.m.** All other students will write their midterm online and should follow the instructions on the course homepage on UM Learn (click on Content in the top left corner and then select Midterm Exam in the Course Information folder). The midterm will cover Units 1 – 5 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. All other students must use the **Final Exam**

Location Management widget on UM Learn to request an off-campus exam location by **January 25**. 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 – 11, with emphasis on Units 6 – 11. 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, if required, 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 6 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 five out of six** assignment marks will count toward your final grade (your lowest assignment mark will be dropped).

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.

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 14 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 19 – 22).

Voluntary Withdrawal

The voluntary withdrawal date is **March 20** (by which time you will have received your marks for the first four 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 UM Learn 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: 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 $1.5 \times$ 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.
For students who live within 2 hours of Winnipeg,
the test is on **Monday, March 4, 2019** from 5:30 p.m. to 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
- 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

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 Registrar's Office.
