STAT 2000 Section A01
Basic Statistical Analysis 2
Fall 2021

Time Monday, Wednesday & Friday 9:30 a.m. – 10:20 a.m.
CRN 10099

Instructor Carrie Madden
Email: Carrie.Madden@umanitoba.ca

Office Hours: Every Sunday, I will send an email with times for the week.

Join Zoom Meeting
In UMlearn – Go to Integrations – UMZoom and the link is there
OR
`https://umanitoba.zoom.us/j/68030852947?pwd=azh4bW11NU80TGVsZVFJS3RvRmR0dz09`

Meeting ID: 680 3085 2947 **Passcode**: 667165

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

When joining Zoom meetings (whether for office hours or your tutorials), please use your real name.

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.

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

Quizzes (best 7 of 9)	55%
Final Examination	45%

All quizzes and the final exam will be done in UM Learn. All marks will be posted in the UM Learn gradebook.

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

There will be no midterm examination in this course. There are a total of nine non-cumulative quizzes (combination of multiple choice and long answer) to be completed in a 50-minute time period. We will take your best 7 of 9 quizzes to count towards your final grade. Any missed quizzes will result in a grade of 0 on that quiz, no documentation is required. The final examination (cumulative) will contain both multiple-choice questions and a written component, in an approximate 75:25 ratio.

Quizzes and exams in this course require the use of LockDown Browser and a webcam (using a program called Respondus Monitor). The webcam can be built into your computer or can be the type that plugs in with a USB cable. More detail about the use of LockDown Browser and Respondus Monitor will be given by your instructor.

Quizzes and exams in this course are **closed book**. You cannot use the course notes or access any websites, books or any other resources while writing. However, for quizzes, you

will be permitted to prepare one page of notes (writing only on one side of the page) that can be used during the quiz. You can write notes, formulas, or anything else you want on this page. For the final exam, you will be permitted to prepare two pages of notes (writing only on one side of each page). The notes you write must be prepared by you, you are not permitted to use notes written for you by another student or anyone else. For quizzes, and final exam you are also permitted to use a non-programmable scientific calculator, and any statistical tables provided by your instructor. If you are ever unsure of what is permitted please ask your instructor.

During quizzes and exams, you are **not** permitted to:

- access the internet (other than UM Learn, where you will write the quizzes and exams),
- communicate with any classmates, tutoring websites or any other person,
- use notes prepared by anyone else (other than your instructor).

Academic Dishonesty

It is important that you understand what constitutes academic dishonesty and that you are familiar with the very serious consequences. The following link describes various types of academic dishonesty (including plagiarism, cheating, inappropriate collaboration and examination impersonation), and offers several resources to help students understand and avoid academic dishonesty:

`http://umanitoba.ca/student-supports/academic-supports/academic-integrity`

The Student Discipline Bylaw, which describes the potential consequences of academic dishonesty, can be found at the following link:

`http://umanitoba.ca/admin/governance/media/Student_Discipline_Bylaw_-_2018-09-01.pdf`

An academic integrity and student conduct can be found at the following link. For this course, it is recommended in particular that you view the parts on Tests & Exams and Inappropriate Collaboration.

`http://umanitoba.ca/student/resource/accessibility/files/AI-Student-Conduct-Tutorial/story_html5.html`

All students are required to complete a short Academic Integrity quiz in UM Learn. If you receive a score of 100% on this quiz, you will receive a 1% bonus towards your final grade in the class. The quiz must be completed by **Friday, September 24 at 11:59 p.m.**.

For any student that creates a Telegram chat group (or any other chat group), we ask that you disable the room during quiz and exam times. We also ask that any student joining a chat group uses their real name.

Tutorials

Your tutorial will be held on Zoom twice a week beginning September 20. Your T.A. will go through practice questions, which will be posted in advance on UM Learn in your course schedule. It is recommended that you attempt the questions in advance.

Quizzes

There will be nine quizzes throughout the term, which will be written during the scheduled class time. All quizzes will be written during class time (50 minutes in duration). An email will be sent out prior to each quiz with information on that quiz. The material covered on each quiz is already in your course schedule. The best seven quizzes are worth 55% of your final grade (equal weight). There will be no make-up quizzes. If you miss any quizzes you will be awarded a grade of 0.

Technology Requirements

You will require the following minimum technological requirements for this course:

- A computing device where one can create and edit documents
- An internet connection capable of streaming videos and downloading software
- Access to a webcam and microphone

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

If you already have a version of Microsoft Excel on your computer, you don't need to download it again.
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, then select Office apps in the left panel, and then click on Install Office. The analysis ToolPak for Excel is referred to in the some practice questions for some units of the course. To install this add-on to Excel please follow the instructions found at the following link: `https://support.microsoft.com/en~ca/kb/2431349`

Voluntary Withdrawal

The voluntary withdrawal date is **November 23**

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.

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-supports/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 when σ is Known or the Sample Size is Large; 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-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
- 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)
- Analysis of residuals and use of diagnostic tools
- Multiple regression (time permitting)