STAT 2300 Section A01
Summer 2022

Time	10:45-12:00 MTWR
Location	207 Buller
CRN	2497

Instructor	Jenna G. Tichon 321 Machray Hall Telephone: 204-474-8417 Email: jenna.tichon@umanitoba.ca

Office Hours:	Tuesday: 9:00 - 10:00 a.m. Thursday: 1:00 - 2:00 p.m.
Web Pages	UMLearn: `http://umanitoba.ca/umlearn` Statistics: `https://www.sci.umanitoba.ca/statistics/`

If the above times are not convenient for you, please email to arrange an alternate time to meet. I will do my best to return all email messages within 24 hours. Office hours are subject to change should we return to in-person.

Calendar Description

Introduction to the basic principles and foundational aspects of data collection with a focus on the design and basic analysis of observational and experimental studies. Important issues like randomization, blocking and confounding, sampling, stratification, response bias and nonresponse will be covered. May not be held with the former STAT 3480.

Prerequisite: one of STAT 1150, STAT 2000 (B), or STAT 2001 (B)

Course Goals

By the end of the course students should be able to:

- create clear and useful surveys.
- select and implement an appropriate sampling method for survey studies.
- recognize and identify strategies to eliminate and/or minimize nonresponse, undercoverage, and non-sampling error.
- create a well designed experiment and collect data using appropriate randomization techniques.
- analyze experimental data for basic designs by hand and using R.
- recognize the limitations of how broadly results can be generalized based on whether they have taken observational studies or experiments.

STAT 2300 is designed to have students thinking early on in their degree about the principles behind good data collection and how we select samples and create well designed experiments. The course is for both Statistics majors as well as students seeking a minor in statistics or any student that requires data collection in their degree program. While we discuss how to analyze data for each sampling and design method discussed, the emphasis is on how a practitioner would handle the data and not on mathematical derivations. The course has an added focus on the clear communication of statistical ideas and outcomes as its recognizes that statisticians work with people, from many disciplines, when they consult in survey and experimental design.

Textbook, Readings, and Course Materials

Required Textbook: *Elementary Survey Sampling* by Schaeffer et al ISBN-13: 9780840053619

The textbook is available as an e-text at `https://www.nelsonbrain.com/shop/ProductDisplay?langId=-1&storeId=10651&catalogId=10052&productId=546013`.

Supplementary Readings: Occasionally I will assign supplementary readings in the form of short articles or website URLs to complement the lecture materials. These will be made available through the course website on UMLearn under the course content for the appropriate unit or on the class discussion forum.

Required Materials: All students will be required to have a scientific calculator.

Using Copyrighted Material

Please be mindful and respect copyright throughout this course. All course notes, assignments, tests, exams, practice exams, and solutions are either my own intellectual property or that of the Department of Statistics. If I use any copyrighted material in my lectures I will properly source and follow copyright guidelines and I expect you to do the same. The copyrighted works are made available for your personal use and study and must not be distributed in any format without express permission.

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/admin/vp_admin/ofp/copyright/media/Note_sharing_Web_sites.pdf`

Recordings of the lectures are available for your own personal use only. You may not upload or edit any of the videos or materials I produce.

Course Technology

Use of Technology in the Classroom: Please ensure that any technology used in the class is used in a responsible manner that is mindful of the students around you. You may have cell phones on your person as long as they are kept on silent and are not brought above table height. You may use laptops or tablets in class to help with note taking or follow along with any computer demonstrations but please keep only academic matters up on your screen and refrain from distracting the students around you

R Studio: In this class we will be making some use of the statistical software R. You can download R from `http://cran.utstat.utoronto.ca/` and the R Studio program from `https://www.rstudio.com/products/rstudio/download/`. No previous programming experience is required and the required use of R by students will be minimal but I will may make more use of it for demonstrations during lectures or to suggest enrichment practice problems of students that I will not test. Testable material in R will be made very clear.

UMLearn: All course material will be posted on UMLearn minus in class participation activities. All important dates can be found on the calendar and I will make class announcements through the news feed on the course website. All grades will be posted in the UMLearn Gradebook

In addition, there will also be discussion forums available. For each class I will open up a discussion forum where I will post the material covered that class, any announcements, and suggestions for preparation for the next class. Please be in the habit of checking it after every class. If you have questions about anything during the lecture or any announcements, you can ask directly on the forum for the relevant class. There will also be a discussion forums opened up for general class/technology questions, for questions on assignments/projects, and a student forum.

All discussion will be monitored closely by me. 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.

Access to the class recordings and the live lectures will be available through UMLearn under Echo360 in the content browser.

Crowdmark: The midterm and final exam will be conducted via Crowdmark. All these exams will be written by you on paper and then l will scan them for online marking. Upon completion of the marking for the midterms, an electronically marked copy of your exam will be emailed to your UManitoba e-mail address. I will send out an email when the marked copies have been sent. Please check your spam folders if you do not see it in your inbox.

Notice Regarding Collection, Use, and Disclosure of Personal Information by the University: Your personal information is being collected under the authority of the *University of Manitoba Act*. It will be used for the purposes of grading papers and providing feedback to students. Personal information will not be used or disclosed for other purposes, unless permitted by *The Freedom of Information and Protection of Privacy Act* (FIPPA). The University of Manitoba has taken steps to ensure that its agreement with Crowdmark, Inc. for services provided by the Crowdmark application in compliance with FIPPA. Please be aware that information held by Crowdmark Inc. may be transmitted to and stored on servers outside of the University of Manitoba, or Canada. The University of Manitoba cannot and does not guarantee protection against the possible disclosure of your data including, without limitation, against possible secret disclosres of data to a foreign authority in accordance with the laws of another jurisdiction. If you have any questions about the collection of personal information, contact the Access and Privacy Office (tel. 204-474-9462), The University of Manitoba, 233 Elizabeth Dafoe Library, Winnipeg, Manitoba, Canada, R3T 2N2.

Expectations: I Expect You To

In my class I expect you to:

- Attend lectures as much as possible. If you are ill, you should stay home and watch recordings but every effort should be made to attend live when you are not ill.
- Participate in small group activities when asked.
- Use technology respectfully as outlined in the syllabus.
- Come prepared the class with paper, writing utensils, a scientific calculator, and any needed statistical tables.
- Arrive to your exams with writing utensils, and a scientific calculator.
- Do your utmost to arrive on time and be as quiet as possible should you unavoidably need to arrive late or leave early.

- Not talk to your neighbours while I am lecturing.
- Ask questions during my lecture as needed and interrupt me if I write something incorrect on the overhead.
- Be mindful of my time outside of class and allow me sufficient time to answer emails or look in to your concerns.
- Follow all policies in the syllabus and consult it as needed.
- Come to me with any constructive feedback that would improve the running of the course.

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://www.umanitoba.ca/student/resource/student_advocacy/academicintegrity/students/a-to-i-what-is-academic-integrity.html#cheating-on-exams`

`http://www.umanitoba.ca/student/resource/student_advocacy/academicintegrity/students/student-academic-misconduct-faq.html`

`https://www.sci.umanitoba.ca/students/undergraduate-students/academic-resources/academic-integrity-2/`

I expect students to hold themselves to the highest standards of academic integrity. Impersonation, cheating for hire websites, and using unauthorized materials are very serious offences. I expect you to be honest, conduct yourself with integrity, actively encourage your peers to conduct themselves with integrity, and uphold the value of what a degree from the University of Manitoba means. When you are in doubt, always consult with your instructor. My door is always open for discussions on the boundaries of what is and what is not allowed. Asking is a sign of integrity, not a signal that you might think of cheating. Always bear in mind that what is considered a violation of academic integrity can vary from course to course (even with the same instructor) so it is always important to ask and clarify. Ignorance is not an acceptable excuse for academic misconduct.

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.

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 personal matters or your private information) 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 as I cannot handle the large volume of emails and still productively manage my courses when answering those kinds of emails. The subject line of your emails should contain "STAT 2300". 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. These hours are there for you and you are not imposing by coming from help. It would make me the happiest if all of my office hours were full of students. This is a great opportunity to get feedback on your projects, to ask questions about the lecture, bring practice questions you are stuck on, or to ask for R help. If you can not make my scheduled office hours, please email me to make an appointment.

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/` 520 University Centre
204-474-7423
Student_accessibility@umanitoba.ca

Expectations: You Can Expect Me To

As your instructor you can expect me to:

- Treat you with respect inside and outside of the classroom.
- Come to class 5-10 minutes to get setup and make sure the class is ready to go.
- Come prepared to my lectures.
- Be available during my office hours and make my best attempt to provide sufficient notice if an office hour needs to be moved or canceled.
- Answer your questions thoughtfully and follow up if needed.
- Listen to your feedback/concerns and do my best to take reasonable requests in to account.
- Monitor my markers and ensure assessments are retuned in a reasonable time period.
- Set assessments that are reasonable and contain questions that match the learning objectives for the course.
- Be passionate about my subject and what I teach.
- Be flexible in the face of any technological or other sundry issues that may arise.

Course Schedule and Evaluation

Please see the additional document with the class schedule for the list of classes and all due dates and important dates.
Please note that dates for live content coverage in these schedules are approximate and subject to change. Should we find ourselves behind, I may assign some questions as videos to watch at home. Should we find ourselves substantially ahead, I may add in bonus lecture content.

Grading: The following will be the breakdown of your class mark:

Participation	5%
Paper	12.5%
Project 1	12.5%
Project 2	10%
Midterms 1	20%
Final Exam	40%

Marks will be posted on the gradebook in UMLearn.

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%).

Midterm Info: There is one midterm in the course which will be written during the class period on Monday, May 30th. Assuming there is booking availability, the midterm will likely be occurring in a computer lab so that you may have access to R. It will be written on paper in pen/pencil which I will scan for marking through Crowdmark. The tentative coverage is units 1-5 which may have a slight modification depending on timing. Should you be unable to write due to sickness or another approved absence, you are to complete a missed work self declaration form (which I will link on the pre-midterm instructions) and send it to me within 24 hours of the test. There will be a makeup, in-person midterm during business hours at a time that is mutually agreed upon by myself and anyone requiring a deferred. You may bring one double-sided sheet of 8.5x11 paper with you to the exam. If you submit the formula sheet with your exam the paper and it contains what I deem to be a good faith effort to have most of the formulas, I will give you a 5% bonus on the midterm.

Reflections/Participation: During each lecture there will be a participation activity which will often be a short self reflective question but could also be a small group activity connected to the lecture. Often these can be done in small groups, I will let you know when they cannot be. You can either provide your own paper or take a slip from the pile I will have at the front of the room. At the end of the class you are to turn it in with your name and student ID number. For the first class, the Getting to Know You Survey will count as your participation grade. The second through fourth classes will be for practice while we wait to pass the add/drop date. After that they will begin to count, usually, being worth 2 marks.

The final grade will be calculated as (Your score)/(Total available marks - 8). (Note that your Getting To Know You Survey will be converted to a mark out of 2 in the gradebook) This will be sufficient to allow you to miss up to a week for illness or other reasons without affecting your grade.

Project Info: For each half of the course (sampling and design) there is a small project component. Both projects are scaffolded over two weeks where each part should be uploaded in a UMLearn assignment dropbox. All files must be submitted as word documents or PDFs. You must complete the previous part before the dropbox will appear to submit the next part. Late submissions of intermediary work will not be counted for marks but they still must be submitted in order to submit and receive marks for the later submissions. There is some flexibility on the submission date of the final project submissions if students request an extension via email prior to the deadline but note that will not change any of the other due dates. Full instructions will be provided on UMLearn and in class. These projects are individual but, as the projects will be unique, you may ask your peers for feedback or editing suggestions. The marking will be done using a rubric which will be available to students prior to starting the projects. These projects must be written in your own words. If you reference or quote a source, it is important that you cite your source in your project. All images that are not your own that you include in your projects must be cited as well.

Papers Info: There will be a 1.5-2-page paper due for the course which can be done optionally on a sampling or on a design topic. You will select a topic based on a list of interesting historical or current issues in sampling and design respectively. The paper scaffolded over two weeks though it will be available for over three weeks should you want to work on it early. All files must be submitted as word documents or PDFs. Late submissions of intermediary work will not be counted for marks but they still must be submitted in order to submit and receive marks for the later submissions. There is some flexibility on the due date of the final submission if students request an extension by email prior to the deadline but note that will not change any of the other due dates. Full instructions will be provided on UMLearn and in class. The paper must have a minimum of two sources from newspaper or academic journal articles with citations done in APA formatting. There will zero tolerance for plagiarism from your sources and you are highly encouraged to ask your instructor or a U of M academic writing tutor if you are unsure if you have correctly cited or properly paraphrased without plagiarizing. You may ask a peer for feedback on your paper but you must state who you showed your paper to in the comment box on your UMLearn submission page. The marking will be done using a rubric which will be available to students prior to starting the paper.

Final Exam Info: There is a three-hour cumulative final exam that will be scheduled by the registrar's office. As of setting this outline, that date it not yet available. I will also attempt to have this booked into a computer lab but I do not know if that will be possible. You will be allowed to bring in two double-sided sheets of paper to the exam containing any information you like.

Voluntary Withdrawal

The voluntary withdrawal date is **June 7** (by which time you will have received your marks for your midterm, your first project, and the intermediate submissions for the essay).

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 Topics

Unit 1 – Introduction

- What is statistics?
- Populations vs Samples
- Sampling distributions

Unit 2 – Survey Design and Construction

- Question design
- Sampling frames
- Non-response, response bias, non-sampling error

Unit 3 – Simple Random Samples

- definition
- selection
- estimation and inference
- sample size determination

Unit 4 – Stratified Sampling

- definition
- selection
- optimal allocation and construction
- estimation and inference

Unit 5 – Other Sampling Schemes

- multistage sampling
- cluster sampling
- systematic sampling
- convenience/voluntary sampling
- census

Unit 6 – Ratio, Difference, and Regression Estimators

- ratio estimators and sample size
- regression and difference estimators
- relative efficiency

Unit 7 – Optional Topics in Sampling

- sampling hard-to-reach populations
- capture-recapture

Unit 8 – Introduction to Experimental Design

- terminology
- well designed experiments
- observational studies vs experiments

Unit 9 – Complete Randomized Designs

- approaches to randomization
- matched pairs
- two-sample independent tests
- one-way ANOVA

Unit 10 – Randomized Block Designs & Two-Way ANOVA

- types of blocking
- designing experiments and randomization with blocking
- two-way ANOVA

Unit 11 – Optional Topics in Design

- ethics in experiments
- limitations of studies and conclusions
- designed experiments