STAT 4000 Section A01
Winter 2022

Time	MWF 10:30 -11:30 a.m.
Location	Zoom
CRN	60914
Instructor	Jenna G. Tichon 321 Machray Hall Email: jenna.tichon@umanitoba.ca
Office Hours:	T: 4:00 - 5:00 p.m. R: 9:00 -10:00 a.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. Note that my office hours are subject to change should we return in person.

Calendar Description

Generalizations of linear models, including polynomial regression, analysis of covariance, logistic regression, and regression for count data. Other optional topics include: random effects and mixed models, models for dependent data, advanced concepts in designing experiments.

This course may not be used in the Honours or Major degree programs in Statistics. May not be held with STAT 3550.
Prerequisite: one of STAT 3000, STAT 3450, the former STAT 3470, or the former STAT 3120.

Course Goals

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

- create organized and clear reports in R Markdown.
- approach research with a recognition to issues of accessibility.
- apply advanced modelling techniques to data using R.
- identify when the modelling techniques discussed in class are appropriate and test model assumptions.
- clearly interpret results to statistical tests and explain the implications to non-statisticians.

STAT 4000 is designed as a follow-up course to STAT 3000 for non-majors or students from graduate programs requiring an advanced statistics class without mathematical prerequisites. The focus of the class is applied modelling and data analysis using R and R Markdown to visualize data, test model assumptions, run analysis, and present findings. The topics will build on the foundation of ANOVA and regression to explore more sophisticated modelling techniques.

This course is intended to foster a mindset of creating good habits in research skills. The statistical topics will be complemented with discussions on finding literature, creating reports, developing a professional network, managing files/data, and working in a collaborative environment.

Textbook, Readings, and Course Materials

Required Textbook: *STAT 2 Modeling with regression and ANOVA, Second Edition* by W.H. Freeman.

The textbook is available as an e-text from the publisher's website.

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 and access to a computer with R and R Studio installed.

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

Respectful Behaviour in an Online Classroom: It is expected that students will conduct themselves respectfully and professionally in the classroom. We are all in class to learn and that is only done by helping one another, participating fully, and doing our best to support each other's learning. Please do your best to frame comments constructively, interact positively with your class mates, and be mindful and respectful of everyone's time.

R Studio: In this class we will be making extensive 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/`. It is expected that you are familiar with R and R Markdown prior to starting this class. There will be some review material available but please contact the instructor if you require further references to get caught up with the class if you have not used R sufficiently before.

UMLearn: All course material will be posted on UMLearn. 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. Your first project has a peer feedback component which will be conducted through the discussion 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.

Crowdmark: Should we return to in-person instruction, the midterms will be marked using the Crowdmark software, an online grading tool. All exams will be written by you on paper

in class and then they will be scanned and marked online by the instructor. There will be special instructions for writing an in person Crowdmark exam given prior to and during the midterm. 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 and participate in class discussions and activities.
- Make use of the chat function over UMZoom to ask questions of myself and provide answers to class discussions.
- Behave professionally and respectfully in and outside of the classroom.
- Have a writing utensil and scientific calculator available at the midterms.
- Ask questions during my lecture as needed and answer questions asked of you.
- Be mindful of my time outside of class and allow me sufficient time to answer emails or look in to your concerns.
- Make use of the discussion forums as much as you are able for your course questions.
- 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/

As this is a university course, 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. Statisticians are scientists and working professionals that can cause catastrophic real world consequences by not acting with integrity and being ethical in the handling of their research and data. 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.

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.

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 4000". 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. While remote, these will be conducted over Zoom. Should we return to in-person, my office hours will be a hybrid of both in-person and via Zoom. If you can not make my scheduled office hours, please email me to make an appointment. Office hours are a great time to get help on your assignments and bring your R documents for help solving errors in your code.

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.
- Be in class or start the video 5-10 minutes prior to the start of class and remain for a few minutes afterwards to answer questions after the lecture.
- 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 issues that may arise as we navigate remote learning together.

Course Delivery

This course will be live lectured during the scheduled class times. If we are remote, this will be done via Zoom. If we are in-person, I will be lecturing in the classroom.

Course Schedule and Evaluation

You can find the course schedule in a separate document that has approximate class coverage and dates for all assessments.
Please note that dates for class content coverage in these schedules are approximate and subject to minor changes.

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

Journal/Participation	10%
R Markdown	20% (5% each with lowest dropped)
Midterms	60% (20% each)
Take Home Assessment	10%

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: The midterms will occur in class on Monday, February 28th, Friday March 25th, and Wednesday, April 20th.. To complete them you will require a writing utensil and a scientific calculator. The midterms will not require you to write R code but will require you to interpret code and output that are provided for you. There will also be non-computational questions that will require to explain concepts, give examples, identify strengths/weaknesses of approaches, compare and contrast methods, etc... Should you miss a midterm for a valid reason, there will be a deferred test given during a time mutually agreed upon by the instructor and any students requiring a deferred midterm. Should we remain remote, the midterms will be written either via UMLearn or Crowdmark depending on the nature of the midterm. More information will be given at the time if this is relevant.

Journals/Participation: Each student is required to keep a class journal in R Markdown. This journal will contain reflective questions on class content, entries for your personal learning network (PLN), and various other short activities done during class. Each Sunday I will announce what the entries will be for the week. Generally, entries will be worth 1 mark each with marks given on a pass/fail basis for making a genuine effort to complete the activity. Activities that are worth more or marked differently will be made clear at the time and will generally be related to the Research Topics classes. The grade for this part of the course will be assigned as 0/10 for less than 25% of the marks, 3/10 for 25%-40%, 5/10 for 40%-60%, 7/10 for 60%-80%, and 10/10 for 80%+. Entries that are prompt questions based on classes will also appear in the class discussion post. Students that miss an in-class activity can see the discussion post for an alternative at-home exercise. The journal will be made in an R Markdown document. Each Monday, the entries for the previous week should be knit to PDF and submitted to a drop box in UMLearn by 6:00 pm.

R Markdown: For each of unit 1 to 5 there is a guided R Markdown document that needs to be completed to practice and assess analyzing real data sets. They can be viewed as short assignments. They are to be handed in by uploading the completed PDF document into Crowdmark. You do not need to provide your .rmd document but it should be available upon request by the instructor.

Take Home Assessment: In lieu of a final exam, there will be an extended take home assessment. It will be available on the last day of class and due at the end of the class' exam period as scheduled by the registrar's office. This will be a non-computational assessment where you will be asked skill based and reflective questions about the research skills you have acquired throughout the course and your growth as a researcher.

Voluntary Withdrawal

The voluntary withdrawal date is **Friday, April 9th** (by which time you will have received your marks for 2 midterms and 4 R assignments).

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 – R, Markdown, Research Skills

Unit 2 – ANCOVA

Unit 3 – Logistic Regression

Unit 4 – Multiple Logistic Regression

Unit 5 – Poisson Regression

Unit 6 – Time Series
