STAT 1150 Section A01
Fall 2019

Time	10:30-11:45 am
Location	207 Buller
CRN	16016
Instructor	Jenna G. Tichon
	321 Machray Hall
	Telephone: 204-474-8417
	Email: jenna.tichon@umanitoba.ca
Office Hours:	Tuesday & Friday: 10:00-11:00 a.m.
	Wednesday: 1:30-2:30 p.m.
Web Pages	UMLearn: `http://umanitoba.ca/umlearn`
	Statistics: `http://umanitoba.ca/statistics`
	R Studio Cloud login: `https://rstudio.cloud`
	iClicker Registration: `https://app.reef-education.com/`
	MyStatLab: `http://www.pearsonmylabandmastering.com`

If the above times are not convenient for you, please call, email or speak to 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

(Lab required) This course is recommended for students in mathematically rich disciplines, including Statistics, Mathematics, Actuarial Science, Computer Science, and related interdisciplinary programs. Topics to be covered include: summarizing and displaying large datasets, sampling, estimation and significance tests, probability calculations, random variables and probability distributions, introduction to regression and correlation analysis, statistical software.

Not to be held with STAT 1000, STAT 1001, STAT 2000, STAT 2001 and STAT 2220.

Prerequisite: Minimum of 70% in Pre-calculus Mathematics 40S or a grade of B or better in Mathematical Skills (MSKL 100) offered by Extended Education or equivalent.

Course Goals

By the end of the course we would like students to:

- Be able to make appropriate choices for numerical and graphical summaries for a wide variety of data sets.

- Formulate statistical hypotheses and perform the appropriate tests for common one-sample and two-sample data problems.

- Identify statistical questions in real world examples and think critically about data sources and assumptions made in studies.

- Be able to effectively communicate basic statistical ideas and concepts to non-statisticians.

- Use R to create graphical and numerical summaries as well as carry out all learned statistical tests.

STAT 1150 is designed to help prepare students for further study in statistics by giving a broad summary of important ideas in probability and inference. There is an emphasis on understanding the underlying principles behind the methods used so that the students can make judicious choices in their further studies what method should be applied. This course will introduce students to the use of statistical computing software to not only apply methods but explore the mechanics through simulations.

Textbook, Readings, and Course Materials

Required Textbook: *Statistics: 13th Edition* by James T. McClave and Terry T Sincich ISBN-13: 9780134080215

The textbook is available as an e-text through the purchase of MyStatPortal which is required for the course. Paper copies of the textbook are available through the bookstore if students would like a hard copy as well. An access code to the textbook and MyStatPortal is available for purchase through the University of Manitoba Bookstore.

Supplementary Readings: Occasionally I will assign supplementary readings in the form of short articles or website URLs to complement the lectures. 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 purchase and bring with them to class a scientific non-programmable calculator. It will also be required for all quizzes, the midterm, and the final exam.

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/student/resource/student_advocacy/media/Message_note_sharing_December_2013.pdf`

No video or audio recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without my permission.

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 use of the statistical software R. While you may download R from `http://cran.utstat.utoronto.ca/` and the R Studio program from `https://www.rstudio.com/products/rstudio/download/`, in this class we will be making use of R Studio Cloud through a web browser. It is required that you can access the course and files through R Studio Cloud to work on course work and submit assignments. The second week of term in the lab we will get everyone set up with R Studio Cloud. It is very important that you attend this lab.

Throughout the course I will demonstrate how to carry out many of the calculations using R and the labs will make extensive use of R for doing demonstrations and simulations.

UMLearn: All course material will be posted on UMLearn in the Contents section. 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 forum opened up for each lab section where you can ask questions of your T.A. or your fellow lab

mates.

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.

i▶clicker : Throughout the course, I will be making extensive use of the i▶clicker classroom response system in order to enhance your understanding of the material and promote classroom participation. Note that i▶clicker participation constitutes a portion of your grade in this course. You are required to bring your i▶clicker or an internet enabled device that runs a web browser or the REEF app to each class. If you are using a physical clicker, it is your responsibility to ensure that it has functional batteries. You may either use a remote purchaseable at the bookstore, a remote loanable from UMSU's Answer's booth for a deposit, or you may use a laptop, iPhone/iPad (iOS 10+), or Android (OS 5.0+) device. You will need to make a free REEF account either through their app or at the website, `https://app.reef-education.com/`. Once registered you will need to add my class in your app or web profile. It is **very** important that you register using your U of M email and use your 7-digit student ID. If you are using a physical iClicker remote, you will have to add your clicker ID number (found on the back by the barcode) to your profile page in REEF. Before your first class using iClickers, you must go to UMLearn and, in the iClicker Link section of the content browser, clicker "iClicker Reef Course Registration Page", and sign in to your REEF account to link your account to the UMLearn Gradebook.

The use of another student's i▶clicker constitutes impersonation and is strictly forbidden under the University of Manitoba's academic dishonesty policy. (See page 4.)
Echo360: This class is using the Echo360 software and all lectures will be video captured and available for viewing online. The video will capture from about the first row of seats forward. Should you have privacy concerns, please contact the Privacy Office as given in the section on Crowdmark. The videos will be available via a link to the Echo360 portal in Crowdmark. If you are using a smart device to follow the slides, you can view the slides via the portal to mark questions for further study as you go along. When you review the videos and slides after class, you will have the ability to ask questions that are marked to specific times in the video or slides. We will discuss further functionality in class. The videos will not be used for any other purposes than your studying.

Crowdmark: All quizzes, the midterm, and the final exam will be marked using the Crowdmark software, an online grading tool. All exams will be written on provided paper and then scanned for grading. Additional instructions will be given prior to the first assessment to ensure the examinations can be scanned correctly. Upon completion of the quizzes and the midterm 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.

MyStatLab: This class will make use of the learning management system, MyStatLab.

To access MyStatLab you will need to buy an access code from the University of Manitoba bookstore. You should then go to `http://www.pearsonmylabandmastering.com` and under **Register** select **Student**. When prompted to enter your instructor's course ID, type **tichon56597** and click **Continue**. You will then need to create a Pearson account if you do not have one from another class. Use the access code purchased from the bookstore to complete the registration. From the **You're Done!** page, select **Go To My Courses** and select my class. If you are unsure if you will remain in the course, you can use a free temporary access code for the first few weeks. You can also find these instructions posted on UMLearn.

To login in the future, go to `http://www.pearsonmylabandmastering.com` or use the link in UMLearn in the Content Browser.

In MyStatLab you will have access to the class textbook, the online assignments which are worth 10% of your final grade, and other videos and supplementary instructional material.

Expectations: I Expect You To

In my class I expect you to:

- Attend lectures and listen attentively.

- 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, your i-clicker, and any needed statistical tables.

- Arrive to your exams with writing utensils, a scientific calculator, and a ruler if appropriate.

- 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 respectful of your lab T.A.s and extend to them all courtesies you would extend to me.

- 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

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

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 your personal information or the answer

would not be of interest to other students) 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. The subject line of your emails should contain "STAT 1150 A01". 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. This is the perfect time to ask questions about course material, your assignment, review your coursework, or receive help with R. 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.

- Arrive early to class and remain for a few minutes afterwards to answer questions.

- Come prepared to my lectures.

- Be available during my office 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 the lab demonstrators and ensure quizzes 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.

Course Schedule and Evaluation

Week	Content	Special Notes	Evaluation		
			Type of Assessment	Date	Value of Final Grade
Week 1 Sept 2 - 6	Welcome	First day, Sept 5 No lab			
Week 2 Sept 9 - 13	Unit 1	First Lab			
Week 3 Sept 16 - 20	Unit 1 & 2	End of revision period, Sept 18			
Week 4 Sept 23 - Sept 27	Unit 2		Quiz 1	In Lab	3.33%*
Week 5 Sept 30 - Oct 4	Unit 2 & 3		R Assg't 1 11:59 p.m.	Oct 4	2.5%**
Week 6 Oct 7 - Oct 11	Unit 3 & 4		Quiz 2	In Lab	3.33%*
Week 7 Oct 14 - 18	Unit 4 &5				
Week 8 Oct 21 - 25	Unit 5	No Lab	Midterm 1	In Class Oct 22	20%
Week 9 Oct 28 - Nov 1	Unit 5 & 6				
Week 10 Nov 4 - Nov 8	Unit 6				
Week 11 Nov 11 - 15	No Class	Fall Break			
Week 12 Nov 18 - 22	Unit 7	VW Deadline Nov 18	Quiz 3	In Lab	3.33%*
Week 13 Nov 25 - 29	Unit 7				
Week 14 Dec 2 - 6	Unit 8	Last Class Dec 5	Quiz 4 R Assg't 2	In Lab Dec 6 11:59pm	3.33%* 2.5%**
			Assg'ts 1-3 MyStatLab	Dec 8 11:59 p.m.	2.5%** each
			Final Exam	TBA	50%

* Best 3 out of 4 quizzes will be counted.

** Best 4 out of 5 assignments will be counted.

Please note that all dates for content coverage in these schedules are approximate and subject to minor changes.

Lab Expectations: This course comes with a mandatory lab component. The lab will be run by graduate students from the Department of Statistics with previous lab demonstrating experience.

Six labs will contain activities and additional instruction. The material covered is testable and is not necessarily also covered during the lecture section so it is important that you attend. These labs will have a large group work component and require participation in group discussions. I expect that you will treat your classmates and lab demonstrators respectfully and that you will contribute meaningfully and enthusiastically to the discussions. Several of these labs will have a short pre-lab activity that I expect for you to complete prior to the start of the lab. Please bring with you writing materials, any preparatory work, and a calculator. You may wish to bring with you a computer to follow along with the R code.

Four labs will be taken up by quizzes with short answer questions that require you to show your work. Please bring with you writing utensils, a ruler, and a calculator to all quiz labs. It is very important that you write your quiz in the section in which you are registered. If you write the quiz of another lab section, you will receive a grade of 0 with no exceptions.

Lab Schedule:

Week	Date	Activity	Coverage
1	Sept 2 - 6	No Lab	
2	Sept 9 - 13	Computing Lab	R Studio Cloud MyStatPortal Intro
3	Sept 16 - 20	Lab 1	Unit 1
4	Sept 23 - 27	Quiz 1	Unit 1
5	Sept 30 - Oct 4	Lab 2	Unit 3
6	Oct 7 - 11	Quiz 2	Unit 2
7	Oct 14 - 18	Lab 3	Unit 4
8	Oct 21 - 24	No Lab	
9	Oct 28 - 1	Lab 4	Unit 6
10	Nov 4 - 8	Lab 5	Unit 6
11	Nov 11 - 15	No Lab	Reading Week
12	Nov 18 - 22	Quiz 3	Unit 6
13	Nov 25 - 29	Lab 6	Unit 7
14	Dec 2 - 6	Quiz 4	Unit 7

Grading:

i►clicker Questions/Participation	5%
Assignments (Best 4 of 5)	10%
Quizzes (Best 3 of 4)	15%
Midterm Test	20%
Final Examination	50%

Marks for i►clicker sessions, assignments, quizzes and the midterm test will be posted on the gradebook in UMLearn.

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**.

Midterm Info: There is one midterm for this course that will be written in class on Tuesday, October 22nd. It will consist of a 50 minute individual test followed up by a second 20 minute group portion. For this second portion you will randomly be divided into groups of 3-5 students. Your mark on your midterm will be the better score of 100% your individual mark or weighted as 85% your individual mark plus 15% your group mark. Please allow for the class period to extend to 12:50 if the transition time takes a bit longer. More information on the two-stage exam and pedagogical reasons for the testing will be provided in class. If you miss the midterm for an acceptable, documented reason, then the weight of your midterm will be moved to the final exam.

The midterm will cover Unit 1 up to portions of unit 4 to be announced in class. It consists of long and short answer questions. For quizzes, 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 (for the midterm test and final examination only).

i►clicker Info

For every i►clicker response you give, you will be awarded 1 point. For questions with a correct answer, an additional point will be awarded for selecting the correct response. Occasionally I may assign short activities to count towards the iClicker participation marks. Full marks (5/5) will be given if you receive at least 75% of the total possible i►clicker points. Partial marks (3/5) will be given if you receive between 50% and 75%. No marks (0/5) will be given if you receive less than 50%.

Quiz Info: There will be four short quizzes over the course of the term. I will inform students of the exact material covered on each quiz at least one week in advance. Approximate coverage can be found on the lab schedule.

Quizzes account for 15% of your final grade. Your percentage grade for quizzes will be calculated using the **best three of four quiz marks**. Note that this policy is designed to allow for students to miss one lab due to outside circumstances without requiring a sick note and is not primarily designed to increase the grade. They will be graded within one week and marks will be posted on the Gradebook. There will be no make-up quizzes.

Online Assignments: There will be three assignments to be completed in the MyStatLab portal for marks. They will all consist of multiple choice or short answer questions that are graded automatically by the system. The assignments are grouped as Units 1-3, 4-5, 6-7. You will have multiple attempts at the short answer questions and have the ability to see guided sample questions. I will have a "practice" assignment that is not for marks so that you can get used to the system. Further details on how attempts work will be given then. As they are designed to be practice, I will have the due date set as the December 8th but I will suggest to you along the way when you should be completing them. It is highly recommended that you do not leave it all for the end of term. There will not be extensions granted under any circumstance.

Your other two assignments will be computing assignments done in R Markdown and turned in electronically by email by 11:59 on their due date. The required files will be posted in the class portal on R Studio Cloud.

The best 4 out of 5 of your assignments will count for marks for a total of 10% of your final grade. This will allow for students who may have issues completing one of the assignments.

Practice Questions: Through out the course I will provide extra practice problems in pdf form and suggest questions from the textbook. These are not for marks but you should complete them for the extra practice. The pdf questions in particular will be helpful as they were written by me and will reflect the way I ask questions on the quizzes and tests. You will also find additional practice problems on the MyStatLab portal under the study plan.

Final Exam Info: The final exam will be 3 hours in duration and scheduled by the registrar's office. The final exam will cover Units $1 - 8$, with emphasis on Units $5 - 8$. Should you miss the final exam or require a deferred, please contact your home faculty. I do not personally handle any deferred exam requests.

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 September 9 to December 6):

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. – 4:30 p.m.
Friday	9:30 a.m. – 12:00 p.m.

Note: The help centre will be closed on holidays and during the Fall term break (November 11-15).

Voluntary Withdrawal

The voluntary withdrawal date is **November 18** (by which time you will have received your marks for the first quizzes, the midterm test, up to 3 assignments, and several i►clicker sessions).

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 – Examining Data

- obtaining data: samples, types of variables
- representative samples and data quality
- displaying data: frequency distributions, histograms
- describing data with numbers: mean, weighted mean, median, quartiles, 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
- Introduction to R with descriptive statistics

Unit 2 – Random Variables and Probability Distributions

- randomness, the language of probability
- long term proportion
- discrete random variables and probability distributions
- continuous random variables, density curves
- uniform distribution
- statistics vs parameters
- normal distribution

Unit 3 – Sampling Distributions

- simple random samples
- sampling distribution of a sample mean
- bias and variability
- Central Limit Theorem
- sampling distributions for proportions

Unit 4 – Confidence Intervals for a Single Population Mean

- confidence intervals for σ known
- selecting samples sizes
- introduction to the t-distribution
- confidence intervals for σ unknown
- confidence intervals for $\hat{p}$

Unit 5 – Tests of Significance for Single Populations

- tests of significance for a single population mean (σ known and unknown)
- test of significance for population proportions

Unit 6 – Inference for the Means of Two Populations

- matched pairs t procedure
- inference when population variances are equal
- inference when population variances are unequal

Unit 7 – Regression

- association versus causation
- response variable, explanatory variable
- scatterplots
- correlation
- least-squares criterion, least squares regression line and r^2
- residuals, outliers, influential observations
- lurking variables
- extrapolation
- inference on β_0 and ρ
- analysis of residuals
- confidence intervals for μ_Y

Unit 8 – (Time Permitting) Inference for the Means of Two or More Populations

- graphical comparisons
- inference for equality of means: introduction to ANOVA
- F-distribution and F-test

Final Examination is 3 hours in duration covers material on Units 1 – 8, with emphasis on Units 5 – 8.