

# STAT 3000 Section A01

## Applied Linear Statistical Models

**Time** M/W/F, 12:30 p.m. – 1:20 p.m.  
**Location** 111 Armes

**Instructor** Jenna G. Tichon  
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**Web Pages**            Statistics: <http://umanitoba.ca/statistics>  
                         Course Website: <http://umanitoba.ca/umlearn>  
                         R Download: <https://cran.r-project.org/mirrors.html>  
                         Gradebook: <http://www.stats.umanitoba.ca/gradebook>

**Office Hours**    Monday        10:00–11:00  
                         Tuesday        10:00–11:00  
                         Wednesday    2:00–3:00  
                         Friday         11:00–12:00  
                         (Or by appointment.)

**Course Description:** Applied Linear regression and analysis of variance for designed experiments. This course is not for use in the Honours or Major degree programs in Statistics. Not to be held with STAT 3470 (005.347), STAT 3480 (005.348), the former STAT 3120 (005.312) or the former STAT 3130 (005.313). Prerequisite: STAT 2000 (005.200) or STAT 2001 (005.201) (C).

**Textbooks:** The following textbook will be used throughout the course. I will be assigning reading and practice from the text through out the course and may assign some questions on the assignments. Other textbooks may be referenced for additional reading.

*STAT2 Building Models for a World of Data* by Cannon, Cobb, et al. W.H. Freeman and Company  
ISBN 1-4641-4826-0

**Course Notes:** All of the course notes will be provided to students on the course website. Note that solutions to many problems will be worked out in class and not available online. You must attend class to receive the numerical solutions.

**Required Software:** To complete the course it is required that you download and install the statistical software package R. It is a free program available at the URL at the top of the course outline. Throughout the lectures and through additional handouts you will be taught how to use the program. Its use is compulsory to complete the course.

**Term Work:** The term work will consist of three assignments, a project, a midterm exam, and a final exam with the following mark breakdown:

|                 |     |
|-----------------|-----|
| Assignments (3) | 15% |
| Project         | 10% |
| Midterm Exam    | 25% |
| Final Exam      | 50% |

**Grade Assignment:** The following are **guaranteed** minimum requirements to receive a letter grade.

|    |         |
|----|---------|
| A+ | 90-100% |
| A  | 80-89%  |
| B+ | 75-79%  |
| B  | 70-74%  |
| C+ | 65-69%  |
| C  | 60-64%  |
| D  | 50-59%  |
| F  | 0-49%   |

**Gradebook:** All marks will be available through the department of statistics Gradebook (see link at the top of the page). Please check that all of your grades have been entered correctly before the final exam.

**Assignments:** There will be three assignments to be handed in for marks throughout the term as well as a fourth ungraded assignment to help you prepare for the final exam. While you are allowed to work in groups, all assignments must be written up individually. There will be zero tolerance for students found to be copying assignments verbatim. Assignments must conform to the following standards:

- Typeset or hand written in blue or black ink.
- Done on one side only of 8.5 × 11 paper.
- Stapled in the top right corner.
- Not contain highlighter.
- All relevant computer output must be attached at the appropriate location in the assignment and not at the end.
- Be accompanied by a title page that includes: assignment number, course number, student name, student ID number, instructor's name.

Marks will be subtracted if it does meet the above standards. Assignments will be comprised of questions that require hand calculations and that require the use of computer software.

**Late Assignments:** Assignments are due at the start of class on their due date. If you are aware that you will not be in class on the due date, please arrange to have it submitted early. Should extenuating circumstances prevent you from making it to class, late assignments will **only** be accepted if you email the instructor pictures or a scanned copy of your completed assignment by class time and promptly hand in an identical hard copy the next working day.

**Project:** Part of your term mark will be made up of an individual research project that requires identifying a statistical question, collecting data, analyzing, and summarizing the data. Further details on the project will be available within the first month of class with clear instructions and a rubric for how they will be graded. You will receive a minimum of one month to complete the project. All projects are to be completed independently.

**Midterm:** There will be one midterm exam that will take place during class time on **Wednesday, October 19** in the regular classroom. Non-graphical calculators are both permitted and necessary to complete the midterm. There will be no makeup midterm. Should you miss for a valid and documented reason, the weight will be transferred to the final exam.

**Final Exam:** There will be a 3-hour cumulative final exam. Please check Aurora for the date and time of the exam.

**Classroom Courtesy:** Please be respectful of the instructor and your fellow students while attending class. This includes arriving on time, refraining from speaking to your neighbours during class time, and turning all electronic devices to silent. While I will make an effort to arrive to class early and stay around for a few minutes afterwards to answer questions, as I need time to set up/clean up and must make room for the next class, I will not always have time to answer involved questions. If I am unable to answer your question, I will direct you to come and speak with me in my office or to send me an email. I value giving students complete answers and am not dismissing your question if I request you to ask it later.

**Course Website:** All course material and news announcements will be posted on UMLearn. You will also be able to access the course discussion forums from this website.

**Discussion Forum:** On the course website you will find a discussion forum section with three discussion forums you are free to post in:

- **General Course Discussion:** This is the appropriate location to post any *non-content* questions pertaining to the course that would of general interest to the *entire* class.
- **Student Forum:** This is a place where you can ask questions of your fellow students. While the instructor will be monitoring the board, they generally will refrain from involvement in these discussions.
- **Daily Class Discussion Threads:** Each class I will start a thread listing any announcements made, overviewing what was covered in class, and listing suggested readings and practice problems for next class. This is the appropriate location to ask any *content* related questions from the day's lecture. Any questions asked will either be answered in the forum at an appropriate time during class.

All discussion will be monitored closely by the Instructor. 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.

**Email:** 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 3000”. 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 regularly scheduled office hours, please email me to make an appointment.

**Voluntary Withdrawal:** The voluntary withdrawal date is **November 18** (by which time you will have received your marks for the first two assignments and the midterm).

**Copyrighted Materials:** 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.

**Note Sharing:** Please note that all course materials are the intellectual property of the instructor and are not to be shared or altered without the explicit permission of the instructor. 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](https://umanitoba.ca/student/resource/student_advocacy/media/Message_note_sharing_December_2013.pdf)

**Recording of 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.

**Classroom 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](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/>

**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>

## Course Topics

### 1. Linear Regression

- Review of the Simple Linear Regression
- Assessing Conditions
- Transformations

### 2. Inference for Simple Linear Regression

- Inference for regression slope
- ANOVA for regression
- Regression and correlation
- Intervals for prediction

### 3. Multiple Regression

- Multiple linear regression model
- Assessing the model
- New predictors from old
- Techniques for choosing predictors

### 4. Analysis of Variance

- One-Way ANOVA
- Assessing and using the model
- Scope of inference
- Fisher's LSD

### 5. Multifactor ANOVA

- Main effects model
- Interaction in the Two-Way model

### 6. Overview of Experimental Design

- Comparisons and Randomizations
- Randomization F-test
- Blocking
- Factorial Crossing