University of Guelph
Department of Mathematics and Statistics
STAT 3240 - Applied Regression: Fall 2018

Course Information

Instructor: Nagham Mohammad
Lectures: Tuesday and Thursday 10:00am - 11:20am
Location: CRSC 116

TA Office Hours: Will be posted on CourseLink.

Instructor Information

Name: Mrs. Nagham Mohammad
Office: MACN 513.
Office Hours: Tuesday and Thursday 11:30am - 12:30am.
Email: naghamm@uoguelph.ca
You can expect a response to emails within 24 hours Monday-Friday.
Lab Schedule and Location: Thursday 4:30am - 5:20pm in SSC 1305

Textbook/Course Materials

Recommended Text:
Introduction to Linear Regression Analysis by Montgomery, Peck, and Vining. 5th edition. Wiley, 2012. Copies of this textbook available have been placed on 2-hour loan at University of Guelph Library Guelph McLaughlin Book Stacks (**QA278.2 .M65 2012**).

NOTE: Complete electronic copies of lecture PowerPoint slides will be posted on CourseLink. The materials to be covered in the lectures are mainly based on topics from Chapter 1 to Chapter 13 of the textbook and some supplement materials. The class lecture notes constitute study materials for exams and homework assignments.

CourseLink:

Course information and material (such as assignments, data sets, etc.) will be available on CourseLink. Students are responsible to check the website regularly for updated information and announcements.

Software: Assignments, tests and final exam will involve the use of statistical software package R. You can download a free copy on your own computer from the website:
http://www.r-project.org/

Course Description

This course reviews simple linear regression and introduces multiple regression with emphasis on theory of least squares estimation, residual analysis, and model interpretation. Within the multiple regression context, transformations of variables, interactions, model selection techniques, ANOVA, influence diagnostics and multicollinearity will be discussed. Topics may also include Box–Cox transformations, weighted regression, and logistic and Poisson regression. This course is supplemented with computer labs involving interactive data analysis using statistical software.

Course Objectives:

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

- Select, implement and interpret appropriate regression models to explain real-world phenomena.
- Demonstrate an understanding of the limitations and uncertainties associated with regression models.
- State the assumptions of regression models, and investigate these assumptions using appropriate plots and statistics.
- Demonstrate a command of the mathematical foundations of regression models.
- Demonstrate competence in using statistical software to implement regression procedures.
- Effectively communicate a proper interpretation of the results of a regression analysis.

Missed Lectures:

If you miss lectures then you are responsible for finding out what you missed. Your instructor will not reteach missed material.

Out-of-Class Workload:

As in any university course much of your learning in this course will take place outside of class time. Each week you have 3 hours of lectures. Therefore you should plan to spend 3-6 hours each week in out-of-class learning. This learning consists mostly of making sure you understand the concepts and steps that were used in class to solve problems and then solving problems from the practice problems on your own.

Grading Scheme:

Every student is treated the same way according to the grading scheme below. We cannot modify final grades to give you an extra percent – this would be unfair to the other students. There are 2 grading schemes in order to minimize the impact of a poor performance on either of the 2 midterms. The scheme that gives you the best mark will be used automatically.

Scheme 1	**Scheme 2**
Best 4 of 5 Assignments	Best 4 of 5 Assignments
Assignments: 20%	Assignments: 20%
Midterm Test 1 – 15%	Best Midterm Test – 15%
Midterm Test 2 – 15%	Worst Midterm Test – 10%
Final Exam –50%	Final Exam – 55%

Midterm Tests: There will be 2 Midterm Tests; venues and material to be covered will be announced closer to the Midterm date.

Midterm Test 1: Thursday Oct. 4th, 10:00 am - 11:20 am

Midterm Test 2: Thursday Nov. 1st, 10:00 am -11:20 am

Assignment Policies:

- No late assignments will be accepted, and late or missed assignments will automatically receive a grade of 0.
- While you are encouraged to discuss approaches to assignment questions with other students, your submitted assignment must be your own work. Copying any part of another student's work is considered academic misconduct. (Please read the section on academic misconduct at the end of this document and in the undergraduate calendar.)
- In calculating your overall mark, I will throw out your worst assignment grade to account for possible illnesses, computer problems, car accidents, house fires, etc. If you have extremely serious issues that cause you to miss more than one assignment, see me in person.
- Assignments will be submitted through the drobox Folder on the CourseLink.

Final Examination:

A two hour final examination will be held on Dec. 11th 7:00-9:00pm. Please do not make any travel arrangements.

Information regarding midterm tests, and final exam (e.g. material covered and locations) will be posted on the CourseLink. Students must present a valid Student ID card to write all tests and final exam.

***Note* If** a test is missed for a **valid** reason, the weight from that test will be carried to the final exam.

Calculator Policy:

For the Midterm tests and final exam, only a non-programmable, non-graphical **are allowed.**

Remarking of Tests:

If you have a question regarding the marking of a test you must first check the posted solutions. If you still have a question, then you should follow the procedure posted on the CourseLink. **You have 7 days to appeal a test grade.**

Missed Midterm Tests or Final Exam:

The final exam (date, time and location) is scheduled by the Registrar's Office. Students who miss the final exam must contact their program counsellor for advice on University regulations regarding final exams.

Drop Date:

The last date to drop one-semester courses, without academic penalty, is Friday, November 2, 2018. For regulations and procedures for Dropping Courses, see the Academic Calendar: https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for academic consideration:

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.
University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.
For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website:
http://www.uoguelph.ca/csd/

Course Evaluation Information

Please see http://www.mathstat.uoguelph.ca/files/TeachevaluationformF10.pdf

STAT3240 Fall 2018 Course Schedule (Tentative)

Week/Date	Lecture Topics	Text Reference	Notes
1/ Sep.6-7	Course Introduction. Chapter 1 Introduction to Regression Models. Regression and model building. Data Collection. Uses of Regression.	 1.1 1.2 1.3	
2/ Sept. 10-14	Chapter 2 Simple Linear Regression The model and important assumptions. Estimation of parameters. .	 2.1 2.2 2.10	
3/ Sept. 17-21	Chapter 2 Simple Linear Regression Inferences about the Regression Parameters.	 2.3 2.4	Assignment 1 due Thursday September 20th at 8am
4/ Sept. 24-28	Chapter 2 Simple Linear Regression Prediction Coefficient of Determination. Related Models. Matrix Approach to Simple Linear Regression Midterm 1 Review	 2.5 2.6	
5/ Oct. 1-5	Chapter 3 Multiple Linear Regression Model. Multiple Regression Models. Estimation of the model Parameters.	 3.1 3.2	**Midterm Test 1:** Thursday Oct. 4th from 10:00-11:20am

6/ Oct.8-12 ****Tuesday***, October 9	<u>Chapter 4</u> Multiple Linear Regression Model. Statistical inference. Prediction of a New Observation Standardized Regression Coefficients	 3.3 3.4 3.9	**Assignment 2 due** Thursday Oct.11th at 8am
7/ Oct. 15-19	<u>Chapter 9</u> Multicollinearity Introduction Sources of Multicollinearity Effect of Multicollinearity Multicollinearity Diagnostic <u>Chapter 4</u> Model Adequacy Checking Introduction Residual Analysis Detecting and Treatment of Outliers	 9.1 9.2 9.3 9.4 4.1 4.2 4.4	
8/ Oct. 22-26	<u>Chapter 6</u> Diagnostic for Leverage and Influence Importance of Detecting Influential Observation. Leverage Measure of Influence: Cook's D Midterm 2 Review.	 6.1 6.2 6.3	**Assignment 3 due** Thursday Oct.25th at 8am
9/ Oct. 29- Nov. 2.	<u>Chapter 4</u> Model Adequacy Checking PRESS Statistic <u>Chapter 6</u> Assessing the adequacy of the functional form: Luck of Fit of the Regression Model	 4.3 4.5	**Midterm Test 2:** **Thursday** November 1st from 10-11:20am

10/ Nov. 5-9	Chapter 7 Polynomial Regression Models Chapter 8 Indicator Variables	(limited sections) (limited sections)	**Assignment 4 due.** Thursday Nov.8th at 8am
11/ Nov. 12-16	Chapter 5 Transformation and Weighting to Correct Model Inadequacies Introduction Variance stabilizing transformations. Transformations to Linearize the Model.	 5.1 5.2 5.3	
12/ Nov. 19-23	Chapter 5 Analytical Methods for Selecting a Transformation. Generalized Least Squares (GLS) Chapter 10 Variable Selection and Model Building Introduction Computational Techniques for Variable Selections. Strategy Variable Selection and Model Building	 5.4 5.5 10.1 10.2 10.3	**Assignment 5 due** Thursday Nov.29th at 8am
13/ Nov. 26-30	Final Exam Review		

****_Tuesday_, October 9**
Fall Study Break Day - NO CLASSES SCHEDULED -- classes rescheduled to Thursday, November 29