Course Outline: Fall 2015

General Information

Course Title: STAT*3240/6920 – Applied Regression Analysis

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.

Credit Weight: 0.5 credits
Academic Department (or campus): Mathematics & Statistics
Campus: University of Guelph
Semester Offering: Fall

Class Schedule and Location: Tuesday/Thursday, 1:00 – 2:20pm in MCKN 313
Lab Schedule and Location: Thursday, 3:30 – 4:20pm in SSC 1305

Instructor Information

Instructor Name: Lorna Deeth
Instructor Email: ldeeth@uoguelph.ca
Office location and office hours: MACN 548, ext. 53034 (note: no voicemail!).
Office Hours: Tuesday/Thursday 2:30 – 3:30pm, or by appointment.

Course Content

Specific Learning Outcomes: After successful completion of the course, students will 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.

Lecture Content:

The following is a tentative outline of the lecture topics and schedule. While we will cover the majority of the listed topics, the exact topics, order and timing is subject to change.

Lecture Dates	Topic	Textbook Section
September 10	Introduction, review of expectation and variance, basics of matrix algebra	N/A
September 15, 17, 22, 24	Simple Linear Regression	Chapter 2
September 29, October 1, 6, 8, 15	Multiple Linear Regression	Chapter 3
October 20, 22, 27	Model Assumptions and Adequacy, review for midterm (time permitting)	Chapter 4
November 3, 5	Polynomial Regression and Indicator Variables	Chapters 7/8 (limited sections)
November 10, 12	Transformations and Weighting	Chapter 5 (limited sections)
November 17, 19	Diagnostics for Leverage and Influence	Chapter 6
November 24, 26	Model Building	Chapter 10
December 1, 3	Introduction to GLMs	Chapter 13 (limited sections)

Note 1: Tuesday, October 13 is Fall Study Break Day – no classes scheduled
Note 2: The midterm is being held in class on Thursday, October 29 and will cover material up to and including the October 22 lecture.

Course Assignments and Tests:

Course Component	Date	Due Date & Location	Weight
Assignment 1	Friday, September 25	3:00pm at my office (MACN 548)	25% (best 4 of 5 assignments)
Assignment 2	Friday, October 9	3:00pm at my office (MACN 548)	
Assignment 3	Friday, October 23	3:00pm at my office (MACN 548)	
Assignment 4	Friday, November 13	3:00pm at my office (MACN 548)	
Assignment 5*	Thursday, December 3	4:00pm at my office (MACN 548)	
Midterm	Thursday, October 29	1:00pm – 2:20pm (in class)	30%
Final Exam	TBA	TBA TBA	45%

*Note date and time change.

Course Resources

Recommended Text:

Introduction to Linear Regression Analysis by Montgomery, Peck, and Vining. 5th edition. Wiley, 2012. A copy of this textbook will be available on reserve at the library.

Other Resources:

*Lecture notes***:** A weekly set of incomplete lecture notes will be posted on Courselink. It is expected students will have a copy of these notes available, and will fill them in during lectures. Completed lecture notes will not be posted online.

THE LECTURE NOTES ARE FOR INDEPENDENT USE ONLY, AND ARE NOT TO BE RE-DISTRIBUTED IN ANY FORM WITHOUT MY WRITTEN PERMISSION.

Computing Labs & Statistical Software: The computer labs will be held in SSC 1305, and will provide students with an introduction to the statistical software system SAS and/or R. Students will be expected to use SAS and/or R (as specified) for various questions on their assignments.

SAS is available in the SSC computer labs, as well as on the computers in the library. R is open source software, which is compatible with both Windows and Mac machines. Students can download and install R on their personal machines through the website: http://www.r-project.org/

Course Policies

Communication Policies: My preferred method of communication is in-person or by email. For email communication, you must use your University of Guelph email account. Use STAT*3240/6920 in your subject line, and include your name and student ID number in all correspondence. Emails that do not include a name and ID number, or from non-uoguelph accounts, will not be answered; otherwise, I will try to respond to emails within 2 business days. Please note that only administrative inquiries will be answered via email; questions regarding assignments, course content, etc. will only be answered during office hours, in lecture, or on the Courselink discussion board.

Grading Policies

*Assignments***:** There will be a total of 5 assignments throughout the semester. The best 4 marks of the 5 assignments will be used in the calculation of the final grade; the lowest assignment mark will be discarded. This is to account for various problems (computer issues, poor performance on a particular assignment, illness, overloaded schedule, etc.), and is the only accommodation that will be made. **No late assignments will be accepted, and late or missed assignments will automatically receive a grade of 0.**

Students are responsible for answering all questions on an assignment; however <u>for some assignments not every question will be marked</u>. Full solutions will be posted on Courselink, and it is your responsibility to review the solutions and evaluate your performance on unmarked questions.

*Midterm***:** Students who miss the midterm for a valid, documented reason (such as a medical illness) must contact me within 5 business days of the missed midterm, and provide the appropriate documentation. In this situation, a student's final exam will be reweighted to make up for the missed test.

The final exam (date, time and location) is scheduled by the Registrar's Office. Students who miss the final exam due to a valid, documented reason must contact their program counsellor for advice on University regulations regarding final exams. These procedures are based on University policy, and are not under the control of the course instructor.

For the midterm, students are permitted one double-sided 8.5 x 11 (letter size) reference page, and two double-sided 8.5 x 11 (letter size) pages are permitted for the final exam. You are free to write whatever you would like on your reference pages. For both the midterm and the final exam, students will be allowed a stand-alone calculator, however cell phones and/or laptop computers may not be used as calculators during the midterm or exam, and will be confiscated.

Course Policy on Group Work: Students are encouraged to work together to discuss course content, share ideas, and ask/answer questions. However, all submitted work must be done **independently**; completing another student's work, having another student complete your work, or copying another student's work will constitute academic misconduct.

Course Policy regarding use of electronic devices and recording of lectures: Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

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

Drop date

The last date to drop one-semester courses, without academic penalty, is *Friday, November 6, 2015*. For regulations and procedures for Dropping Courses, see the Academic Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Additional Course Information

Any additional information regarding the course, including (but not limited to) important announcements, assignment information, test room confirmations, etc., will be posted on Courselink. Students are encouraged to check this website daily for any new information.