College of Physical and Engineering Science
Department of Mathematics and Statistics

STAT*3240: Applied Regression Analysis (0.5 credit)
Course Outline for Fall 2020

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Disclaimer:
Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website https://news.uoguelph.ca/2019-novel-coronavirus-information and circulated by email.

Illness:
The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.

Lectures:
- Online lectures using virtual classroom on the CourseLink.
- The students will be invited by a link to join live session on a specific day and time (the attendance is optional) and the session will be recorded to be posted on the CourseLink.
- Courselink: STAT*3240 (01) F20 - Applied Regression Analysis

Calendar 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.
Pre-Requisites: (1 of IPS*1510, MATH*1210, MATH*2080), (1 of MATH*1160, MATH*2150, MATH*2160), STAT*2050

Course Materials:
* Introduction to Linear Regression Analysis by Montgomery, Peck, and Vining. 5th edition. Wiley, 2012. (Textbook)
* STAT*3240 lecture notes (provided on the Courselink site)

Calculator: Your calculator should be able to calculate two-variable statistics.

Course Learning Outcomes
By the end of this course, you should be able to:
1. Select, implement and interpret appropriate regression models to explain real-world phenomena.

2. Demonstrate an understanding of the limitations and uncertainties associated with regression models.
3. State the assumptions of regression models, and investigate these assumptions using appropriate plots and statistics.
4. Demonstrate a command of the mathematical foundations of regression models.
5. Demonstrate competence in using statistical software to implement regression procedures.
6. Effectively communicate a proper interpretation of the results of a regression analysis.

Marking Scheme and Test Dates:

Assignments	35%	4 assignments
Midterm Exam	25%	Online (90 minutes)
Final Exam	40%	Online (120 minutes), Friday, December 9; 11:30 - 13:30

NOTE: You should have **NO** conflicts concerning these dates and times. If you do it is your responsibility to resolve them as soon as possible.

POLICY for missed tests: If you miss a test during the semester for a **documented** valid reason (e.g., medical illness) your final exam will be reweighted to make up for the missed test.

If you miss the final exam for any reason, you must see your program counsellor. University regulations require specific procedures to be followed regarding the conduct of final exams, including recourse, if any, for missed final examinations. These procedures are out of my control.

Tests and Exam calculator: You must have a stand-alone calculator for all tests and the final exam. You will **not** be permitted to use a calculator on a laptop computer, smartphone, etc. If you are discovered to be using anything but a stand-alone calculator during a test or the final exam, it will be reported as possible academic misconduct.

Assignment and Exam Policies:

- Any assignment not submitted by the deadline will not be marked and will receive a grade of 0.
- While you are encouraged 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.)
- If you miss the midterm exam due to medical illness or another valid (and documented) reason, your final exam will be reweighted to make up for the missed exam.

STAT*3240 Teaching Assistants:

Vanderkruk, Kayla vanderkk@uoguelph.ca

Recording of Materials:

Presentations that are made in relation to course work – including lectures – cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

E-mail Communication: As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement: When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The regulations and procedures for Academic Consideration are detailed in the Undergraduate Calendar.

Drop Date: Students will have until the last day of classes (Friday, Dec. 4th) to drop courses without academic penalty. Review the Undergraduate Calendar for regulations and procedures for Dropping Courses.
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Copies of Assignments: Keep paper and/or other reliable back-up copies of all assignments: you may be asked to resubmit work at any time.

Accessibility: The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.
When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.
For more information, contact Student Accessibility Services at 519-824-4120 ext. 56208 or email accessibility@uoguelph.ca

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

Resources: The Academic Calendars are the sources of information about the University of Guelph's procedures, policies and regulations that apply to undergraduate, graduate and diploma programs.

Tentative Course Schedule:

Dates	Topics	Textbook	Assignments
Week 1 Sep. 7-13 Week 2 Sep. 14-20	Topic1: Simple Linear Regression. (The simple linear regression model, least squares, properties of the least squares estimators, model assumptions, interpretation of model parameters, inference on the slope and intercept, prediction, maximum likelihood estimation, the coefficient of determination, ANOVA for regression.)	Chapter 2	Assignment 1 due Sep. 23 at 11:59pm (8%)
Week 3 Sep. 21-27 Week 4 Sep. 28-Oct. 4 Week 5 Oct. 5-11	Topic2: Introduction to Multiple Linear Regression. (The multiple linear regression model, matrix notation, properties of the least squares estimators, inference on model parameters, estimation and prediction, interpretation of output, standardized regression coefficients, multicollinearity.)	Chapter 3	Assignment 2 due Oct. 14 at 11:59pm (7%)
Week 6 Oct. 12-18	Online Midterm Exam (25%) 90 minutes Friday, Oct. 16 at 12:00 – 6:00 pm		
Week 7 Oct. 19-25 Week 8 Oct. 26-Nov. 1	Topic3: Model Assumptions and Checking Model Adequacy. (Residual analysis, standardized and studentized residuals, residual plots, partial regression and partial residual plots, outliers, lack of fit tests.)	Chapter 4	Assignment 3 due Nov. 11 at 11:59pm (10%)
Week 9 Nov. 2-8	Topic4: Transformations and Weighting. (Variance stabilizing transformations, intrinsically linear models, the Box-Cox transformation, weighted least squares.)	Chapter 5	
Week 10 Nov. 9-15	Topic5: Leverage and Influence. (Leverage, influence, measures of leverage and influence, treatment of influential observations.)	Chapter 6	Assignment 4 due Nov. 25 at 11:59pm (10%)
Week 11 Nov. 16-22	Topic6: Polynomial Regression Models, Indicator Variables. (Including higher order terms in the linear regression model, the use of indicator variables to represent categorical explanatory variables, one-way ANOVA as a regression.)	Chapter 7	
Week 12 Nov. 23-29 Week 13 Nov. 30-Dec. 6	Topic7: Model Building. (Model building techniques, forward selection, backward selection, stepwise selection, Mallow's Cp.)	Chapter 10	
Week 14 Dec. 7-13	Online Final Exam (40%), 120 minutes Dec. 9, 11:30-13:30		

*** NOTE: The STAT*2080 Fall 20 Final Examination is on Wednesday, December 11; 11:30 to 13:30 (ONLINE)**

Online Behaviour:
Inappropriate online behaviour will not be tolerated. Examples of inappropriate online behaviour

include:

- Posting inflammatory messages about your instructor or fellow students
- Using obscene or offensive language online
- Copying or presenting someone else's work as your own
- Adapting information from the Internet without using proper citations or references
- Buying or selling term papers or assignments
- Posting or selling course materials to course notes websites
- Having someone else complete your quiz or completing a quiz for/with another student
- Stating false claims about lost quiz answers or other assignment submissions
- Threatening or harassing a student or instructor online
- Discriminating against fellow students, instructors and/or TAs
- Using the course website to promote profit-driven products or services
- Attempting to compromise the security or functionality of the learning management system
- Sharing your user name and password
- Recording lectures without the permission of the instructor

Recording of Lecture Materials:
The University of Guelph's primary mode of course delivery has shifted from face-to-face instruction to remote and online learning due to the ongoing COVID-19 pandemic. As a result, some learning activities (e.g., synchronous lectures or student presentations) may be recorded by faculty, instructors and TAs and posted to CourseLink for grading and dissemination; students may be recorded during these sessions.

By enrolling in a course, unless explicitly stated and brought forward to their instructor, it is assumed that students agree to the possibility of being recorded during lecture, seminar or other "live" course activities, whether delivery is in-class or online/remote.

If a student prefers not to be distinguishable during a recording, they may:

1. turn off their camera
2. mute their microphone
3. edit their name (e.g., initials only) upon entry to each session
4. use the chat function to pose questions.

Students who express to their instructor that they, or a reference to their name or person, do not wish to be recorded may discuss possible alternatives or accommodations with their instructor.