Regression and Linear Models
STAT 615, Fall 2020

Required (core) course, 3 credits (3 contact hours per week)

Course home page: http://www.ece.rice.edu/~erzsebet/STAT615.html
(This website is also linked from the CANVAS home page.)

Students are responsible for being familiar with this syllabus, and with the contents of both the above and the CANVAS website, and follow the postings as the course proceeds. The information contained in the course syllabus, other than the absence policies, may be subject to change with reasonable advance notice as deemed appropriate by the instructor.

Class meets: Tue & Thu 9:40 – 11:00am Central Time via Zoom (URL to be sent separately)
Instructor: Erzsébet Merényi email: erzsebet@rice.edu
Office/Phone: DCH 2082, 713-348-3595 but email is preferred during the pandemic
Office hour: by appointment via Zoom
Teaching Assistant: Hoai Nam Nguyen hn17@rice.edu
Graders TBA
Technology TA (help with Zoom and similar issues): Xianglin (Rose) Zhang xz70@rice.edu

Optional review session, weekly via Zoom, time TBA based on student input
Additional advising: by appointment

This course will be taught remotely, as a combination of synchronous activities (lectures, office hour, optional review sessions, TA advising via Zoom) and asynchronous components (assignments, exercises, discussions) through CANVAS. The “live-online” environment of synchronous attendance enables real-time questions and discussion during class, as well as instant feedback; students are strongly encouraged to attend in that mode if it is feasible for them. Recording of Zoom classes may be available after the respective classes for those in time zones that prohibit synchronous attendance.

I realize that some students attending while away from the campus may not have ready access to some of the desirable infrastructure. In that event, it is important to let me know as early as possible so that we can work together to find alternatives. I also encourage you to communicate with me as soon as possible if you have any concerns, experiences or difficulties that may affect your learning in this class, or for any other reason.

Short course description

A survey of regression, linear models, and experimental design. Topics include simple and multiple linear regression, single- and multi-factor studies, analysis of variance, analysis of covariance, model selection, diagnostics. Data analysis using the statistical software R is emphasized. STAT 615 is the graduate level version of STAT 410.

Objectives of the Course

1. Student understanding of concepts and mastery of statistical methods in regression and linear models, and their applications including statistical computing.

2. Student mastery of statistical problem solving, both theoretically and by using statistical software.
3. Student competence in communicating statistical findings.

**Pre-requisites**

(STAT 310 OR ECON 307 OR ECON 382 OR STAT 312) AND (MATH 355 OR CAAM 335)

**STAT 310 - Probability and Statistics**
**STAT 312 - Probability & Statistics for Civil & Environmental Engineers (replaced section 2 of STAT 310)**
**STAT 331 - Applied Probability**
**STAT 340 - Statistical Inference**

ECON 307 and 382 are cross-listed courses in ECON and STAT
MATH 355 – Linear Algebra
CAAM 335 – Matrix Analysis

Basic, general knowledge of R and R Studio is assumed.

**Brief Sample List of Topics**

- Simple Linear Regression
- Multiple Linear Regression
- Generalized Least Squares
- Weighted Least Squares
- Transformations
- Variable Selection Methods
- Robust Regression
- Analysis of Variance
- Analysis of Covariance
- Introduction to Computationally Intensive Methods
- Introduction to Generalized Linear Models

See a more detailed sample course outline at [Sample Course Contents](#)

Software: We will work with **R**: [www.r-project.org](http://www.r-project.org)

While basic familiarity with R and R Studio is assumed, functions and procedures specific to linear regression will be introduced in class and exercised in home works. Additional “lab” scripts will be available to lead students through computing examples. Our weekly optional review sessions, led by TAs / graders will provide an opportunity to get extra help if needed.

**Detailed Course Schedule**

A detailed schedule of class topics will come on-line in a timely manner at the course web site [http://www.ece.rice.edu/~erzsebet/STAT615.html](http://www.ece.rice.edu/~erzsebet/STAT615.html) under **Course Schedule** along with reading assignments from the text book and lecture notes. I will also indicate here when home work assignments are posted in CANVAS, along with due dates; post the dates of upcoming tests, and all relevant logistics. The materials (such as lecture and R exercise materials, home work assignments, test) indicated in the Course Schedule will be downloadable from CANVAS, and all assignments will be turned in through CANVAS.
Course Materials

The course will follow parts of this book. It is available at Amazon, or may be available at the campus bookstore. Fondren Library also has a few copies. Further suggested reading is listed at the course web site under Course Materials.

Assignments, Grading Policy and Other Logistic Requirements for STAT 615

Grades will be made up of the following components, with approximate weights as shown:

40% - Homework assignments
10% - 2 Quizzes
25% - Exam 1
25% - Exam 2

1. Homework assignments
There will be approximately one assignment per week, posted in CANVAS. The scheduling of assignments and their due dates will also be shown in the Course Schedule in a timely manner. You are encouraged to work in groups and get help from anyone (including help in the optional review / advising sessions) but you will turn in your own solution which you are expected to understand. If the solution is the result of group work, each group member will write the names of the collaborators on their solution. Solutions from previous years are off-limit. Partial grading may be applied (i.e., grading a randomly selected subset of the homework problems) depending on the number of students and grading support for the course.

More details are posted at the standalone course home page under Assignments, Grading Policy, Requirements. A summary of required formats, file names, and other logistic requirements are posted here for your convenience. Please be sure to thoroughly read and follow.

1.1 Late homework policy
Homework is due before the beginning of class on the due date, at the time specified in the CANVAS posting. You will submit solutions electronically through CANVAS. We intend to continue paperless grading that we have introduced for this class. Should any circumstance prevent electronic submission to CANVAS at any time, please contact me before it is due, and copy TA Nam Nguyen. We will work with you to solve the problem. However, please let me and the TA(s) know immediately (by phone if necessary) of any problem accessing CANVAS. After the due date, but before the due date of late homework (the "accept until" date in CANVAS), homework can be turned in for 50% credit. After the late due date submissions will not be allowed in CANVAS, and you will receive 0% credit. Please do not email me or the TA(s) any assignment unless you contacted us and we instructed you to do so. We will ignore any unsolicited emailed assignment.
2. Tests
Quiz 1 and Quiz 2: approx. 40 - 45 min, closed notes/books/phones/computers, planned as electronic “in-class” quizzes. (Computers may be used only for writing and submitting the quiz answers.) The exact implementation (multiple-choice form, questions requiring short typed answers, or combination) will be announced well ahead of time.

Two midterm exams, Exam 1 and Exam 2: The Exams will be open book and open notes but using restricted time, and other resources (such as internet). I will require you to give the honor pledge. The exact requirements and details will be given with the exams. Test solutions from previous years are strictly off-limit.

The exact dates of these will be posted in the Course Schedule as well as announced in class approximately 2 weeks ahead of time. The anticipated approximate dates are September 24 or 29 (Quiz 1), October 20 (Exam 1), November 19 (Quiz 2), and December 4 (Exam 2).

Missed assignments If you must miss (or be late with) a homework, or a test due to an extraordinary circumstance please notify me and the TA(s) as much ahead of time as possible, and make arrangements with me for completing the missed assignment. If, in extreme emergency, you are unable to provide advance notice, please let us know as soon as possible afterwards, and I will work with you on a solution accordingly. Please do not ask the TA(s) for extensions, make-up arrangements, and other exceptions. Address all such requests directly to me (but copy the TA(s)).

Other Requirements
In addition to file formats and name requirements, the file STAT615-LogisticsDetails.pdf (our STAT 615 "rules" file) contains a summary of other logistic requirements such as the procedure that you must follow for disputing / appealing grade points; and email communication with me and TA(s) and graders. I will expect you to communicate with me through properly titled emails (see the "rules"). I will not be monitoring comments and messages in Canvas. Please be sure to thoroughly read the "rules" and follow them.

Class Attendance and Absence Policy
There is no specific attendance policy but students are strongly advised to attend classes and participate in class activities. Students who must miss a class or assignment due to unavoidable circumstances should consult with the instructor as much in advance as possible so that alternative arrangements may be made.

Expectations Regarding Honor Code, Collaboration, and Citation
In preparing homeworks, students are encouraged to work in groups and consult freely any material and anyone (including help in the optional review / advising sessions). However, each individual will write and turn in his or her own solution, which they are expected to understand. If the solution is the result of group work, each group member will write the names of the collaborators on their solution. For tests students will be required to give the Rice Honor Pledge and adhere to the Rice Honor Code. Solutions from previous years are off-limit. In all work, students are expected to be scrupulous about proper citation of
sources (where applicable), as required both as a matter of integrity and formally as a part of the Rice Honor Code.

**University Disability Accommodation Policy**

The University seeks to foster an environment of broad access and feasibly equal opportunity to education. The Office of Disability Support Services (DSS; Allen Center, Room 111; 713-348-584; adarice@rice.edu) supports and implements federal guidelines under the Rehabilitation Act of 1973 and the Americans with Disabilities Act. Students with documented disabilities requiring accommodation under Rice's established policies should consult DSS and the instructor; all such consultations and accommodations will be held confidential to the extent feasible.

**Use of Machines During Class and Class Etiquette**

*Cell phones must be turned off during class unless I request you to use them* for class purposes. If you anticipate the need to take an urgent call, please set your phone to vibration and take the call outside the room. Laptops or other small devices may be used only for specific class purposes such as participating via Zoom or taking notes. If you have an urgent need to be online for other purposes during class time, feel free to do so . . . but outside the (Zoom) classroom. If possible please have live camera presence in class, or at least a static picture of you in Zoom, and be available for discussion. I will expect students to be punctual, to dress like in the regular classroom, and to refrain from eating or other distractions during class.