

Regression and Linear Models

STAT 615, Fall 2021

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 be linked from the CANVAS course 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.

Class meets: TR 9:25 - 10:40am MXF 251 (in-person, in-class instruction*)

Instructor: [Erzsébet Merényi](#)

email: erzsebet@rice.edu

Office/Phone: MXF 229, 713-348-3595

Office hour: [by appointment](#)

Teaching Assistant(s) and contact information:

Grace Nie Grace.Nie@rice.edu or gn6@rice.edu

Zejian Liu Zejian.Liu@rice.edu

[Optional review session](#), W 5 - 7pm (tentative), room TBA

Additional advising: by appointment

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.

*In particular, should Covid-19 circumstances force substantial changes in safety measures we may revert to remote instruction via Zoom.

While in class or visiting me in my office I expect everyone to strictly adhere to Rice University's mask requirements and other guidelines for minimizing the spread of the Covid-19 virus.

We may not have sufficient grading support to grade everyone's homework individually. Therefore, students will be asked to form homework groups, submit one homework per group that the entire group agrees on. Everyone in a homework group will receive the same points unless group members declare an uneven credit distribution. The size of the groups will depend on the class size vs the grading help. Details will be discussed in class in a timely manner as the parameters become available.

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.

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.

Further details on the above courses can be found at the links provided at the course home page, <http://www.ece.rice.edu/~erzsebet/STAT615.html> under Prerequisites.

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

Software: We will work with **R**: www.r-project.org

Many sample “lab” R scripts will be available to help students with using particular methods and coding procedures related to linear regression.

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> 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; will post the dates of upcoming test, and all relevant logistics. The materials (such as lecture notes and home work assignments) indicated in the Course Schedule will be downloadable from CANVAS, and all assignments will be turned in through CANVAS.

Course Materials

The course will be based on Lecture Notes, scheduled as described at the course web site <http://www.ece.rice.edu/~erzsebet/STAT615.html> under [Course Schedule](#) , and in the textbook

Montgomery, D. C., Peck, E. A., and Vinning, G. G., Introduction to Linear Regression Analysis, 5th Edition, Wiley, 2012. ISBN 978-0-470-54281-1

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.

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 using statistical software.
3. Student competence in communicating statistical findings.

Assignments, Grading Policies and Other Logistic Requirements for STAT 615

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

- 30% - Homework assignments LL
ISEP
- 15% - 2 Quizzes LL
ISEP
- 25% - Exam 1 LL
ISEP
- 25% - Exam 2 LL
ISEP
- 5% - Class participation

1. Homework assignments LL ISEP

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 Wed 5-7pm review / advising sessions), but you will turn in your own solution which you are expected to understand. [As per the note about homework groups above, "your own solution" here may mean your group solution. However, you as an individual will be expected to thoroughly understand any solution your group produces.] 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 grading support for the course.

More details are posted at the [course home page](#) under Assignments and Grading Policies.

LL
ISEP 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 them.

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 submit a hard copy to me in class or drop it at my office any time before it is due. (In my absence please you can slide it under my door, drop it with our TA(s), or with Paige Goodson in MXF 110; and notify both me and the TA(s) of that fact by email immediately.) We will work with your hard copy and ask you to upload the electronic version when the problem has been fixed. 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 homework submitted in any other way after the late due date will receive 0% credit.

2. Tests

There will be four tests. Quiz 1 and Quiz 2 (approx. 40 - 45 min, done through Google forms in class, closed notes/books/phones/computer except for the device used for submitting answers); a midterm exam, Exam 1 (take home or in-class, TBA), and Exam 2 (take home or in-class, TBA). 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 21 or 23 (Quiz 1), October 14 (Exam 1), November 18 (Quiz 2), and December 3 (Exam 2). The Exams will be open book and open notes but using restricted time, and other resources (such as internet) will be restricted. I will require you to give and sign the honor pledge. The exact requirements and details will be given with the exams.

Test solutions from previous years are strictly off-limit.

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 try to ask the TAs for extensions, make-up arrangements, and other exceptions. Address all such requests directly to me (but copy the TAs).

Expectations Regarding Honor Code, Collaboration, and Citation

In preparing home works, students are encouraged to work in groups and consult freely any material and anyone (including help in the optional Wed 5-7pm review / advising sessions). However, each individual will write and turn in his or her own solution (or group 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 state and sign 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.

Class Attendance and Absence Policy

Students are strongly advised to attend all classes. 5% of the grade is composed of participation and performance in class. Students who must miss a class or assignment

because of unavoidable circumstances should consult with the instructor well in advance so that alternative arrangements may be made.

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 in the Classroom

Cell phones must be turned off within the classroom 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 in class only for specific class purposes such as 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 classroom.