Linear Models in Data Science

IE-3500452, Spring 2023

Engineering Building #10, Room 10-515, Mon/Wed 10:30–11:45

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Office: Engineering Building 207–10527

Office Hours: 12:00–13:00 (M/W).

Textbook *Applied Linear Regression Models*, McGraw-Hill/Irwin; 4th edition, by Michael H Kutner, Christopher J. Nachtsheim, and John Neter.
(ISBN-10: 0073014664 | ISBN-13: 978-0073014661)

Web Page https://AppliedStat.GitHub.io/teaching

Software *R Language* (http://www.r-project.org).
Minitab (http://www.minitab.com).

Prerequisite The expectation is that you have already been exposed to the basic probability and statistics.

Policy

- Attendance Policy: Class attendance is mandatory. If you miss a class for some reason, it is your responsibility to get notes, *etc.* from someone in the class. I will not repeat lectures during my office hours.
- Tardy Professor Policy: If the instructor has not arrived within 15 minutes of the scheduled class time, you may assume that class has been canceled.
- All drop/add procedures are your responsibility.

Description and Learning Objectives

Upon successful completion of this course, a student will be able to:

- Program statistical softwares (Minitab and R).
- Derive parameter estimates under the simple linear regression model.
- Do basic statistical inference for the simple linear regression model.
- Know how to use matrix algebra in regression models.
- Extend the simple linear regression model to the multiple linear regression model using the matrix algebra.
- Set up polynomial regression models.
- Analyze and infer the multiple linear regression model.
- Understand how to diagnose the problems from regression models.
- Know the general linear F-test.
- Use categorical predictor variables in the regression model setup.
- Use "all possible regression."

- Understand several model selection procedures.
- Build an appropriate model.
- Detect outliers and influential observations.

Grading

The final grade will be curved and calculated as follows:

Homework/Project:	5%
Attendance:	5%
Midterms 1, 2:	60% (30+30)
Final:	30%

The lowest one of your mid-term exam grades will be replaced by the final exam after scaling to 30% if it is better. If a student misses a mid-term exam for any *legitimate* reason, then the final exam will count 60%.

Rough Grading Guide:

- A+: 90 $\sim$ 100 A: 80 $\sim$ 90-
- B+: 70 $\sim$ 80- B: 60 $\sim$ 70-
- C+: 50 $\sim$ 60- C: 40 $\sim$ 50-
- F : below 40.

Exams

Midterm:	T.B.A.	In class
Final:	T.B.A.	

– All the exams will be closed-book.

– For the final exam, you are allowed to bring in *one* A4-size formula sheet made up by yourself.

– The final exam will be comprehensive.

– During the exams, a basic calculator will be permitted but cannot be shared with others.

– Calculators in smart phones, tablet PC and laptops are prohibited.

– No early or late exams will be allowed without a written and legitimate excuse.