Experimental Design and Regression Analysis

IE-34243, Fall 2019

Engineering Building #10, Room 10-301, Mon/Wed 13:30–14:45

Instructor
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Office: Engineering Building 207–10527

Office Hours: 10:30–11:30am (M/W); 18:00–18:30pm (M/W); or by appointment. (No office hours on the first Monday of each month).

Textbook
R을 이용한 통계적 실험설계와 분석, 김재희 著, 자유아카데미
(ISBN-13: 978-89-7338-384-9)

References
1. *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)
2. *Design and Analysis of Experiments*, John Wiley & Sons; 9th EMEA edition, by Douglas C. Montgomery.
   (ISBN-10: 1119589061 | ISBN-13: 978-1119589068)

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

In this course, various statistical theories will be studied, including experimental design and regression analysis. In order to incorporate the theories into practical problems, the popular R statistical language or Rstudio will be handled in this class.

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

- Understand the simple linear regression model.
- Estimate the parameters under the linear regression model.
- Perform basic statistical inference for the linear regression model.
- Know how to use matrix algebra in regression models.

- Analyze and infer the multiple linear regression model.
- Use categorical predictor variables in the regression model setup.
- Understand the connection between regression and experimental design.
- Understand basics on ANOVA (analysis of variance).
- Understand the randomized complete block design.
- Understand and design factorial experiments.
- Program statistical softwares (Minitab and R).

Grading

The final grade will be curved and calculated as follows:

HOMEWORK:	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 1:	T.B.A.	In class
MIDTERM 2:	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.