

Applied Statistical Linear Models (Fall 2024)

Title: **Applied Statistical Linear Models**, 3 credits

Lectures: **Tuesday 9:10 am -12:00 pm** in room B301 of Science and Engineering Building I.

Computer Lab: A322 Science and Engineering Building I

Instructor: Wei-Ying Wu

A432 Science and Engineering Building

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Office hours: Mon 10:00 am -12:00 pm, or by appointment at A432.

Objectives Description: This course will focus on what the **linear model** is; how to **estimate** model information; **theoretical properties** of the least squares estimator and **computation** studies; the **adequacy** of linear model; **prediction**; **model selection**; how to analyze data through the linear model.

Textbook: Applied Linear Regression Models, Kutner, Nachtsheim, Neter, 4th Edition.

Teaching Schedule:

Week	
1	Review basic statistical and probability concepts; The introduction of R language; What's the linear regression model ?
2	<u>Tutorial course by Dr. Kismiantini</u> <u>(Sep 25th 10:00 am -12:00 pm)</u> <u>(Sep 26th 10:00 am -12:00 pm)</u> <u>(Sep 27th 10:00 am -12:00 pm)</u> Binary logistic regression; ordinal logistic regression; multinomial logistic regression

3	Bivariate data case & Linear model & Least Squares Estimator & Its properties (I) Review of Matrix properties; Multivariate Data Case
4	Least Squares estimator through Matrix representation. & Its properties
5	Linear model on multivariate data.
6	Least Square estimator and Its properties (II)
7	Analysis of Variance
8	Midterm
9	Least Square estimator and Its properties (II)
10	Tutorial course by Dr. Chae Young Lim
11	Prediction Discussion
12	Regression in Qualitative data
13	Variable selection issue (I);
14	Variable selection criteria (II); Comparison of model selection criteria –AIC, BIC, Cross-validation, Mallow's Cp
15	Penalized method for the variable selection– Lasso; Adaptive Lasso; SCAD; Group Lasso.
16	Non-linear Regression: Varying coefficient model
17	Project Study
18	Final Week

Grading: Course points are earned through General Performance, homework, four quizzes, two unit examinations, and a cumulative final exam:

Source	Percentage
General Performance	10%
Homework	30%
Quizzes	10%
Midterms	25%
Final exam	25%
Total:	100%

Homework: Please note that the work you turn in must be your own. Late homework will not be permitted. The deadline of assignment will be announced later.

Quizzes: It will be closed book/closed notes.

The exact schedule of quizzes and exams will be mentioned in the class. An unexcused, missed examination will be counted as a zero.

* Make-up examination and quizzes is not agreed without any legitimate reason. Please contact the instructor with excuses before the exam or quiz.

* Importance: The instructor reserves the right to make any changes he considers academically advisable. Changes will be announced in the class. It is your responsibility to keep up with any changed policies.

Other References:

Mathematical statistics by Jun Shao.

Regression Analysis by Example by Samprit Chatterjee and Ali S. Hadi.

Linear Regression Analysis by George A.F. Seber and Alan J. Lee.