



THE OHIO STATE UNIVERSITY

STAT 7410

Linear Models (20949)

Autumn 2026

Syllabus - Graduate Instructor Information

Name: Yoonkyung Lee

Professional Qualifications

Ph.D., Statistics, University of Wisconsin-Madison

Syllabus - Required or Recommended Readings

- *A First Course in Linear Model Theory*, 2nd edition by N. Ravishanker, Z. Chi and D. K. Dey, CRC Press. Available online at ProQuest Ebook Central through the OSU library.
- *Advanced Linear Modeling: Statistical Learning and Dependent Data*, 3rd edition by R. Christensen, Springer. Available online at Springer Link through the OSU library.

Course Details - Instructor Contact Details

- Office: Cockins Hall 440H
- Email: lee.2272@osu.edu
- Phone: 614-292-9495

Course Details - Office Hours

R 2:00-2:55pm, F 3:00-3:55pm, or by appointment

Course Details - Additional Instructional Staff

Grader

- Name: Jongha Lee
- Office: Cockins Hall 305E
- Office Hours: by appointment only
- Email: lee.10895@buckeyemail.osu.edu

Course Details - Class Meeting Details

Lectures: 01:50 PM-02:45 PM - Enarson Classroom Bldg 209 - MWF

Course Details - Course Description

Theory of the general linear model, definition, assumptions, estimability, hypothesis testing and multiple comparisons. Modern extensions of the linear model, interpretation, inference, prediction and penalized estimation. Multivariate linear models. Prereq: 6802, 6910, and 6950; or permission of instructor.

Prerequisite(s) / Corequisites: Prereq: 6802, 6910, and 6950; or permission of instructor.

Course Details - More About This Course

Statistics 7410 is a course on linear models, the most commonly used statistical model. The course will present topics on the definition, estimation and hypothesis testing in this class of models, and model comparisons. In addition, this course will introduce modern regression models that extend the linear model

and explore the concepts of penalized estimation and nonparametric regression if time permits.

Prerequisites:

Stat 6802 (Statistical Theory II), 6910, and 6950 (Applied Statistics I and II). Solid understanding of linear algebra at the undergraduate level is also required.

Course Details - Course Learning Outcomes

By the end of this course, students should successfully be able to:

1. Demonstrate an understanding of the algebraic and geometric underpinnings and interpretation of the linear model
2. Demonstrate an understanding of the theory of the linear model
3. Discuss the definition and the assumptions of the general linear model
4. Carry out appropriate statistical inference under the general linear model
5. Describe the breadth of models that extend the linear model
6. Perform statistical inference and prediction for a variety of models that extend the linear model
7. Interpret the results of statistical analyses based on models that extend the linear model.

Course Details - Detailed Course Schedule

A tentative course schedule is provided below. For up-to-date assignment due dates, please refer to the Carmen course page.

Week	Date	Topics/Readings	Assignments Due
1	8/25-8/28	Introduction, Linear models (4.1), Linear algebra (ch. 1)	
2	8/31-9/4	Least squares, Geometry (4.2, 2.6), Generalized inverse (3.1-3.2)	

Week	Date	Topics/Readings	Assignments Due
3	9/7-9/11	9/7 (M): Labor Day Fitted values, Residuals (4.2), Projection (3.2)	9/13 (S): HW1
4	9/14-9/18	Projection (3.2), Symmetric and idempotent matrices (2.4), Estimation of error variance (4.2)	9/20 (S): HW2
5	9/21-9/25	Estimability, Gauss- Markov theorem, Generalized LS (4.3-4.5)	9/27 (S): HW3
6	9/28-10/2	Multivariate Normal distribution (5.1-5.3)	10/4 (S): HW4
7	10/5-10/9	Distribution of quadratic forms (5.4)	10/11 (S): HW5
8	10/12-10/16	Inference for estimable functions (7.1) 10/14 (W): Midterm 10/15 (R)-10/16 (F): Autumn Break	
9	10/19-10/23	Hypothesis testing, F-test (7.2-7.3)	

Week	Date	Topics/Readings	Assignments Due
10	10/26-10/30	Likelihood ratio test (8.1), Confidence intervals and regions (7.4)	11/1 (S): HW6
11	11/2-11/6	Departures from model assumptions (8.2), Model diagnostics (8.3)	11/8 (S): HW7
12	11/9-11/13	Model selection criteria (8.1, 9.1), Model comparison (7.3), 11/11 (W): Veterans Day	11/15 (S): HW8
13	11/16-11/20	Collinearity, Ridge regression (9.2, C2.2), Principal component analysis (9.2, C14.1-14.2)	11/22 (S): HW9
14	11/23-11/27	Principal component regression, LASSO (14.3, C2.3), 11/25 (W)-11/27 (F): Thanksgiving Break	
15	11/30-12/4	Penalized regression (14.3, C2)	12/6 (S): HW10

Week	Date	Topics/Readings	Assignments Due
16	12/7-12/11	Nonparametric regression (14.2, C1) 12/9 (W): Review	
17	12/16 (W)	Final exam (2:00pm-3:45pm)	

Course Details - Grading Policy

How your grade is calculated:

Category	Percentage
Homework Assignments	30%
Midterm	30%
Final exam	40%

Homework assignments

There will be homework assignments posted on the course website. Homework is due approximately once per week, typically on Sunday of the week following the homework posting. Check Carmen for exact dates and times. Homework assignments will be submitted for grading via Carmen.

Late assignments

No late homework assignments will be accepted with few exceptions. If you have documented reasons for missing work or needing extra time, please contact me as soon as possible prior to the due dates. Where appropriate, due dates could be extended.

Exams

There will be one midterm exam. The midterm will be in person, during class time. Information about the exam will be posted well in advance through the course website and also announced in class. The final exam will be

comprehensive and cover all the material for the course. It will be in person, during the scheduled final exam hours. There will be no make-up exams.

Course Details - Instructor Policies

Attendance Policy

You are expected to attend all lectures.

Disclaimer

This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it and in particular we reserve the right to change due dates or the methods of grading and/or assessment if necessary. Any changes will be communicated to you through official course announcements.

Syllabus - University Policies

Office of Undergraduate Education - Standard Syllabus Statements

- [Academic Misconduct](#)
- [Religious Accommodations](#)
- [Accommodations for Disability and Illness](#)
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