

# STAT 714 Fall 2021 Class Schedule

Ray Bai

## Overview of Linear Models

- 8/20/21: syllabus and course overview
- 8/23/21: examples of linear models

## Review of Linear Algebra

- 8/25/21: rank, linear independence, vector spaces
- 8/27/21: Gram-Schmidt process, basis, column space and row space
- 8/30/21: nonsingular matrices, rank-nullity theorem, systems of linear equations
- 9/1/21: generalized inverses, eigenvalues, eigenvectors
- 9/3/21: spectral decomposition theorem
- 9/6/21: **Labor Day (no class)**
- 9/8/21: quadratic forms, orthogonal projections
- 9/10/21: orthogonal projections
- 9/13/21: orthogonal decompositions
- 9/15/21: orthogonal decompositions
- 9/17/21: random vectors
- 9/20/21: singular value decomposition
- 9/22/21: singular value decomposition

## Least Squares Estimation

- 9/24/21: normal equations
- 9/27/21: **Exam 1**
- 9/29/21: geometry of the least squares estimator
- 10/1/21: orthogonal decomposition of least squares
- 10/4/21: estimability and identifiability
- 10/6/21: estimability
- 10/8/21: **Fall Break (no class)**
- 10/11/21: estimability

## Gauss-Markov and Aitken Models

- 10/13/21: Gauss-Markov model and Gauss-Markov Theorem
- 10/15/21: Gauss-Markov model and Gauss-Markov Theorem
- 10/18/21: Aitken's generalized least squares
- 10/20/21: Aitken's generalized least squares

## Distributional Theory

- 10/22/21: multivariate normal distribution
- 10/25/21: multivariate normal distribution
- 10/27/21: **Exam 2**
- 10/29/21: distributions of quadratic forms
- 11/1/21: Cochran's Theorem

## Inference in the Linear Model

- 11/3/21: maximum likelihood estimation, confidence intervals,  $t$ -tests
- 11/5/21: prediction intervals,  $F$ -test
- 11/8/21:  $F$ -test, stochastic dominance
- 11/10/21:  $F$ -test, stochastic dominance
- 11/12/21:  $F$ -test for general linear hypotheses
- 11/15/21: likelihood ratio test

## Shrinkage Methods for Linear Regression

- 11/17/21: bias-variance trade-off, centering and scaling
- 11/19/21: ridge regression
- 11/22/21: LASSO regression
- 11/24/21: **Thanksgiving holiday (no class)**
- 11/26/21: **Thanksgiving holiday (no class)**
- 11/29/21: LASSO and adaptive LASSO
- 12/1/21: coordinate descent algorithm
- 12/3/21: coordinate descent for LASSO
- 12/10/21: **Final Exam**