MATH 541A Introduction to Mathematical Statistics
Spring 2025

Class schedule: MWF 11:00-11:50 am at KAP 156

Instructor: Yizhe Zhu (yizhezhu@usc.edu) Office: KAP 464B

Instructor Office Hour: Wednesday 12-2 pm, KAP 464B

Course TA: Rundong Ding (rundongd@usc.edu)

Course website: https://sites.google.com/usc.edu/yizhezhu/teaching/math-541a-spring-2025

Textbooks:

- George Casella and Roger L. Berger. Statistical Inference. Second Edition.
- Other textbooks (not required): Robert Keener. Theoretical Statistics.
- Supplementary lecture notes will be updated weekly on Bringspace.

Prerequisite: Math 505A or Math 407 or Math 408.

Topics: This is an introductory course to mathematical statistics for PhD level students. Tentative topics are listed below:

- Parametric families of distributions
- Data reduction: Sufficient statistics, ancillary statistics, complete statistics
- Methods of finding estimators: Methods of moments, maximum likelihood estimators, Bayes Estimators, the EM algorithm
- Evaluating estimators: Mean squared error, the best unbiased estimators, sufficiency and unbiasedness, loss function optimality
- Asymptotic evaluations: modes of convergence, the Delta method, consistency, efficiency, robustness

Homework:

- There will be approximately 7 homework assignments. Homework problems will be posted on Bringspace and on the course website.
- You will submit your homework as a PDF file to Gradescope. Writing your homework in LaTex is encouraged but not required.

- Your solutions to homework problems must be submitted by the due date. Late homework is not accepted.
- You are encouraged to discuss with each other, but all homework assignments must be written by you independently. Doing homework is the most important part of a PhD course.
- Your lowest homework assignment score will be dropped in calculating your final grade.

Exams: There will be two in-class midterm exams and one final exam. A missing midterm exam will result in a zero mark. If you are unable to make the exam, you must contact the instructor at least one week before the exam. All excuses must be made for a legitimate reason (e.g., illness with a doctor's note). There will be no make-up midterm exams.

Exam dates:

- Midterm 1: Wednesday, Feb 26, 11:00-11:50 am, KAP 156
- Midterm 2: Wednesday, April 9, 11:00-11:50 am, KAP 156
- Final: Wednesday, May 7, 11 am-1 pm, KAP 156

If you cannot attend one of the exams, you must notify me within the first two weeks of the start of the quarter.

Grading:

- Homework assignments: 30%; Midterm exams: $2 \times 20\%$, Final Exam: 30%.
- You must attend the final exam to pass the course.