

# STAT 713 sp 2023 Mathematical Statistics II

Time/place: 1:15 – 2:30 TR, LeConte College 107  
Instructor: Karl Gregory  
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## Required textbook

The course will follow very closely the material in Chapters 6–10 of the book:

Casella, G. and Berger, R. (2002). *Statistical Inference*, Second Edition. Duxbury.

I will assume each student is confident in the material from Chapters 1–5 of the same book. I will post my lecture slides at the [course website](#).

## Topics covered

- *Principles of data reduction*: Sufficiency, minimality, ancillarity, and completeness of statistics.
- *Point estimation*: Method of moments, maximum likelihood, Bayes estimators, mean squared error, unbiasedness, best unbiased estimators, uniform minimum variance unbiased estimator, Rao-Blackwell theorem, Cramér-Rao lower bound, consistency of estimators, asymptotic distributions of estimators.
- *Hypothesis testing*: Likelihood ratio tests, Bayesian tests, Type I and Type II error, power function, uniformly most powerful tests,  $p$ -values, Neyman-Pearson lemma, monotone likelihood ratios, Karlin-Rubin theorem.
- *Interval estimation*: Inverting a test statistic, pivotal quantities, Bayesian intervals, size and coverage probability, optimality.
- *Asymptotic evaluations*: Consistency and asymptotic efficiency of estimators, asymptotic likelihood ratio tests, Wald-type tests, score test.

## Grading

There will be about 8 homework assignments, to be submitted in class. There will be two exams during the semester on *Tuesday, Feb 14th* and *Thursday, Mar 30th* and a final exam on *Thursday, Apr 27th from 9:00 am to 11:30 am*. Each exam is worth 30% of the course grade, and the homework average is worth 10% of the course grade. The final exam score, if it exceeds the lower of the first two exam scores, will replace the lower score. The thresholds 90%, 87%, 80%, 77%, 70%, 67%, and 60% will be used to determine the assignment of the letter grades A, B+, B, C+, C, D+, and D, respectively. The grade of F will be assigned to those earning less than 60%.

## Honor code

See the Carolinian Creed in the Carolina Community: Student Handbook Policy Guide. Violations of the USC Honor Code may result in a 0 for the work in question, and, in accordance with University policy, other punishments up to and including expulsion from the University.