

STAT 530: Mathematical Statistics - Spring 2021

Instructor: Wen Zhou (Email: riczw@stat.colostate.edu), 216 Statistics Building

TA: Gray Stanton (Email: Gray.Stanton@colostate.edu)

Meeting Time and Place: TR 2:00pm-3:15pm (MST), place to be announced

Office Hours: TR 10:30-11:30am (MST) or by appointment

Webpage: We will use the Canvas system.

Midterm Exams: 02/25; 04/08 (R-in class)

Final Exam: 05/11(T), 9:40-11:40am (MST)

Prerequisites: STAT 520 (or equivalent courses on probability theory, limiting theorems, convergence, and random processes). Solid training in linear regression is strongly recommended.

Objectives: The course will generally cover, but not restricted to, the following topics from *Statistical Inference* by G. Casella & R.L. Berge, Duxbury Press (2nd Edition).

- Theory of Point Estimation
- Data Reduction Principles and Introduction to the Statistical Decision Theory
- Testing of Hypothesis
- Interval Estimation
- Modern Statistical Topics (Time Permitting)

Learning Outcomes and Expectations: The students are able to understand the principles/theories behind various statistical estimation and inference techniques and are capable to provide some theoretical justification of statistical methods in practice. The students are highly recommended to spend at least six hours outside of instructional time on reading, homework, and exam preparation.

Other Useful References (recommended only)

Mathematical Statistics: Basic ideas and selected topics, by P.J. Bickel & K.A. Doksum

Mathematical Statistics, by J. Shao

Mathematical Statistics, by K. Knight

A Course in Large Sample Theory, by T.S. Ferguson

Asymptotic Statistics, by A.W. van der Vaart

Topics (temporary list)

- Statistical estimator and their assessment
- Statistical decision theory
- Large sample properties of statistical estimators
- Data reduction principle
- UMVUE and general unbiased estimators, sufficiency
- Hypothesis testing: UMP, Neyman-Pearson Lemma, likelihood based procedures, Bayes procedure
- Interval estimations and their assessment
- Pivotal statistics and applications
- Bootstraps: parametric, nonparametric, wild

- Multiple testing and false discovery rate (FDR) control

Course Work

Homework: Homework will be assigned approximately every week (it will be assigned on Thursday in general and due on the following Friday), and each assignment will carry equal weight.

Exams: There will be two midterms (temporarily and subject to change according to the course progress) and a comprehensive final exam.

Grading: Homework (10%), midterms (50%), and final exam (40%). There is no quota or limit to the number of potential A's or any other grade.

Course Policies

1. Late homework: No credit unless a prior permission is granted.
2. Exam conflicts: Requires prior permission *and* prior testing only. *Under no circumstances* (aside from University requirements) will changes to the final exam time be permitted; plan accordingly.
3. Any grading dispute must be submitted in writing to me within one week after the work is returned. No changes will be made after this deadline.
4. **Academic honesty:** It is important that your course work represents only your ideas. I encourage discussion of homework in broad, conceptual terms where one student is trying to educate another without giving away the answer. Copying solutions or computing code from other students or other sources is plagiarism. At a minimum, all students involved will receive a 0 on the assignment in question for any type of academic dishonesty.
5. Resources for Disabled Students: Support and services are offered to student with functional limitations due to visual, hearing, learning, or mobility disabilities as well as to students who have specific chronic health conditions. See the Resources for Disabled Students web page for more information (rds.colostate.edu). If you need specific accommodations due to a disability, please meet with me outside of class to discuss your needs as early in the semester as possible. In accordance with RDS procedures, accommodations must be arranged in advance—no retroactive remedies are allowed.

Disclaimer The instructor reserves the right to make amendments to the syllabus and schedule as the semester develops. It is your responsibility to attend lectures and keep track of the proceedings.

Important information for students on COVID-19 All students are required to follow public health guidelines in any university space, and are encouraged to continue these practices when off-campus(es). Students also are required to report any COVID-19 symptoms to the university immediately, as well as if they have potentially been exposed or have tested positive at a non-CSU testing location. If you suspect you have symptoms, please fill out the COVID Reporter (<https://covid.colostate.edu/reporter/>). If you have COVID symptoms or know or believe you have been exposed, it is important for the health of yourself and others that you complete the online COVID Reporter. Do not ask your instructor to report for you; if you report to your instructor that you will not attend class due to symptoms or a potential exposure, you are required to also submit those concerns through the COVID Reporter. If you do not have access to the internet to fill out the online COVID-19 Reporter, please call (970)491-4600.

If you report symptoms or a positive test, your report is submitted to CSU's Public Health Office. You will receive immediate, initial instructions on what to do and then you will also be contacted by phone by a public health official. Based on your specific circumstances, the public health official may:

- choose to recommend that you be tested and help arrange for a test
- conduct contact tracing
- initiate any necessary public health requirements or recommendations and notify you if you need to take any steps.

If you report a potential exposure, the public health official will help you determine if you are at risk of contracting COVID.

For the latest information about the University's COVID resources and information, please visit the CSU COVID-19 site (<https://covidrecovery.colostate.edu/>).