

Statistics 6302: Theory of Statistical Analysis
Spring 2020 Course Syllabus
Updated on January 10, 2022

Instructor: Dr. Y. Zhang

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Office hours: Wednesday, 12:30–2:30pm, in my office Cockins Hall 229

Lectures: Monday, Wednesday, Friday, 11:30am – 12:25pm, Cockins Hall 232

Email: To protect your privacy, **all course email correspondence must be conducted using your valid OSU name.# email account**. Also please keep in mind that due to the large volume of emails, I may not be able to answer promptly. Please consider whether your question would be best answered in person during office hours.

Grader: Yongqi Liu

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To be announced

Contents: Contents, organized by a tentative order in which they will be taught, list as follows:

1. Recap of STAT 6301 gist
2. Point estimation
 - (a) Method of moments and maximum likelihood estimation (MLE)
 - (b) Criteria for evaluating estimator performance
 - (c) Uniformly minimum-variance unbiased estimator (UMVUE)
 - (d) Sufficiency
 - (e) Exponential family distributions
3. Interval estimation
 - (a) Confidence intervals
 - (b) Pivotal quantity
 - (c) One and two sample normal confidence intervals
 - (d) Non-normal confidence intervals
 - (e) Central Limit Theorem (CLT) and approximate confidence intervals
4. Hypothesis testing

- (a) Concepts, simple versus simple test
- (b) Tests for one and two sample normal distributions
- (c) Large sample tests
- (d) Duality of confidence interval and test
- (e) Neyman-Pearson lemma
- (f) Uniformly most powerful test (UMPT)
- (g) Likelihood-ratio test
- (h) Goodness-of-fit test

5. Advanced topics

Prerequisites: STAT 6301 or STAT 6801, Not open to students with credit for STAT 6802

Course Website: carmen.osu.edu, all class contents and grades will be posted there

Textbook: Reading assignments and homework problems will be from the course textbooks:

- John A. Rice. *Mathematical Statistics and Data Analysis* (Third Edition). Duxbury, 2007.
- Robert W. Keener. *Theoretical Statistics: Topics for a Core Course*. Springer, 2010.

We will mostly rely on the Rice book, with a few references to some chapters in the Keener book (especially for the interval estimation and testing parts). The Keener book can be downloaded by visiting <https://library.ohio-state.edu/record=b8653187> using OSU campus IP address.

Optional references:

- Robert V. Hogg, Joseph W. McKean, and Allen T. Craig. *Introduction to Mathematical Statistics* (Seventh Edition). Pearson, 2013.
- Larry Wasserman. *All of Statistics* (First Edition). Springer, 2004.

Course Materials: Partial notes will be posted on Carmen on the day before each class. These consist of a notes containing blank spaces, which I will fill in during the lecture. I will not share the marked-up slides, so please make arrangements with your classmates to obtain any missed class material. Please make sure that you understand and can do all the examples that we cover in class.

Homework: Homework assignments are due on Fridays. Due to the current pandemic situation, **ONLINE SUBMISSION ONLY** until further notice, hand-write and scan your homework, submit as PDF, DOCX or image. You can type up homework but it's not recommend for own interest of time (unless you do want to practice Latex). **Paper homework submitted in-person will not be accepted.** Only part of each homework assignment will be graded, but all questions can be important for exams. Solutions will be posted after the due date of each homework. **Homework should be due at the beginning of the lecture on its due date. No late homework accepted.**

You may discuss the problems with each other in general terms, but you must write your own homework solutions. Starting and trying to get help early will be helpful. Academic misconduct of any sort will not be tolerated. Please review OSU's policies at <http://studentaffairs.osu.edu/csc/>.

Exams: All exams are closed-book. You are allowed one piece of double-sided A4/US-letter size cheat sheet of your own making for Exam 1, two pieces for Exam 2 and three pieces for Final Exam; plus a calculator without communication functions. No other assistance is permitted. Exams will cover materials up to the exam date unless otherwise specified. Exam 2 will emphasize on contents since Exam 1. Final Exam is comprehensive and may test materials throughout the entire course in a balanced fashion.

Grading: Grade break-down is as follows:

- **Homework:** 20%, lowest homework score (score/full-mark) dropped when averaging
- **Exam 1:** 20%, Friday, February 25, in class, no homework will be due on this day
- **Exam 2:** 20%, Monday, March 28, in class
- **Final Exam:** 40%, Friday Apr 29, 12:00pm-1:45pm in regular classroom

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Disability Services: The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.