

STA 4322 Introduction to Statistical Theory

Fall 2022

Instructor Hani Doss—222 Griffin-Floyd; email: doss@stat.ufl.edu (email is primarily for administrative purposes, not for questions regarding the course material; for such questions, talk to me during office hours). Office Hours: Tu-Th 1:20pm–2:10 pm. Office hours will be in person most of the time, but will be occasionally on zoom. When office hours are in person, I allow only two students in my office at a time. Office hours will be on zoom if I think that many people will want to attend, for example just before an exam or before a homework assignment is due. I will give out the zoom link during the first lecture. For short questions, you may talk to me in person right after class.

Teaching Assistant Xiran Fan—209 Griffin-Floyd Hall; email: fanxiran@ufl.edu

Course Description and Objectives This is a calculus-based course which gives a theoretical foundation for fundamental methods in statistical inference. It covers the theory underlying point estimation, confidence intervals, and hypothesis testing for models based on standard parametric families. The course is designed to prepare students for graduate-level work in statistics and related fields, or for research in the sciences, social sciences or medical sciences of the type where advanced statistical methods are used. This is fundamentally a theory course, not a course in applied statistics.

Grading Your final course grade will be based on the four components below, with the stated weights:

Exam 1:	Friday September 30, 8:20 pm, room TBA; covers everything up to and including the lecture of Wed September 28. Note the evening time slot.	26%
Exam 2:	Friday November 4, 8:20 pm, room TBA; covers all material after exam 1, up to and including the lecture of Wednesday November 2. Note the evening time slot.	26%
Final:	Thursday December 15, 3:00pm–5:00pm; covers all material after Exam 2.	26%
Homework:	There will be 9 or 10 homeworks assigned during the semester.	22%

Note the dates and times of the three exams. You should clear your schedule now so that you do not have a conflict with these time slots.

A course average of 93–100 will guarantee an A, 90–92 at least an A⁻, 87–89 at least a B⁺, 83–86 at least a B, 80–82 at least a B⁻, etc. (The tests will be hard, and the actual cutoffs for the grades are very likely to be lower than these numbers. After each of Exams 1 and 2, you will be given precise information on what your current grade is.)

Prerequisites Prerequisites are:

- STA 4321 (Introduction to Probability)
- MAC 2311, 2312, 2313 (Calculus I, II, III)

If you have not taken all of these (or their equivalents), you may not register for this course.

Course Web Page <http://www.stat.ufl.edu/~doss/Courses/sta4322>

A password is needed to enter the Homeworks page; the password will be given out in class or in an email.

Text *Mathematical Statistics with Applications* by Wackerly, Mendenhall, and Scheaffer (7th edition, 2008).

This book is recommended, not required. We will not follow it closely. Some problems from the book will be assigned for homework, but otherwise, we will not use it.

Coverage Roughly, we will cover the material in Chapters 7–10 of the text (however, the level of this course is much higher than that of the book, so there is no real correspondence between what we cover and these chapters). *Note that there will be material covered in lectures which is not found anywhere at all in the textbook, and you will be responsible for that material.*

Main Topics

1. Rules for expectations and variances of linear combinations of random variables
2. Distributions of random variables formed from independent samples from the normal distribution
3. The Central Limit Theorem
4. Point estimation
5. Confidence intervals
6. The Law of Averages
7. The likelihood function, sufficiency, the Factorization Theorem, and the Rao-Blackwell Theorem
8. Maximum likelihood estimation
9. Hypothesis testing

General Course Policies

- Homework must be turned in (in person) at the beginning of the lecture on the due date. Late homework will not be accepted. All work must be entirely your own.
- All exams are closed-book, closed-notes; however, you may bring two 8.5×11 (one-sided) sheets of notes to the exams. You should bring a calculator to the tests. Makeup exams must be approved before the time of the exam and will be given only in case of medical or family emergencies, or conflicts with other exams (any of which must be appropriately documented).
- *You are responsible for everything from the lectures.* Do not depend on the course web page for announcements regarding due dates for homeworks, changes in schedules, etc.
- I am going to use the projector, and distribute hard copies of the notes (electronic versions of the notes will *not* be available). The hard copies will be distributed once. I am not going to bring notes from the previous lecture for the benefit of those who didn't come to class. The notes will be a skeleton of the lectures (in other words, they are going to be incomplete) with the missing material developed during the lectures. Therefore, skipping class and getting a copy of the notes is not going to work.
- All emails to me or the TA must have the string "4322" in the subject line (so I can retrieve emails quickly) and must be sent from your official UF email account.
- Cell phones should be turned off (or set on silent). Laptops must be shut.
- Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://disability.ufl.edu>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to me when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Policies on Covid Safety

Illness If you are sick, stay home. If you are sick and need immediate care, call your primary care provider or the UF Student Health Care Center at 352-392-1161 to be evaluated.

Absences If you test positive, you should not come to class, and as with any excused absence, you will be given a reasonable amount of time to make up missed work.

Masks As of this writing, UF is recommending that we wear masks inside all UF facilities if we are close to other people.

During the lecture, I may or may not wear a mask, depending on whether or not the distance between me and the person closest to me is much greater than six feet. However, I will put on a mask immediately after the lecture, and if you want to talk to me, then you must wear a mask if you get within six feet of me. If you come to office hours, then you must wear a mask regardless of whether or not you are within six feet of me.

Handouts Before the pandemic, at the beginning of each lecture I used to put several sheets of notes at the front of the room and people would pick them up. But it takes time to pick up several sheets, and this creates a big crowd at the front of the room. So this semester the sheets of notes will be stapled, and I will place several stacks at the front of the room. You can remove the staples if you want.