

Syllabus – STOR 655
Spring 2025 (January 8 – May 5)
TuTh 11:00am – 12:15pm
Hanes 130

Instructor: Jan Hannig

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Office Hours: M 1:00 – 2:00PM

Course home page on

<https://hannig.cloudapps.unc.edu/STOR655>

<https://uncch.instructure.com/courses/80318>

Zoom link for office hours (if needed):

<https://unc.zoom.us/j/99086987591?pwd=5BGbJJyp3s3kliKUbfDGAr6yKaNxpU.1>

Meeting ID: 990 8698 7591

Passcode: Hanes320

Zoom link for lectures (if needed)

<https://unc.zoom.us/j/95629518286?pwd=tZ1eGMY86X14hlWTNYl2eCe1kuHWkx.1>

Meeting ID: 956 2951 8286

Passcode: Hanes130

Teaching Assistant: Andrew Nguyen

E-mail: andrwn@unc.edu

TA Office Hour: TBD

TA contact:

Target Audience: First year Ph.D. students in the Department of Statistics and Operations Research who have successfully completed STOR654 and STOR634.

Required Text: Ferguson, *A course in large sample theory*, CRC Press, ISBN 041204371-8

Optional Texts: Casella and Berger: *Statistical Inference*, Duxbury 2/e,
Bickel and Doksum, *Mathematical Statistics, Vol 1*, 2/e, Prentice Hall
A. W. van der Vaart, *Asymptotic statistics*, Cambridge University Press
Mood, Graybill, Boas, *Introduction to the Theory of Statistics*

Course Objective This is a second theoretical course in mathematical statistics. We will continue where STPR654 has left off. The covered topics will include asymptotic statistics and additional topics.

Course Format: I am planning to give a traditional lecture, and anyone is welcome to attend in person. Lectures will also be recorded and available remotely via zoom.

Assessment: Your grade will be based on a midterm exam (40% of the grade), a final exam (40% of the grade) and weekly homework sets (20% of the grade). The instructor might also assign “extra credit problems” from time to time.

Important dates:

- Final Exam: Monday, May 5, 12:00noon – 3:00 PM
(see the published university schedule)
- Midterm exam: Tuesday, February 18
- Homework: Homework sets will be usually assigned on Thursday and due in one week on Gradescope. Late/missed homework will receive a grade of zero. Students are welcome to discuss the homework problems with other members of the class or even consult generative AI but beware of hallucination! Each student must prepare their final answers on their own.

Course Outline:

1. Convergence in probability
 - a. Definition
 - b. Continuous and uniformly continuous functions
 - c. Closure properties of in-probability convergence[*]
 - d. Weak law of large numbers
2. Convergence in distribution
 - a. Definition (using expectations of bounded continuous functions)
 - b. Connections with convergence in probability
 - c. Continuous mapping theorem / Slutsky's theorem
 - d. The delta method
3. Basic asymptotic theory
 - a. Consistency of MLE
 - b. Asymptotic normality of MLE
 - c. Asymptotic efficiency of MLE
 - d. Asymptotic distributions of LR test statistics
 - e. χ^2 goodness of fit tests
4. Other / Special Topics (time permitting)
 - a. Projections and U-Statistics
 - b. Asymptotic properties of Bayesian Posterior
 - c. Bootstrap
 - d. Lower bounds

Delivery Method: This course is classified as “in person”. While I expect you to come in class, I am also planning to accommodate students who are unable to do so by recording and streaming the lectures.

UNC Attendance Policy: No right or privilege exists that permits a student to be absent from any class meetings, even online classes, except for these university approved absences: authorized university activities, and disability/religious observance/pregnancy, as required by law and approved by Accessibility Resources and Service and/or the Equal Opportunity and Compliance Office (EOC). Significant health condition and/or personal/family emergency as approved by the Office of the Dean of Students, Gender Violence Service Coordinators, and/or the Equal Opportunity and Compliance Office (EOC).

Code of Conduct: All students are expected to adhere to University policy and follow the guidelines of the UNC Code of Conduct. Additional information can be found at <https://studentconduct.unc.edu/>.

Generative AI: Generative AI tools may be used for homework; however, they are strictly forbidden during exams.

Equal Opportunity and Compliance: Equal Opportunity and Compliance Accommodations Team ([Accommodations – UNC Equal Opportunity and Compliance](#)) receives requests for accommodations for disability, pregnancy and related conditions, and sincerely held religious beliefs and practices through the University's Policy on Accommodations. EOC Accommodations team determines eligibility and reasonable accommodations consistent with state and federal laws.

Counseling and Psychological Services UNC-Chapel Hill is strongly committed to addressing the mental health needs of a diverse student body. The [Heels Care Network](#) website is a place to access the many mental health resources at Carolina. CAPS is the primary mental health provider for students, offering timely access to consultation and connection to clinically appropriate services. Go to the [CAPS website](#) or visit their facilities on the third floor of the Campus Health building for an initial evaluation to learn more. Students can also call CAPS 24/7 at 919-966-3658 for immediate assistance.

Title IX Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made [online to the EOC](#) or by contacting the [University's Title IX Coordinator](#), Elizabeth Hall, or the [Report and Response Managers](#) in the Equal Opportunity and Compliance Office. Please note that I am designated as a Responsible Employee, which means I must report to the EOC any information I receive about the forms of misconduct listed in this paragraph. If you'd like to speak with a confidential resource, those include Counseling and Psychological Services, the University's Ombuds Office, and the [Gender Violence Services Coordinators](#). Additional resources are available at [safe.unc.edu](#).

Policy on Non-discrimination: The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's [Policy Statement on Non-Discrimination](#) offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, sex, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered, and that equitable and consistent standards of conduct and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (email reportandresponse@unc.edu or see additional contact info at [safe.unc.edu](#)) or the [Equal Opportunity and Compliance Office](#). Please note that I am designated as a Responsible Employee, which means that I must report to the EOC any information I receive about harassment or discrimination. If you'd like to speak with a confidential resource, those include Counseling and Psychological Services and the University's Ombuds Office.

Accessibility Resources UNC-Chapel Hill facilitates the implementation of reasonable accommodations for students with learning disabilities, physical disabilities, mental health struggles, chronic medical conditions, temporary disability, or pregnancy complications, all of which can impair student success. See the ARS website for contact and registration information: <https://ars.unc.edu/about-ars/contact-us>

Syllabus changes: The instructor reserves the right to make changes to the syllabus including project due dates and test dates. These changes will be announced as early as possible. It is your responsibility to attend classes and keep track of the proceedings.