

Syllabus – STOR 655
Spring 2021 (January 19 – May 5)
TuTh 11:00am – 12:15pm
Phillips 0381

Instructor: Jan Hannig

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Office Hours: MW 2:00 – 3:00PM

Course home page on

and by appointment. Office hours will be
on zoom!

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

Zoom link for Office hours:

<https://unc.zoom.us/j/91787829144?pwd=bFQwUW9HUG85d2VaZkZvRVBFV1gwdz09>

Meeting ID: 917 8782 9144

Passcode: HanesHall

Zoom link for lectures (if needed)

<https://unc.zoom.us/j/99881628876?pwd=bEE3akgzcEFBYVhVZG1wblg5Y0N4UT09>

Meeting ID: 998 8162 8876

Passcode: HanesHall

Teaching Assistant: Hang Yu

E-mail: hui0201@live.unc.edu

TA zoom:

TA Office Hour:

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 available remotely via zoom if you are not comfortable with in person instruction.

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: Friday, May 7, 12:00noon – 3:00 PM
(see the published university schedule)

Midterm exam: Tuesday, March 9 in class.

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 but should 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

Note: The instructor reserves the right to make any changes he considers academically advisable. It is your responsibility to attend classes and keep track of the proceedings.