

Syllabus – STOR 655
Spring 2016 (January 11 – April 27)
TuTh 2:00-3:15p
Hanes 125

Instructor:	Jan Hannig	Phone: (919) 962-7511
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Office Hours:	MW 2:00 – 3:00PM and by appointment	Course home page on http://www.unc.edu/~hannig/STOR655
TA:	Xi Chen	TA's E-mail: xich@live.unc.edu
TA Office:	Hanes B 48	TA's Office Hour: W 1:00 – 2:00PM

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

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 multiple testing procedures, multivariate normal distribution, asymptotic statistics and additional topics.

Course Format: Traditional lecture

Assessment: Your grade will be based on a midterm exam (40% of the grade), a final exam (50% of the grade) and weekly homework sets (10% of the grade). The instructor might also assign “extra credit problems” from time to time.

Important dates:

Final Exam:	Thursday, May 5, 12:00 – 3:00P M
Midterm exam:	Thursday, February 25.
Homework:	Homework sets will be usually assigned on Thursday and due Thursday next week at the beginning of the class. 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: We plan to cover the following topics

1. Multiple testing adjustment (Bonferroni, Benjamini-Hochberg)
2. Concentration inequalities
3. Convergence in probability
 - a. Definition
 - b. Continuous and uniformly continuous functions
 - c. Closure properties of in-probability convergence[*]
 - d. Weak law of large numbers
4. 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
5. 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
6. Other / Special Topics, time permitting
 - a. Projections and U-Statistics
 - b. The EM algorithm
 - c. An introduction to MCMC

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.