Instructor: Robert Keener  
458 West Hall  
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Office Hours: Monday, 3:30–4:30 pm; Wednesday, 3:30–4:30 pm;  
Friday, 3:30–4:30 pm.

Text:  
Theoretical Statistics: Topics for a Core Course  
Robert Keener, Springer-Verlag, 2010

GSI:  
Seyoung Park  
437 West Hall  
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Office Hours: Thursday, 2:30–4:30 pm.

Grading:  
Homework: 20% (total)  
Midterm Exam: 30%  
Final Exam: 50%  
(Wednesday, April 25, 10:30 am to 12:30 pm)

SYLLABUS

1. Hypothesis Testing (2)  
Uniformly Most Powerful Tests; Duality Between Testing and Interval  
Estimation.

2. Large Sample Theory (3)  
Convergence in Probability; Convergence in Distribution; Maximum Likeli- 
hood Estimation; Medians and Percentiles; Asymptotic Relative Effici- 
ency.

3. Estimating Equations and Maximum Likelihood (5)  
Weak Law for Random Functions; Consistency of the MLE; Limiting Dis-
tribution for the MLE; Asymptotic Confidence Intervals; EM Algorithm;  
Limiting Distributions in Higher Dimensions; Robust $M$-Estimation of a  
Location Parameter.

4. Large Sample Theory for Likelihood Ratio Tests (5)  
Generalized Likelihood Ratio Tests; Contiguity; Asymptotic Distribution  
of $2 \log \lambda$.

5. Nonparametric Regression (4)  
Kernel Methods; Hilbert Spaces; Splines; Density Estimation.

6. Bootstrap Methods (4)  
Bias Reduction; Parametric Confidence Intervals; Accuracy for Averages.

7. Bayesian Inference (4)  
Hierarchical Modeling; Markov Chains; Metropolis Hastings Algorithm;  
Gibb’s Sampler; Applications.