STAT 610	MATHEMATICAL STATISTICS: ESTIMATION	FALL 2005

Instructor: Robert Keener
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Office Hours: Monday, Wednesday, 9:00–10:00 am
Friday, 10:30–11:30 am

Text: Draft for a book I am writing.

Optional Text: *Theory of Point Estimation (Second Edition)*
Lehmann and Casella, Springer-Verlag, 1998

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Office Hour: Wednesday 3:00–4:00 pm

Grading:

Homework:	20% (total)	
Midterm Exam:	30%	
Final Exam:	50%	
(Monday, December 19, 1:30–3:30)		

SYLLABUS

1. Introduction (1)
2. Probability and Measure (4)
   Measures; Integration; Events, Probabilities, and Random Variables; Null Sets; Densities; Expectation; Random Vectors; Covariance Matrices; Product Measures and Independence; Conditional Distributions.
3. Exponential Families (2)
   Densities and Parameters; Differential Identities; Dominated Convergence; Moments, Cumulants, and Generating Functions.
4. Sufficiency, Completeness, and Ancillarity (3)
   Sufficient Statistics; Factorization Theorem; Minimal Sufficiency; Completeness; Convex Loss and the Rao-Blackwell Theorem.
5. Unbiased Estimation (3)
   Minimum Variance Unbiased Estimators; Second Thoughts About Bias; Normal One Sample Problem—Distribution Theory; Normal One Sample Problem—Estimation.
6. Curved Exponential Families (2)
   Sequential Experiments; Multinomial Distribution and Contingency Tables.
7. Conditional Distributions (3)
   Joint and Marginal Distributions; Conditional Distributions; Building Models; Proof of the Factorization Theorem.
8. Variance Bounds and Information (1)
   Lower Bounds; Higher Dimensions
9. Bayesian Estimation (2)
   Formulation and the Main Result; Examples; Utility Theory.
10. Large Sample Theory (3)
    Convergence in Probability; Convergence in Distribution; Maximum Likelihood Estimation; Medians and Percentiles; Asymptotic Relative Efficiency.
11. Estimating Equations Maximum Likelihood (4)
    Weak Law for Random Functions; Consistency of the MLE; Limiting Distribution for the