STAT 610: STATISTICAL INFERENCE, FALL 2010

1 Instructor and Course Information

- **Instructor:** Moulinath Banerjee
- **Office:** 451, West Hall
- **Email:** moulib@umich.edu
- **Course Page:** http://www.stat.lsa.umich.edu/∼moulib/stat610.html
- **Office Hours:** Monday: 2:00 – 4:00 pm and by appointment.
- **Primary Text:** Theoretical Statistics: Topics for a Core Course, by *Robert W. Keener*
- **Supplementary Text:** Theory of Point Estimation by *Lehmann and Casella*.

2 GSI information

- **GSI:** Toshiya Hoshikaya
- **Office:** 437, West Hall
- **Email:** toshiyah@umich.edu
- **Office Hours:** To be decided.

3 Grade Distribution

- 6 (approximately Biweekly) Homeworks with the best 5 to count. *20 points*
- Test 1 on Monday, October 25, in class. *30 points*
- Test 2 on Monday, December 13 (time and place to be decided). *50 points*

SYLLABUS

- 1 Introduction
- 2 Probability and Measure: *Measures; Integration; Events, Probabilities, and Random Variables; Null Sets; Densities; Expectation; Random Vectors; Covariance Matrices; Product Measures and Independence; Conditional Distributions*.
- 3. Exponential Families: *Densities and Parameters; Differential Identities; Dominated Convergence; Moments, Cumulants, and Generating Functions*.

- 4. Sufficiency, Completeness, and Ancillarity: *Sufficient Statistics; Factorization Theorem; Minimal Sufficiency; Completeness; Convex Loss and the Rao-Blackwell Theorem*.
- 5. Unbiased Estimation: *Minimum Variance Unbiased Estimators; Normal One Sample Problem—Distribution Theory; Normal One Sample Problem—Estimation; Variance Bounds and Information; Variance Bounds in Higher Dimensions*.
- 6. Curved Exponential Families.
- 7. Conditional Distributions: *Joint and Marginal Distributions; Conditional Distributions; Building Models; Proof of the Factorization Theorem*.
- 8. Bayesian Inference: *Formulation and the Main Result; Examples; Empirical Bayes*.
- 9. Hypothesis Testing: *Simple versus Simple Testing; Uniformly Most Powerful Tests; Duality Between Testing and Interval Estimation*.
- 10. Construction of Estimates in Parametric Models: *Method of Moments; Maximum Likelihood; Equivariant Estimation*.