

# Syllabus for Statistics 612 - Fall 2006.

Moulinath Banerjee

*University of Michigan*

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## 1 Instructor information.

**Instructor:** MOULINATH BANERJEE.

**Office:** 451, West Hall.

**e-mail:** moulib@umich.edu

**Course web-page:** [www.stat.lsa.umich.edu/~moulib/stat612.html](http://www.stat.lsa.umich.edu/~moulib/stat612.html)

**Office Hours:** Walk-ins or by appointment.

## 2 Course information.

In what follows I will attempt to describe what one would ideally like to cover for the course, though depending on time constraints we may end up covering a subset of the topics listed below. Let me first list down a set of books and notes that are relevant/potentially relevant.

- (1) Stat 612 Notes 0 – 5, on the course webpage. There are some typos here, so be a bit careful when reading. I'll try to pick out as many as I can.
- (2) Bob Keener's notes for Statistics 610–612. Jon Wellner's lecture notes posted on the Stat 612 webpage.
- (3) Elements of Large Sample Theory, Lehmann.
- (4) Testing Statistical Hypothesis, Lehmann and Romano.
- (5) Theory of Point Estimation, Lehmann and Casella.
- (6) Asymptotic Statistics, van der Vaart.

- (7) Convergence of Probability Measures, Billingsley.
- (8) All of Nonparametric Statistics, Wasserman.

**TOPICS:**

- (a) Asymptotic Theory for Likelihood Based Inference (emphasizing Parametric Models), Efficiency and Large-Sample Optimality. Some references are: 612 Notes, 0–3, Chapters 11–13 of Lehmann and Romano, Chapter 6 of Lehmann and Casella, Chapter 7 of Lehmann, Chapters 2–4 of Wellner’s lecture notes.
- (b) Density Estimation and Nonparametric Regression (Wasserman is a good general reference, but not for (i); also, see Chapter 24 of van der Vaart). Three main topics will be discussed: (i) Isotonic Regression (Stat 612 notes, 4–5). (ii) Kernel Density Estimation (Chapter 6 of Lehmann). (iii) Spline based estimation (Keener’s lecture notes).
- (c) Weak Convergence in Metric Spaces. (Billingsley and Keener’s notes)
- (d) Resampling Techniques. (Chapter 15 of Lehmann and Romano, Chapter 6 of Lehmann, Keener’s lecture notes, “The Bootstrap and the Jackknife” from Wellner’s lecture notes, Chapter 3 of Wasserman; related books: Efron and Tibshirani’s “An Introduction to the Bootstrap” and Politis, Romano and Wolf’s “Subsampling”)
- (e) Empirical Processes and the Functional Delta Method. (Chapters 19 and 20 of van der Vaart; two classics are Shorack and Wellner’s “Empirical Processes with applications to Statistics” and van der Vaart and Wellner’s “Weak Convergence and Empirical Processes”)
- (f) Empirical Likelihood. (“Empirical Likelihood” by Art Owen).