SYLLABUS FOR MATH 6262: Statistical Estimation.

- TEACHER: H Matzinger, matzi@math.gatech.edu, I Popescu, ipopescu@math.gatech.edu
- WHERE and WHEN: 4:30 pm - 5:45 pm, MW Skiles 171
- OFFICE HOURS: I. Popescu, Tuesday 4-6pm in Skiles 260.
- TEXT BOOKS: Lehmann and Casella, Theory of Point Estimation and
  Hogg, Mckean, Craig, Introduction to Mathematical Statistics.
- FINAL GRADE: consists of 60% of the work during semester and 40% final. Typically, the midterms count 3 times more than the quizzes since the quizzes will only take 30 minutes. There may be a few quizzes.
- There will be fun projects with R or Python! :) :) :) (SOMETHING TO BE LOOKING FORWARD TO)!
- MIDTERMS: There will be at least three mid-terms. The midterms contain problems like in the practice tests. The tentative dates for the midterms are: January 30th, February 25th and April 15th. The final is on Wednesday, May 1 2:40 PM 5:30 PM.
- HOMEWORK: For most homework, solution sets will be send over the internet and they will not be collected nor graded.
- FINAL EXAM: consists mainly of problems like in the midterms, homework and proofs.
- We work according to the Georgia Tech Honor code: http://www.honor.gatech.edu

COURSE DESCRIPTION:

- sufficient statistics. exponential families.
- stistical decision theory: geometry of decision problems, the fundamental theorem of game theory and its use in statistical decision theory, specialized techniques for finding minimax and Bayes estimators in standard problems of estimation
- The Bayesian viewpoint: solving the no-data problem and using it in univariate and multivariate settings, detailed analysis for conjugate priors
- Optimality under restrictions: Minimum variance unbiased estimation: the Rao-Blackwell and Lehmann-Scheffe theorems

- Equivariant estimation: invariance of statistical problems under groups and some applications in estimation
- Asymptotic theory of estimation:
  - General notions of asymptotic optimality: Hodges counterexample
  - Le-Cam's theorem on asymptotic optimality
  - Asymptotic optimality of maximum likelihood estimators, special cases including logistic regression
  - Robust estimators (M, L, and R) and their asymptotic relative efficiencies
  - Asymptotic optimality of Bayes estimators including higher order analysis characterizing asymptotic posterior distributions