ISyE 6412  Theoretical Statistics  Fall 2010

Instructor:  Nicoleta Serban (nserban@isye.gatech.edu) 438 Groseclose Building

Class Meets:  Monday, Wednesday 12:05-1:30pm IC 217.
Office Hours:  Tuesday 1-2pm. Please come prepared.

Class Email:  isye6412a@mail.isye.gatech.edu
Most of our class material and course discussions will be submitted via class email including
• Course syllabus
• Homework assignments and due dates
• Questions and replies for homework assignments, exams, etc.

Web Address:  T-square
Class material available on our website includes:
• Course syllabus
• Homework assignments and solutions
• Announcements and class notes
• Your course grades on tests and homework

Optional:

This course will cover the fundamentals of theoretical statistics. Topics include: point and interval estimation, hypothesis testing, data reduction, convergence concepts, Bayesian inference, nonparametric statistics and bootstrap resampling. We will cover Chapters 5 - 10 from Casella and Berger plus some supplementary material. This course is excellent preparation for advanced work in statistics and machine learning.

Class Notes:  Class notes will be posted on the web regularly.  Bring a copy to class. The notes are not meant to be a substitute for the book and hence are generally quite terse. Read both the notes and the text before lecture. Sometimes I will cover topics from other sources.
Pre-requisites: ISYE 2027 & 2028 (or equivalent); Solid math skills (especially calculus). The students’ probability backgrounds are expected to be at the level of Ch. 1-5 of the textbook.

Honor Code: For any questions involving Academic Honor Code issues, please consult me, the class teaching assistant, or www.honor.gatech.edu.

Homework: Assignments are due on Wednesday classes. There are 11 assignments in total. The lowest homework-score will be dropped. Late Homework will not be accepted. No make-ups.
You are allowed (and encouraged) to work together with other students on homework assignments, as long as you write up and turn in your own solutions. You are also allowed (and encouraged) to ask me questions, although you should try to think about the problems before asking.

Midterms: There will be two midterm during the class. The midterms are close notes (including homework solutions) and close textbook but two one-sided page with formulas will be allowed. Do not write homework solutions on the formula sheet. I will provide additional formulas, for example, the densities, cdf’s, expectations and variances of most important distributions. No make-ups.
Midterm Dates: October 4th and November 8th

Final exam: The final is a 3-hour exam reviewing the material (lectures and assignments) provided in this course throughout the full semester. The exam is close notes and close textbook but two (one-sided) pages with formulas will be allowed. Do not write homework solutions on the formula sheet. No make-ups.
Date: December 13th

Grading: The course grade is based on Homework (25%), Midterm I (20%), Midterm II (20%) and Final Exam (35%).

Course Topics
• Review of Chapters 1-4
• Vapnik-Chervonenkis (VC) Theory
• Convergence
• Data Reduction and Likelihood Principle
• Estimation Methods
• Measures of Estimation Performance
• Asymptotics
• Hypothesis Testing
• Confidence intervals and Regions
• Nonparametric Inference
• The Bootstrap
• Bayesian Inference
• Prediction and Classification
• Model Selection