ISyE 6416 A. Computational Statistics

Instructors: Xiaoming Huo, Groseclose 335,
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Class time and Venue: XXX
Office Hours: After class, (or email for appointments)
Contents:
1. Introduction
   o Overview of Software: Matlab, C, SAS, SPSS, JMP, etc.
2. Basic Tools
   o Quick sort
   o Bisection
   o Minimum in constrained optimization
   o Newton's method
   o Iterative solutions to linear equations
   o Eigen decomposition
3. Stat Models
   o Regression
   o Splines
   o Wavelets
   o Fourier Transform
4. Statistical Methods
   o Generating Random deviates
   o Independent Monte Carlo
   o Finite State Markov Chain
   o Monte-Carlo Markov Chain
   o Tree based methods
   o Spatial statistics
   o Cross validation
   o EM algorithm
   o Boostrapping

Textbook/Course Readings:
- Required: "Numerical Analysis for Statisticians," by Kenneth Lange.
- Papers that will be specified in class.

Prerequisites: "Semester level ISYE 2028 Minimum Grade of B."

Grading:
o There are roughly biweekly *homework* assignments.
   Late Homework will not be accepted. You are allowed (and encouraged) to work together with other students on homeworks, 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. I strongly encourage you to work on extra problems from the book on your own.
o *Exams* include two midterms. They are close book. For the midterms I and II, students are allowed to bring four and eight pages (two-sided, or equivalently 8 and 16 one-sided pages) notes, respectively. On the notes, you can write down anything you like. But they have to be **self-made**. Do not copy from others.

- A *make-up exam* requires a written documentation with proper excuse. Please keep in mind that it takes time to prepare a make-up exam. In general, I will not allow makeup exam unless the excuse is extremely compelling.
- There is no final exam. You are required to work on a final project, and give an eight minute presentation on your project in the last two weeks of the semester.
- Distribution of points:
  - Class Attendance 2 %
  - Homework & Projects 25 %
  - Two Midterms 23 % + 25 %
  - Final project and presentation 25 %

Class Mailing List: we use the mailing list in the T-square.

Academic Honor Code: It is your responsibility to get familiar with the Georgia Tech Honor Code. Use of any previous semester course materials is allowed for this course; however, I remind you that while they may serve as examples for you, they are not guidelines for any tests, quizzes, homework, projects, or any other coursework that may be assigned during the semester. For any questions involving these or any other Academic Honor Code issues, please consult me, or visit www.honor.gatech.edu.

Zero-tolerance policy: any violation of honor codes (e.g., cheating in hws, tests, etc) will result in an automatic F in this class.

Other Class Related Rules. No laptop use during lecture, unless instructor said otherwise. No eating. Avoid late arrival and early departure-they are distractive.