Computational Methods in Statistics

Instructor: Xin Qi
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Class: TR: 5:30pm - 6:45pm, in Classroom South 100
Office Hours: TR: 4pm-5pm, or by appointment

Prerequisites: Math 4752/6752— or equivalent.

Materials:

Reference books:
(1). *Statistical Computing with R*, by Maria L. Rizzo. Publisher: Chapman and Hall/CRC, the first edition, 2007,

Software: We will use the R statistical software which a language and environment for statistical computing and graphics. I will provide as many codes as possible in class. However, you should be able to write codes for your homework which are not provided.

Course objectives:

This course consists of three parts. First, I will introduce basics of R language such as data structures, flow control, functions, random variable generating, graphics and so on (topics in Chapters 1,3,4 of the book *Statistical Computing with R*). Second, I will introduce important numerical methods which will be implemented in R (topics in Chapters 11 of the book *Statistical Computing with R*). Third, I will introduce some popular methods in statistical learning (or machine learning) using R, such as linear regression with Ridge or LASSO penalties, linear methods for classification, support vector machine and so on (topics in book *The Elements of Statistical Learning*).
Grading Policy:

Grading will be based on homework assignments, two mid-terms and two course projects. Your grade will be based on the following percentages.

- 30% Homework (about 10 assignments)
- 30% Two Mid-term exams
- 40% Two projects

Final grades will be determined as follows:

- A+: 97----100
- A: 93----96
- A-: 90----92
- B+: 87----89
- B: 83----86
- B-: 80----82
- C+: 77----79
- C: 70----76
- D: 60----69
- F: 0-----59

Homework:

There will be a homework assignment in each week (about ten assignments). The homework is due in Tuesday’s lecture. Each homework assignment is worth 3 points. Try your best to solve all homework problems. You will get all the 3 points if you hand in homework on time and solve most problems. Late homework will be accepted up to the next class on Thursday with 1.5 points taken off. However, in the case of an officially documented emergency situation, I will extend the due day based on your situations and not take off your points. Occasionally, I will assign some hard homework problems with extra credits.

Projects:

Two projects will be assigned during the semester. One is around mid-point in this semester and the other is at the end of the semester. No teamwork for the project.

Exam:

There are two mid-terms each worth 15 points. One is around mid-point in this semester and the other is at the end of the semester. Only two 8.5 x 11 in. formula sheet (four sides) and a calculator are permitted in the exam. There is no final exam.

Teaching materials:

Teaching materials such as syllabus, slides, homework assignments, sample exams, will be uploaded to iCollege (https://gastate.view.usg.edu/) and will be sent by emails. I will assign homework, announce exams and notify other issues by email. If you do not receive any email from me by the end of this week, send me an email and I will add you in the class email list.

Some important days:
The last day to withdraw from the class and receive “W” is **Feb. 27th**.

**Disruptive Behavior:**

Behavior that disrupts the classroom learning environment will not be tolerated. Such behavior includes talking during class, use of cellular phones or other electronic devices during class, and violent or abusive behavior or speech. Students exhibiting such behavior will be removed from the class, and/or be withdrawn from the course with a grade of WF.

**Academic honesty:**

You are permitted and, in fact, *encouraged* to talk to other students, or me about homework. I may give you clues or discuss similar problems without doing your homework for you. However, you may not present other people’s work as your own. If you work with other students solving problems, make sure that you write up your own solution independently. It is not acceptable for one student to write a solution for another student to copy. Plagiarism will result in a score of zero on the test or paper, or dismissal from the course. Also, the Dean of Students office will be notified.

You must work independently during exams. You may not share calculators or pass notes during the exams.

**Students with Disabilities:**

Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

For more information about services available to GSU students with disabilities, contact

The Margaret A Staton Office of Disability Services  
Suite 230 Student Center  
Georgia State University  
Voice and TDD Telephone: (404) 463-9044  
Web Address: [www.gsu.edu/disability](http://www.gsu.edu/disability)

**This syllabus provides a general plan for the course. Deviations may be necessary. Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation.**