Stat-S610: Statistical Computing

Meeting time: Tu/Th 2:20-3:35pm — Meeting location: BH307
Website: http://jfukuyama.github.io/teaching/stat610

Instructor: Prof. Julia Fukuyama — jfukuyam at iu dot edu
Office hours: Mondays and Fridays, 12:45-1:45pm

Associate Instructor: Mr. Mason Griswold — migriswo at iu dot edu
Office hours: TBA — Swain East 200

Occasional lab: Fridays 2:20-3:35pm, SW220

1 Course Overview

As a statistician, you will need to manipulate data, optimize, and simulate. You will also need to know enough about how the methods you use work to diagnose problems when they arise and to be able to implement modified versions when the standard implementations don't suit your purposes.

You also need to write accurate, clean, maintainable, demonstrably correct code. To that end, the first half of the class will be devoted to how to program well, with statistical tasks giving us the computational problems.

Once we have the software engineering down, we will move on to the algorithms used in applied statistics. These can be roughly broken up into optimization methods and stochastic simulation methods.

A couple times throughout the semester, there will be a lab. This will involve a script that you can go through with the TA involving some more complicated material.

2 Textbooks

The primary textbook for the first half of the course with be *The Art of R Programming*, by Norman Matloff.

The R Cookbook, by Paul Teetor, will also be useful.

The primary textbook for the second half of the course will be *Numerical Analysis for Statisticians*, by Kenneth Lange. It is available through the library at this link for IU students.

Additional readings will be posted on the course website.

3 Assessment

Assessment will be based on a combination of homework, an in-class midterm, and a final project. Final grades will be based on:

- 15% homework
- 35% midterm exam
- 40% final project
- 10% participation

3.1 Participation

- Full points for participation can be obtained by participating in class or by sending me mail (~3x over the course of the semester) about mistakes in the notes.
- Showing up to class consistently is worth 6 of 10 participation points, with the remainder being more active participation (asking/answering questions).
- If you send me mistakes in the notes, for them to count towards participation you will need to include the keywords "610", "participation", and "correction" in the email, preferably in the subject line.

3.2 Homework

For homework, we will discuss more on the first day of class. The plan is:

- There will be homeworks assigned most weeks.
- Homeworks will be graded out of 2 points, with 2 points being a good-faith effort, 1 point being "something was turned in but it is embarrassing," and 0 points for not turning anything in. Homework has been downweighted relative to previous years due to the relative ease of cheating on coding assignments.
- Homeworks will generally be due on Wednesdays.
- At the time the homework is assigned, we will often not have covered all the material needed to complete the homework, but we will have covered everything by the week before the due date. The idea is to give you the homework early enough that you can think about it while the material is being covered in lecture. Therefore, it will generally be a good idea to take a look at the homework when it is assigned even if you aren't able to complete all the problems yet.
- If you have any concerns about the format for the homework, feel free to email them or to submit them (anonymously) at the form here.

3.3 Midterm exam

The midterm will be held on Tuesday, October 21. It will be in class, on paper, closed book, and closed notes. I will provide a study guide describing the kinds of questions you will be expected to answer beforehand.

3.4 Final project

We will have final project demonstrations the last week or two of class. Final project writeups will be due on the day the final exam is scheduled for (Tuesday, December 16). There will be no final exam.

4 Late policy

Each student has five "free" late days to use on assignments. After that, homework is penalized at one point (out of two, remember!) per 24 hours. Special accommodations may be granted if you ask very early or if there are extenuating circumstances. These late days cannot be used on the final project, as it is due on the day of the final exam and I need to submit grades soon afterwards.