STAT 428: Statistical Computing

Syllabus

Dr. Ravat, Fall 2017

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Course Overview

Computational skills are essential for statisticians in any area. Students having successfully completed this course will have the necessary computational background for research in any statistics-related field. This course examines theory, statistical packages and graphics for standard numerical methods such as random number generation, integration, optimization and simulation-based methods such as Monte Carlo and bootstrap.

The class will be taught in the R language.

Prerequisite

Stat 410 and some experience with R. Students with programming experience in a language other than R, would need to invest more time learning R syntax.

Course Information

Location and Time

- **Lecture Location:** 1002 Lincoln Hall
- **Time:** MWF, 9:00 AM - 9:50 PM

Course Staff

Instructor

- **Name:** Uma Ravat (https://faculty.math.illinois.edu/~umaravat/)
- **Email:** Click Here. (email_policy.html)
- **Office:** 112A Illini Hall (http://ada.fs.illinois.edu/0065.html)
- **Office Hours:** Wednesday, noon - 1 PM, Friday, 10:00 AM - 11:30 PM, or by appointment.

Teaching Assistant

- **Name:** Fan Yang
- **Email:** Click Here. (email_policy.html)
- **Office Hours:** 5:30 - 7pm on Tuesday, Thursday in Room 122 Conference Room in Illini Hall

Discussions on Piazza

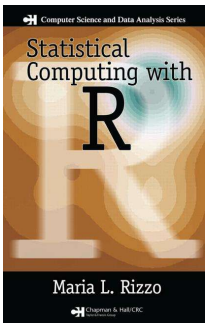
Class discussions will be run through Piazza, linked here (http://piazza.com/illinois/fall2017/stat428)

- Please post questions on Piazza rather than by email.

- Make sure you have read previous discussions to see if your question has already been answered
- Use email *only* when absolutely necessary for questions of personal nature and make sure you follow the email policy below
- You may answer questions on Piazza, but make sure you follow guidelines for posting and answering questions on Piazza as mentioned below. Most importantly, do not post homework solutions or complete code on Piazza, or Piazza may go away.

Textbook

Statistical Computing with R (http://personal.bgsu.edu/~mrizzo/SCR.htm) (2008), by Maria Rizzo.



We will cover Chapters 1-3, 5-11 from the book. Exercises from the textbook will be assigned as homework problems. Occassionally, problems outside the textbook may be assigned.

All R code for examples from the book are available at the above link.

Software

- R (http://cran.r-project.org/), RStudio (https://www.rstudio.com/), LaTex (https://latex-project.org/) software will be used and all are free to download.

R (http://cran.r-project.org/)

is a free, open-source programming language for statistical computing. Almost all of our work in this class will be done using R. You will need regular, reliable access to a computer running an up-to-date version of R. If this is a problem, let the professor know right away.

RStudio (https://www.rstudio.com/)

is a free, open-source R programming environment. It contains a built-in code editor, many features to make working with R easier, and works the same way across different operating systems. Most importantly it integrates R Markdown seamlessly. Use of RStudio is required for the scribing, homeworks, and strongly recommended in general.

LaTex (https://latex-project.org/)

is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents.

Course Management Software

Compass2g (https://compass2g.illinois.edu/webapps/login/)

will be used for submitting assignments electronically, to post course related announcements, notes and as a gradebook. All properly enrolled students should have access to the Compass2g site by the beginning of classes.

Piazza (http://piazza.com/illinois/fall2016/stat428)

will be used for Course discussions.

Getting started with RStudio and R

- Go over Getting started with RStudio and R (./Tutorial/Settingup_RStudio_R.html) for downloading, installing and Resources to get you started with RStudio and R.

Email Policy

Due to the large size of this course, we follows a strict email policy (email_policy.html).

Course mechanics and grading

The course will consist of

1. Lectures
2. Homework
3. Exams
4. Group Project

as explained below.

1. Lectures

Lectures and/or in-class labs will be held each week.

Attendence

You are expected to attend all lectures. Failure to do so may not have a direct effect on your course grade, but will likely have a significant indirect effect. Any known or potential extracurricular conflicts should be discussed in person with the instructor during the first week of classes, or as soon as they arise.

2. Homeworks

Homework assignments will generally be due every other week on **Sunday night at 5:59pm on Compass2g** as per schedule on the course schedule page.

Detailed information about completion and submission, as well as grading of homework can be found in this homework policy note (homework_policy.html).

Please come talk to me if there are difficulties; problems/conflicts must be discussed IN ADVANCE, preferably in the first week of classes or as they arise and no later than noon on the day before the homework is due (which will typically be Friday). Emergencies on the day the homework is due (typically Sunday) that **you did not know of** by noon on the day before the homework due date (typically noon on the previous Friday) must be verifiable. If the emergency cannot be verified, the student is left to deal with the no late homework policy. Such emergencies must be discussed in person, pereferably during office hours. Private emails for such matters will be ignored.

3. Exams

There will be two in-class exams as per schedule below.

Since midterms are in class, no make up exam will be offered. So, please make a note of the exam dates in your calendar and set wake up alarms as necessary to make sure you show up prepared to take the exams.

Please come talk to me if there are difficulties; problems/conflicts must be discussed IN ADVANCE, preferably in the first week of classes or as they arise and no later than the day before the exam. Exceptional circumstances that prevent you from taking the exam on the exam day that **you did not know of by the day before the exam**, will need to undergo an ***excruitating*** verification process and are best avoided. (*A doctors' note will **not** suffice and you may be left to deal with the no make-up policy.*) Such exceptional circumstances must be discussed in person as soon as possible. Private emails for such matters will be ignored.

Exam 1 date, time and location

Week 7, Monday, Oct 9, in class

Exam 2 date, time and location

Week 14, Friday, Dec 01, in class

4. Group Project

You must work in a group with three students(<=3 students). Deadlines for various submissions for the Group Project will be announced later.

Course Grades

Type	Points
Homework	40
Midterm Exam I	15
Midterm Exam II	15
Group Project	30
Course Total	**100**

Grading Scale

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
TBD	93%	90%	87%	83%	80%	77%	73%	70%	67%	63%	60%

Grades are not curved or adjusted. This is not to dishearten students, but to let them know that their grade is based on individual effort and not on comparative effort.

Scribing will bump up your grade if you are on the border (e.g., B+ to an A-), assuming your scribed notes are done reasonably well and submission instructions are followed correctly.

Getting help

- When you have a question, do not hesitate to ask it.
  - If you are confused about something, others are likely confused as well.
  - Tell me if you notice something strange in the notes or books (it may be a typo!).
- Stay and ask questions right after class for short meetings.

Office hours

Instructor and TA office hours held each week as mentioned above. Please stop by for any questions!

If you want help with computing, please bring your laptop.

Piazza

Piazza will be used for class discussions, questions/answers. You should sign up right away; the signup link is: here (http://piazza.com/illinois/fall2017/stat428).

Piazza can be a very successful medium for helpful, class-wide discussions, but without rules, discussions can also quickly get out of hand. Here are the rules for our Piazza group:

- Be considerate to others (respectful language, no sarcasm).
- When it comes to the questions about the homework, "What is wrong with this code?" or "Help me with question 4." is not an acceptable question. Instead, explain what you have done to solve the question and explain why you cannot procceed.
- **Questions about the homework must be sufficiently generalized/modified/abstracted out so that it is not possible to directly construct parts or all of the solutions or code from them.**
- Think before you post. Content deemed inappropriate—by the above rules and otherwise—will be taken down by TAs or Professor and **Piazza may go away**.
- Questions should be placed in the right folder (e.g. hw1, week 1 discussions, general, other). Tags are also encouraged.
- Anonymous posting of questions and replies will be allowed, at least initially; if this leads to problems it may go away. Do remember, TAs and Professor can see you!
- Private questions on Piazza (an option for questions that only TAs and Professor can see) have been explicitly disallowed, because the TAs and Professor may not be able to answer private questions in a timely manner.
- If your question is posted between 9:00 AM Monday and 11:59 PM Thursday, **and you follow the above directions**, we will try our best to respond within 24 hours.
- Homework questions posted the same day a homework is due will likely not receive a response before the homework is due. Plan accordingly.

Academic Integrity

You are encouraged to discuss course material, including assignments, with your classmates. Homework assignments are meant to be learning experiences. You may discuss the exercises with other students, but you must write-up the solutions on your own. **In short, do not cheat, it is not worth the risk.** ***You are more likely to get caught than you believe.*** If you think you may be operating in a grey area, you most likely are. To ensure that you do not violate the academic integrity policies, all code and solutions should be prepared yourself. All code should be typed yourself, **not** copy and pasted. (Except for code provided in class.)

All work you turn in must be your own. This includes both written explanations, and code. Acknowledge any help received on your assignments. Copied assignments will receive no credit.

Copying from other students, books, websites, or solutions from previous versions of the class,

1. does nothing to help you learn how to program,
2. is easy for us to detect, and
3. has serious negative consequences for you, as outlined in the university's policy on cheating and plagiarism which can be found in Article 1, Part 4 of the Student Code. Section 1-402 in

particular outlines behavior which is considered an infraction of academic integrity. (http://studentcode.illinois.edu/article1_part4_1-402.html). If, after reading the policy, you are unclear on what is acceptable, please ask the instructor.

The midterm exams are in-class, and obviously must be done completely independently. Copying or any other form of cheating will result in a 0 for the exam, and possibly a more severe sanction depending on the circumstances.

Safety

The university values your safety. Please read this document (http://police.illinois.edu/dpsapp/wp-content/uploads/2016/08/syllabus-attachment.pdf) or watch this video (http://police.illinois.edu/emergency-preparedness/run-hide-fight/).

Disability Accommodations

To obtain disability-related academic adjustments or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-4603, e-mail disability@illinois.edu (mailto:disability@uiuc.edu) or go to the DRES website (http://disability.illinois.edu/).

Changes

The instructor reserves the right to make any changes she considers academically advisable. Such changes, if any, will be announced in class. Please note that it is your responsibility to attend the class and keep track of the proceedings.