

## STAT 540, Computing in Statistics -- Fall 2019

### Instructor:

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Course Web Page: <http://people.stat.sc.edu/hitchcock/stat540.html>

### Class Meeting Times:

Tues & Thurs 1:15 pm - 2:30 pm, LeConte College 210 or **via distance by streaming video**

### Office Hours:

Mon, Tues, Wed, Fri 9:30-10:30 a.m., or **please feel free** to make an appointment to see me at other times.

**Textbook:** *The Little SAS Book: A Primer*, 5<sup>th</sup> edition (earlier editions are probably OK too, but the 5<sup>th</sup> edition should be widely available), by Delwiche and Slaughter.

**Required Supplementary Material:** Available for download: *Basics of R: A Primer*, by Don Edwards. You should download this at the course web page.

Recommended to look at: *Introduction to R*, Available at CRAN: <http://www.r-project.org> (click "Manuals" at left side of page; then choose the first manual, "Introduction to R").

**Required Computing Resources:** Access to a computer with R (available as a free download from the [CRAN](http://www.cran.r-project.org) home page) and SAS (students who want SAS can buy a copy from USC Computer Services\*, but see below for a free SAS alternative). We will be using these computer packages throughout the course. R is available for free download. Instructions are given on the course web page, and everyone should probably install R on his/her own computer.

(1) You will need to create a student account in **SAS OnDemand for Academics** in order to access (for free) SAS Studio or SAS Enterprise Guide. Instructions are given on the course web page. You will receive an enrollment link in an email from the course instructor. In addition, SAS is available in some of the labs around campus.

(2) SAS licenses are available for student use for a fee from USC (accessed via the Technology tab in VIP).

**Course Outline:** Edwards' primer, plus most of chapters 1-8 of the Delwiche & Slaughter textbook. Topics covered include: Objects in R; Inputting and Outputting Data in R; R Graphics, Functions, Arithmetic, Logicals, Conditional Execution, Subsetting, Sorting, Iteration; Random Variables and Simulation Studies; Introduction to SAS; Reading and Writing Data; Working with Your Data; Sorting, Printing, Summarizing Data; Modifying and Combining Data Sets; MACRO programming in SAS; ODS output in SAS; PROC SGPLOT

### Class Lectures:

You may attend the lectures live on Tuesdays and Thursdays in LeConte 210, or you may watch them live online via Adobe Connect, or after the fact by viewing the lectures that are posted on the Blackboard STAT 540 course page (click the Course Lectures Playlist link on the left side of the page). Information about how to access online lectures has been emailed to you.

**Homework:** Homework exercises will be assigned on the course web page. Due dates will be given on the course web page. Late homework will be penalized. The homework will typically involve writing some programs/code (along with explanatory comments) in R or SAS.

**Each student's homework must be done independently.** You may ask each other informal questions about the homework, but everyone is to do his/her own work. If homework is found to be copied, all students involved will receive a 0. Of course, you may always ask me questions about the homework. [To be clearer, students can ask each other informal ORAL questions about homework, but **cannot look at or copy each other's homework papers or code.** All submitted homework must be their own work.]

**Purpose:** To learn computing skills that will be useful to them both in academic endeavors and as working statisticians. Students will be introduced to programming using the free software package R and the widely used commercial software SAS. Programming skills, rather than straightforward data analyses, are emphasized in this course.

**Learning Outcomes:** Students should be able to

- Identify different object types in R and understand their uses
- Carry out arithmetic and logical operations in R and SAS
- Manage datasets in R and SAS, including sorting and subsetting
- Input, output, and manage complex datasets in SAS
- Produce high-quality graphics in R
- Save SAS output in presentation-quality formats
- Understand macro commands in SAS and construct simple macro programs.

**For Graduate Students:** Since 500-level courses are required to contain more rigor for graduate students than for undergraduates, there will be an extra short project required for graduate students. Undergraduate students may do this project for extra credit. The project will be due near the end of the semester. More information will be given out later in class.

**Disabilities:** Any student with a documented disability should contact the Student Disability Resource Center at 777-6142 to make arrangements for appropriate accommodations.

**Exams:** There will be two midterm exams and a final exam. All these exams will consist of multiple-choice questions about the concepts studied in the class, as well as short free-response coding problems. The midterm exams will be given in the classroom during the regularly scheduled class time. If you are not able to come to campus for the exams, you must contact Shannon Carson in the distributed learning office to set up a proctor. If you are on campus and not able to attend class live, you may either contact the distributed learning office to set up a proctor, or may arrange with me to take it at some other time. More information will be provided about these options closer to the test dates.

Exam 1: Tuesday, October 1

Exam 2: Tuesday, November 5

Final Exam: Tuesday, Dec. 10, 12:30 p.m.

**Grading:** The course grade will be based on the three exams (20% each) and homework (40%). A course average of 90-100 will result in an A, 87-89 a B+, 80-86 a B, 77-79 a C+, 70-76 a C, 67-69 a D+, 60-66 a D, and 59 or below an F.

For graduate students, the mandatory project will represent 5% of their overall grade, with the other grade components scaled proportionally.