Introduction to Advanced Programming in R

Spring 2020, STAT 33B

The course is designed primarily for those who are already familiar with programming in another language, such as Python, and want to understand how R works, and for those who already know the basics of R programming and want to gain a more in-depth understanding of the language in order to improve their coding. The focus is on the underlying paradigms in R, such as functional programming, atomic vectors, complex data structures, environments, and object systems. The goal of this course is to better understand programming principles in general and to write better R code that capitalizes on the language's design.

Instructor:	**Office Hours:**		**Lecture:**	
Nick Ulle	M 11am-12pm	387 Evans	W 9-10am	50 Birge
nick.ulle@berkeley.edu	W 2-3pm	387 Evans		
GSI:	**Office Hours:**		**Labs:**	
Sarah Johnson	W 1pm-4pm	432 Evans	F 10-11am	342 Evans
sarah_johnson@berkeley.edu	Th 10am-11am	432 Evans	F 11-12pm	340 Evans
			F 12-1pm	242 Hearst Gym

Reference Materials:

- [W] Advanced R (2nd Edition) by H. Wickham
- [N] An Introduction to Programming with R by D. Nolan

Grade Breakdown

Homeworks (30%): There will be 7 homework assignments. The homework assignments review concepts covered in lecture and lab. Your lowest homework score will be dropped. Late homeworks will not be accepted.

Lab Assignments (30%): There will be 7 lab assignments. Lab assignments will generally be due by midnight on Saturdays, but are meant to be finished in your lab section. Lab grading emphasizes completion rather than correctness. Your lowest lab score will be dropped. Late labs will be penalized 10% per day.

Quizzes (20%): There will be 4 quizzes, given during the lab session. Quiz questions are generally multiple-choice or fill-in-the-blank. Your lowest quiz score will be dropped. No make-up quizzes will be offered.

Final Exam (10%): There will be a final exam. The format will be similar to a quiz, but longer. See CalCentral for the exact time and location.

Attendance (10%): You must attend at least 10 of the 14 lectures to receive full credit. At some point during each lecture, there will be an attendance question. Your answer counts for attendance (even if it is incorrect). Waived beginning Mar 10, 2020.

Tentative Schedule (As of Mar 10)

This schedule will be updated throughout the semester.

W	Date	Lecture	References	Lab	HW Due
1	Jan 22	Syllabus; R syntax; Vectorization	N 1-3	No Lab	
2	Jan 29	Types; Data frames; S3 classes; Attributes	W 3	Lab 1	
3	Feb 5	Subsets: `[`, `[[`, `$`, and `subset`	W 4	Quiz 1	HW 1
4	Feb 12	Graphics: `plot`, lattice, ggplot2	N 4-6	Lab 2	
5	Feb 19	ggplot2; Reshaping data	Package Docs	Lab 3	HW 2
6	Feb 26	Merging data		Quiz 2	
7	Mar 4	Control Flow; Apply functions	W 5	Lab 4	HW 3
8	Mar 11	Functions; Lazy evaluation	W 6.1-6.3, 6.5-6.8	Lab 5	
9	Mar 18	Scoping; Closures; Environments	W 6.4, 7	Quiz 3	HW 4
S	Mar 25	Spring Break		No Lab	
10	Apr 1	R idioms; R gotchas		Review	
11	Apr 8	Warnings & errors; Debugging	W 8, 22	Lab 6	HW 5
12	Apr 15	Object Systems: S3, S4	W 13, 15, 16.2	Quiz 4	
13	Apr 22	Profiling	W 23	Lab 7	HW 6
14	Apr 29	Metaprogramming	W 17.1-17.5		
R	May 6	Review Week			HW 7