SIOB 296: "Advanced R Programming"

Dates: Tuesdays, January 9 - March 13, 2018
Time: 1400 - 1700
Location: Eckart Building, first floor, Sea Cave
Four Units, S/U Grading Only

Contact: Eric Archer
eric.archer@noaa.gov
858-546-7121

Course Description

This course is designed to teach intermediate and advanced R programming techniques to students who already have experience with the basics of R. We will cover concepts to help improve the performance and management of code, provide the tools necessary to conduct quality reproducible research, and develop and release full R packages.

Prerequisites

An introductory R course or equivalent experience is required. Students are expected to be familiar with basic R data structures, how to add and extract information from them through standard indexing techniques, reading and writing data, basic plotting, and writing and executing R functions.

Course Outline

The first hour and a half of each class will be a review of homework and lecture. In the second half, we will have individual and group work through tutorials. For a final project, students will work in groups to create a fully functional and documented R package that is hosted on Github.

Syllabus

Date	Topic
January 9	RStudio projects, RMarkdown, Git/Github
January 16	Package development
January 23	Package development
January 30	S3 and S4 classes
February 6	Code profiling and performance
February 13	Non-standard evaluation
February 20	ggplot
February 27	dplyr, tidyr
March 6	shiny
March 13	Final package presentation

Software

1) Students should come with the latest versions of R and RStudio installed on their laptops. They can be obtained at:

- R: https://www.r-project.org
- RStudio: https://www.rstudio.com
- Git: https://git-scm.com

2) In R, make sure you have the following packages installed (with dependencies):

- knitr
- devtools

3) Install a TeX distribution:

- Windows: MiKTeX (Complete) - http://miktex.org/2.9/setup (NOTE: Be sure to download the Complete rather than Basic installation)
- Mac OS X: TexLive 2013 (Full) - http://tug.org/mactex/ (NOTE: Download with Safari rather than Chrome *strongly* recommended)
- Linux: Use system package manager

4) Make sure you have an account set up on GitHub (https://github.com)

Suggested Text

- Wickham, H. 2014. Advanced R. CRC Press. 456pp. ISBN 978-1466586963

Other Resources

- Davies, T. 2016. The Book of R: A First Course in Programming and Statistics. No Starch Press. 832pp ISBN 978-1593276515

- Matloff, N. 2011. The Art of R Programming: A Tour of Statistical Software Design. No Starch Press. 400pp ISBN 978-1593273842

- R Bloggers: https://www.r-bloggers.com

- Base R Cheat Sheet: https://www.rstudio.com/wp-content/uploads/2016/10/r-cheat-sheet-3.pdf

- R Reference Card: https://cran.r-project.org/doc/contrib/Short-refcard.pdf

- Other Documentation: http://cran.stat.ucla.edu/other-docs.html