SIOB 296 - Introduction to Programming with R

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Course Description

This course will focus on establishing a solid fundamental understanding of data manipulation and analysis with R. No programming experience is necessary, and all backgrounds are welcome. We will start with an introduction to the R command line, followed by a detailed description of R data structures and how to manipulate them. The course will continue by covering commonly used R functions and students will then learn how to write their own functions and scripts. We will end by exploring visualization in R using base R graphics and the ggplot2 package. For the final project, students will write an R script to analyse their own data as well as edit R scripts from other students.

Software

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

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

Syllabus

Week 1 (4/4) R console, RStudio, data structures, vectors, indexing, logical operations, factors
Week 2 (4/11) indexing review, matrices and arrays, lists, data.frames
Week 3 (4/18) reading and writing data, common functions for data summary and selection
Week 4 (4/25) character and string manipulation, function writing and flow control
Week 5 (5/2) function review, `apply` family of functions
Week 6 (5/9) base graphics
Week 7 (5/16) ggplot2 graphics
Week 8 (5/23) statistics and model fitting
Week 9 (5/30) date and time handling, `tidyr` and `dplyr`, other special functions
Week 10 (6/6) project review

Text

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

Other Resources

- 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