University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

R Programming

2 credits

MEES 615B
Even Falls

Course Objectives / Overview

This course is for all new R users. No prior (R) programming experience is required. Through hands-on experience with examples, students will learn the basics of R language and related software.

This course will engage students into programming in the world's most popular language for statistical computing – R. Nowadays, R is used in governmental organizations, in academia, and in industry (i.e., everywhere) for everything from financial forecasting to studying new drug efficiency to evaluating the impacts of global warming. The goal is to train students in using R for their own research.

Students will learn R language with examples by practicing them in class on their machines (need to bring a laptop to each lecture). We will start from foundations – installing R and getting data into it – and will continue with blocks on data manipulation, visualization, writing reports and new functions. The course focuses on programming part (how to do this and that), however, R is a language for statistical computing, so some basic understanding of statistics is desired. Participants may need to consult a statistical text to interpret some of the results. This course covers only a few statistical procedures, it is not about statistical analysis.

Expected Learning Outcomes

After taking this course, students will be independent R programmers comfortable with finding, developing, and using R tools in their own research.

Course Assessment / Grading

This course is of tutorial type, thus, students' participation is very important and represents 25% of the final grade. It is expected that students will follow the instructor by writing their own code in class and communicating any issues that will arise. Other credits are earned for a homework (25%) and final presentation (50%). The course will be graded in a pass/fail system, with a passing grade of at least 50%.

INSTRUCTOR DETAILS:
Vyacheslav Lyubchich
lyubchich@umces.edu
410-326-7413

CLASS MEETING DETAILS:
Dates: M
Times: 3-5 p.m.
Originating Site: CBL
IVN bridge number:
(*******)
Phone call in number:
(***)
Room phone number:
(*****)

CURRICULUM FULLFILMENT:
Elective

Prerequisites
N/A

Teaching Assistant
N/A

Tentative Weekly Course Schedule

1. Getting started
2. Importing and exporting data, data extraction from online sources
3. Visualizing data using R graphics
4. Working with data frames, date and time objects
5. Using basic statistical functions
6. Preparing reports in R
   Homework due.

7. Sorting, printing and summarizing data
8. Modifying and combining data
9. Debugging
10. Code sharing and version control
11. Running simulations
12. Parallel computing
13. Writing R functions and packages
14. Class presentations (The last day of classes is reserved for project presentations. Time for each presentation will depend on the total enrollment and will be determined during the course.)

Required textbooks, reading and/or software or computer needs

Recommended reading:

- Venables, W. N., Smith, D. M. and the R Core Team. An Introduction to R. https://cran.r-project.org/manuals.html
- Torfs, P. and Brauer, C. 2014. A (very) short introduction to R. https://cran.r-project.org/doc/contrib/Torfs+Brauer-Short-R-Intro.pdf
- Crawley, M. J. 2013. The R Book (2nd edition). John Wiley and Sons. ISBN 978-0-470-97392-9 (available as e-book)
- CRAN Task Views. https://cran.r-project.org/web/views/

Required technology:
Personal computer with Internet access at the lectures with the following (free) software installed (recommended installing in the order listed):

- R (https://cran.r-project.org/)
- TeX Live (https://www.tug.org/texlive) or MiKTeX (http://miktex.org/download, for Windows) or MacTEX (http://www.tug.org/mactex, for Mac)
- R Studio (https://www.rstudio.com/products/rstudio/download/)
- Git (https://git-scm.com/downloads)
- GitHub Desktop (https://desktop.github.com)

Course Communication

UMCES Courseware Server (Moodle, https://moodle.cbl.umces.edu)

Resources

See textbooks and software above.

Campus Policies

The University of Maryland Center for Environmental Science has drafted and approved of various academic and research-related policies by which all students and faculty must abide.

Please visit http://www.umces.edu/consolidated-usm-and-umces-policies-and-procedures for a full list of campus-wide academic policies.

Course-Specific Policies and Expectations

File format for submissions (homework, presentation slides) is PDF. Late submission penalty is 25% of the total grade per each 12-hour delay (thus, a submission with a delay of 12–24 h will receive only a half of earned points).