EEB 201 – Introduction to R for Ecology and Evolutionary Biology

Course description

Lecture, six hours; discussion, six hours. 1 unit

Requisites: Enrollment in EEB doctoral program or permission of instructors.

Introduction to basic concepts and practice of scientific programming, using the language R. Topics include working at the command line, writing scripts and functions, flow control, graphics, and conducting basic simulations in discrete and continuous time.

Offered as intensive multi-day course at beginning of quarter. S/U grading.

Course aims, format, and motivation

As sophisticated modeling and analyses of large datasets continue to permeate ecology and evolutionary biology, students need to be equipped with sufficient computational tools. This course aims to give all students a basic foundation in scientific programming in the R environment. Topics include working at the command line, writing scripts and functions, flow control, graphics, input and output of large datasets, basic statistical analyses, and conducting basic simulations in discrete and continuous time. The format of the class is a mix of lectures, demonstrations, discussion, and hands-on practice in executing various tasks in R. Students will be assigned a set of exercises to complete on their own, and will have the opportunity to discuss this work with the instructors. The skills learned in this course will be directly applicable to later EEB courses and to students' own research projects.

Background

No previous experience in computer programming is assumed. Preliminary readings will be assigned to give all students a common foundation in basic principles of using R. The course will require access to a computer with R installed; students can use their own computers, or borrow a laptop from the library.

Installing R

R is completely free and installs easily on Windows, Mac and Linux systems. Please go to

http://www.r-project.org/

and download and install R on your computer. There are lots of manuals and other resources available on the R website as well. R-Studio is a free package that creates a nicer user environment for R – it is recommended, but optional. It can be downloaded from:

http:// http://www.rstudio.com/

Learning objectives

By the end of the course students will:

- Be comfortable executing basic commands in the R environment.
- Be able to load packages in R and make use of their added functionality.
- Be able to read in data files, manipulate data, and perform simple analyses in R.
- Be capable of plotting curves, scatter-plots, histograms, and other graphic outputs in R.
- Be able to write their own computer programs to simulate population models in discrete or continuous time.

Evaluation

The course is graded on an S/U basis. Students will be assigned preparatory work and three sets of programming exercises, which will require them to apply what they have learned during the course. Each of these assignments will be graded out of 25 points, for a total of 100 possible points. Students who attend all sessions, participate actively in class, and complete all assigned exercises (with mean grade of 70% or higher) will be judged to have performed satisfactorily.