GG 615

LITERATE PROGRAMMING WITH R, RSTUDIO, AND R MARKDOWN

PURPOSE
This course was created to meet the needs of graduate students and upper level undergraduates who haven’t coded before at all, or want to learn R, or want to learn literate programming for the purpose of writing research papers.

The course is mostly hands-on coding. Weekly coding assignments touch on introductory statistics, pre-calculus math, and even a bit of linear algebra. Toward the end of the course we also introduce Matlab, which is easy to learn and convenient for rapid modeling.

Instructor: Neil Frazer, neil@hawaii.edu, POST Building 819-C

Times: Monday & Wednesday 12:30-1:20, Thursday 1:30-4:20.

Topics
Numbered roughly by week, although the order of topics may change.


2. Introduction to graphics in R: base graphics and the ggplot2 package. LaTeX for math in R Markdown. Expressions and latex2exp for annotation in R.


5. Skill with RStudio: navigating directories and environments, inspecting and editing data structures, choosing and installing packages, CRAN and Taskview. Skill with R Markdown: stopping the knit where you want, figure sizing, choosing the dev, saving separate figures.


9. Forward modeling and the estimation of uncertainty. Why Monte Carlo is easier and less prone to error than calculus. Histograms, densities and statistics. Why quantiles are always more informative than mean and sd.
10. More on distributions: PDFs, CDFs, inverse CDFs and samplers. The d-p-q-r nomenclature. Interval scale and ratio scale variables: when to transform.


14. Review.

Textbooks: A textbook isn’t absolutely required, but I recommend Data Analysis with R by Tony Fischetti, PACKT Publishing, and copies of this text have been ordered by the UHM bookstore.

Assessment and Grading:
Literate programming, no less than traditional programming, requires regular practice, so this course utilizes weekly coding assignments that must be handed in by the due date except for medical reasons. Most students will be able to complete the assignments during the laboratory period. The final grade will be a weighted average of attendance (10%), scores on weekly assignments (40%), scores on midterm quizzes (40%), and student projects (10%). There is no final exam.

Class Format:
This is a combined lecture-laboratory. Students are encouraged to actively ask questions in class, to work on weekly assignments in class, and to assist each other in learning, although copying of work is not permitted.