

# ECOL592: Intro to R

## Take Home Messages

May 5, 2014

### Programming Advice

1. *Always* look at the variables that you are using (data included)! Most errors come about when you and R don't agree on what your variables look like.
2. *Always* use comments and metadata. Look with disdain upon code lacking these elements.
3. Build your program from smaller fragments of code first. Get them to run before adding complexity.
4. Debug by isolating where the problem is. Run smaller parts of the code to make sure each part is working how you think it is.
5. Be precise when describing your code. It matters if you say "open parenthesis" when you meant to say "open square bracket."
6. Related to #5, be precise when describing your variables. What mode is it? What class? How big is it? (*e.g.* "the `dim()` function returns a 2-element numeric vector.")
7. Describe functions by their three part summary: what arguments does it take in, what does it do to those arguments, what ONE thing does it return?
8. Avoid using code that you can't explain. That is, copy-pasting an answer from google that you don't really understand isn't that helpful in the long run.
9. Instead of thinking about what package to download to accomplish your goal, think hard about finding a solution using native operations. You'll learn more this way (see #8).
10. Your turn!

### Top Ten Terms

1. variable/object
2. mode and class
3. function  
(arguments and return)
4. conditional statement  
(`==`, `!=`, `>`, `<`, `>=`, `<=`, `|`, `&`)
5. vector, element, index
6. data frame
7. indexing
8. bracket notation
9. formula notation
10. `for` loops

### Top Ten(ish) Functions

1. `<-`
2. `c()`
3. `head()`, `dim()`, `length()`, `names()`, `str()`
4. `which()`
5. `plot()`, `lines()`, `points()`, `matplot()`
6. `aggregate()`
7. `apply()`, `tapply()`, `lapply()`, etc.
8. `paste()`
9. `lm()`
10. `rnorm()` or `sample()`
11. `read.csv()` and `file.choose()`

## Our Guest Lecturers

If you want to contact our guest lecturers for questions or to thank them for their time, here are their emails:

Carlyn Perovich	<a href="mailto:perovich@rams.colostate.edu">perovich@rams.colostate.edu</a>	Using the data.table package
Alison Cartwright	<a href="mailto:studio@alisoncartwright.com">studio@alisoncartwright.com</a>	Plotting with ggplot2
Jared Stabach	<a href="mailto:jstabach@rams.colostate.edu">jstabach@rams.colostate.edu</a>	Geospatial applications in R
Clint Leach	<a href="mailto:clint.leach@gmail.com">clint.leach@gmail.com</a>	Parallel operations and multicore computing in R

## Additional Resources

StackOverflow	<a href="http://stackoverflow.com">http://stackoverflow.com</a>
R-bloggers	<a href="http://www.r-bloggers.com">http://www.r-bloggers.com</a>
R Reference Card*	<a href="http://cran.r-project.org/doc/contrib/Short-refcard.pdf">http://cran.r-project.org/doc/contrib/Short-refcard.pdf</a>
All Colors in R*	<a href="http://www.stat.columbia.edu/~tzheng/files/Rcolor.pdf">http://www.stat.columbia.edu/~tzheng/files/Rcolor.pdf</a>

\*From Caryln.

## Colorado State University Courses That Use R

STAT511	Design and Data Analysis for Researchers I	Dr. Ann Hess
ESS575	Models for Ecological Data	Dr. Tom Hobbs
FW673	Hierarchical Modeling in Ecology	Dr. Mevin Hooten
ECOL620	Applications in Landscape Ecology	Dr. Barry Noon
BZ577	Computer Analysis of Population Genetics	Drs. Bill Black and Mike Antolin
NR512	Spatial Statistical Modeling of Natural Resources	Dr. Robin Reich
STAT460	Applied Multivariate Analysis	Dr. Darren Homrighausen