

Getting Started in R

Some Strategies and Tactics

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1. Start right away

Do something with R on day 1.

Do something else on day 2.

Have students do something by the end of week 1 at the latest.

2. Illustrate frequently

Have R running every class period and use it as needed throughout the course so students can see what R does.

Preview topics by showing before asking students to do things.

3. Teach R as a programming language (but don't overdo)

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4. Teach R as a programming language (but don't overdo)

There is a bit of syntax to learn – so teach it explicitly.

- ▶ Capitalization (and spelling) matter
- ▶ Explain carefully (and repeatedly) the syntax of functions.
- ▶ Every object in R has a type (class). Ask frequently: *What type of thing is this?*
- ▶ Get students to think about what arguments are needed for functions by asking *What does this function need to know to do its job?*

Give more language details in higher level courses

- ▶ More about R classes
- ▶ User-defined functions
- ▶ Control structures

5. “Less volume, more creativity.”

– Mike McCarthy, head coach, Green Bay Packers

Use a few methods frequently and students will learn how to use them well, flexibly, even creatively.

Focus on a small number of data types: numerical vectors, character strings, factors, and data frames.

Not everything needs to be introduced from first principles.

6. Find a way to have computers available for tests

It makes the test match the rest of the course and is a great motivator for students to learn R.

It also changes what you can ask for and about on tests.

May choose to mix in-class and take-home sections.

7. Rethink your course

If you have taught computer-free or computer-light courses in the past, you may need to rethink some things.

With ubiquitous computing, some things disappear from your course.

At the same time, other things become possible that were not before:

8. Anticipate computationally challenged students, but don't give in

Be prepared to help them, but don't enable.

Focus on diagnosing what they don't know and how to help them "get it".

Tell students to copy and paste R code and error messages into email when they have trouble.

9. Introduce graphics early

Students must learn to see before they can see to learn.

Lattice graphics in R prepare students for modeling (conceptually and syntactically)

10. Introduce sampling and randomization early

Welcome to Project Mosaic

We are a community of educators working to develop new ways to introduce mathematics, statistics, computation and modeling to students in colleges and universities.

Our purpose:

- ▶ To share ideas and resources to improve teaching and assessment.
- ▶ To make it easy and rewarding to do so.

The MOSAIC Web and Wiki

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Project MOSAIC is a community of educators working to develop a new way to introduce mathematics, statistics, computation and modeling to students in colleges and universities.

Our goal: Provide a broader approach to quantitative studies that provides better support for work in science and technology. The focus of the project is to tie together better diverse aspects of quantitative work that students in science, technology, and engineering will need in their professional lives, but which are today usually taught in isolation, if at all.

- **Modeling.** The ability to create, manipulate and investigate useful and informative mathematical representations of a real-world situations.
- **Statistics.** The analysis of variability that draws on our ability to quantify uncertainty and to draw logical inferences from observations and experiment.
- **Computation.** The capacity to think algorithmically, to manage data on large scales, to visualize and interact with models, and to automate tasks for efficiency, accuracy, and reproducibility.
- **Calculus.** The traditional mathematical entry point for college and university students and a subject that still has the potential to provide important insights to today's students.

Announcements

Upcoming M-CASTs

[Friday March 25](#)
12:30 EST Toward a
MOSAIC R Package for
Calculus and Statistics

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