Charles DiMaggio, PhD

Departments of Anesthesiology and Epidemiology
College of Physicians and Surgeons
Columbia University
New York, NY 10032

cjd11@columbia.edu

Spring 2014
Basic Structure

- Lecture - Exercise
  *or "Flip"*
- Assessment - Questions - Exercises - Lecture (NEW!!)
- Break
- (Discussion/Lecture/Exercises)

About the "Flipped" Sessions

- View Screencasts at Home
- 2 or 3 Question Assessment
- Spend more classtime working in R
course blueprint

About the Exercises

- Illustrate material from lecture
- Introduce new material
- Get you used to "thinking in R"
- First half contributes to grade

About the final project

- R "Vignette"
- Presentations final 3 weeks
- Paper last class
all the material is on my website
except for the material that’s not
  - syllabus
  - correspondence
  - announcements

let’s look at the syllabus...
broad overview of the course

Part 1
- introduction
- foundations
- function
- packages
- graphics
- data
- variables

Part 2 (for discussion)
- power
- web/online data
- bayes (multilevel, hierarchical)
- spatial
- meta-analysis
1.1
A Gentle Introduction

- About R
  - Some things people are doing with R
- Installing
- Using R
  - Calculating, Assigning, Combining
  - From Calculations to Programming
- Data
- R Packages
- Workspaces and Packages
1.2
A Foundation for Understanding R: Objects and Data

- Objects
- Vectors
  - Logical Vectors
- Matrix
- Array
- List
- Data Frame
  - Indexing Data Frames
- Data
  - Getting Your Data Into R
1.3
How R "Works" for Epidemiologists: Functions (and more indexing)

- Functions for Epidemiologists
  - `apply()` - marginals
  - `tapply()`, `by()`, `aggregate()` - stratified analysis
  - `sweep()` - summary statistics
  - `table()` - cross tabulations

- Indexing to Manipulate Data
  - position
  - logical
  - indexing matrices and arrays
  - indexing lists and data frames
1.4
Getting the most out of R: Functions and Packages for Epidemiologists

- Functions
- Packages
  - Linear Regression
- Epidemiology Packages
  - epitools
  - epicalc
- From Risks to Rates
  - Survival Tools for Epidemiologists
Some things you can do with R graphics
Graphic basics
  - about graphing parameters
Graphing Examples
  - Syphilis
  - An Epidemic Curve
  - Time Series with Confidence Limits
  - Comparison Bar Plots

ggplot2
1.6
ins and outs of data

- functions for data
  - editing
  - merging data frames
  - subsetting
  - re-orienting
- missing values (NA)
- working with files
  - saving data sets
  - working from external code
- DBMS interfaces
1.7
odds and ends

- categorical data (factors)
- working with dates and time
- searching and replacing ("grep")
Part 2

let’s talk...