

# 14BD99

## Introduction to Computing

### Overview and Objectives

This course introduces the fundamentals of computing that will be necessary to succeed in the rest of the courses throughout the master. Specifically: understanding the Unix environment (executables, the shell, package management), an introduction to R and Python, an overview of core software engineering theory, and an introduction to Git. The course features an online component to be done before the class, as well as programming assignments to be completed each day.

### Course Outline

#### 1. Get to Know Your Computer

- Introduction to Unix
- Introduction to shell
- Installing packages, compiling executables, the path.
- Reproducible environments

#### 2. R

- R basics: IDE's, editors, scripts, and interactive sessions.
- Packages
- Understanding and using Functions
- Working with empirical data: Tidyverse
- Functional Programming in R

#### 3. Python

- Python basics: IDE's, editors, Jupyter
- Packages and folder structures
- Basic Syntax
- Easier to Ask for Forgiveness than Permission
- Object Oriented Programming in Python

#### 4. Programming Efficiently

- DRY
- Loose coupling and the principle of least knowledge
- Testability
- Object Oriented vs Functional Programming
- Working with a Team

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- Git

We will start each day with a short programming exercise that will be presented and discussed. This will be followed by lectures that will introduce a new topic, and there will be assignments each day to apply the theory we discussed in class.

This is an essential time for you to get comfortable with programming before the theoretical onslaught of your first-term courses begins. I highly recommend you familiarize yourself as much as possible with R and Python before the course. This will allow me to give you more personalized guidance during the brushup.

### Evaluation

A final exam.

### Hardware & Software

I expect you to come with a laptop on which you will implement the computing assignments that will be interspersed throughout the lectures. You should come with access to a unix environment: Linux, Mac OS, or Windows 10 with Windows Subsystem for Linux. I highly recommend Linux or Mac OS, as Windows is historically a royal pain in the ass, and I just won't be able to support you as much if you go that way. However, it is technically possible if you wish to go it the hard way, alone and lonely.

Please come on the first day with the following installed:

- Homebrew (for Mac OS users)
- R & RStudio (or your preferred editor setup for R)
- A Python IDE or editor that you can use (Spider, PyCharm, Atom, etc.)
- Docker for Mac/Linux/Windows

### Materials

Suggested materials and assignments provided through the online DataCamp classroom. You will be provided free access to all the premium content on DataCamp.