Poli270: Math Bootcamp

Faculty Coordinator: Seth J. Hill  
Instructors: Matt Bergman & Alex Hughes  
Time, Place & Date: Beginning September 8, 2015 in SSB 104

Goal of the Course  This course is intended to serve as an refresher (or perhaps introduction) to the core mathematical concepts used in principled thinking about a probabilistic world. Because the scope of the course is sweeping we will spend a very limited amount of time on each topic. Matt and Alex will both be very available to help with difficult concepts.

This course is designed to be combined with Poli204b, taught in the fall. Here we provide you the tools to think about the political world: calculus and optimization, linear algebra, and probability theory. In 204b you will learn about how to identify systematic patterns in a noisy world.

These tools are important and will form the basis of your understanding into your career. Additionally, we are told that there are typically non-academic reasons that this boot-camp is useful – this is a introduction to the friends and peers that you will have throughout the program.

Structure  We have assigned reading for you to complete prior to our lectures in the mornings. Grades will be based on short homework assignments (due at the beginning of the morning session) and on a final exam covering the course’s topics. The exam will be 3 hours, open book, open notes, open internet.

Books for the Course  The primary text for the course is Moore and Siegel (2013). The interested student might also consider purchasing the text we have used in previous years, Gill (2006). Both texts are written by political scientists and do a good job motivating and justifying concepts with relevant political science examples. For the student interested in a high-level undergrad treatment we recommend Larsen and Marx (2006).
• **Required Books**
  

• **Optional Books**
  
  

**Software for the Course**  In the second part of this course we will focus on bringing you up to speed with the computing tasks that you will be expected to perform as a modern political scientist. Core emphasis will be placed on the two core statistical packages R and STATA. Before beginning the course, we recommend you obtain a copy of both software packages.

1. R can be obtained for free for all platforms at this [link](#). Check that you obtain a "bit-version" that is compatible with your operating system. There are really two options 32 or 64. Here’s how you check!

   • **Mac Users:** Follow this [link](#).
   
   • **Windows Users:** Follow this [link](#).

2. STATA can be purchased for the low-low price of $395 at this [link](#). If you are going to purchase, we suggest the SE level not the IC. But, think carefully about plunking down this money. The computer lab in our building has licenses of STATA that are available to all graduate students. In addition, the campus computing lab has a really great virtual computing lab that you can utilize to access STATA from you laptop anywhere you have an internet connection. There almost certainly are illicit means of obtaining this software, but this comes at the risk of hackey-performance, computer viruses, and crippling lawsuits. We don’t endorse this.

For the computing section, we recommend getting an introductory text for R and Stata. We continue to consult these books almost every day we’re working on our stats. For an introduction to R I like *Dalgaard (2008)*, available [here](#). This gives a nice introduction to how R handles data and dataframes. A less thorough introduction introduction by John Fox is available [here](#). Stata publishes a good introduction available [here](#). The primary benefit of using a good book is that the concepts are presented with some sort of logic underlying them – your frantic google searches when deadlines loom in the future will not!

**Recommended**
Course Plan

Assumed Knowledge  (Aliased as, "things to remind yourself about, but that will not be covered formally.) We will assume that you are comfortable with these core concepts before we start the class. If not, please come and talk with Matt or Alex.


Meeting 1: Linear Algebra  (08 September)


Meeting 2: Derivative Calculus  (09 September)


Meeting 3: Multivariate Derivative and Integral Calculus  (10 September)

Meeting 4: Introduction to Probability  (11 September)


Meeting 5: Discrete Probability Functions  (13 September, n.b. Yes... this is a Sunday.)


Meeting 6: Continuous Probability  (17 September)


Meeting 7: Common Distributions  (19 September)


Meeting 8: An Introduction to Computing with R  (21 September)

1. Install R from the CRAN website HERE.
2. Watch this video.

Meeting 9: An Introduction to Computing with STATA  (22 September)

1. "A Gentle Introduction to Stata." Available at Amazon here.
4. “Introduction to Stata,” UNC at Chapel Hill. Available here
Meeting 10: Final Exam  (23 September)

References


