

PLAD8310
Regression Analysis in R
Spring 2024, Thursday 09:30am to 10:45am
Gibson 296

Instructor: Melle Scholten
Pronouns: he/him/his
Email: ms2xj@virginia.edu
Office Hours: by appointment

Course Description: This is the syllabus for the accompanying “discussion section” to Prof. Kirill Zhirkov’s Regression Analysis class. Whereas Kirill will teach you the underlying statistical concepts of ordinary least squares (OLS) regression and generalized linear models (GLMs), my section of the course will emphasize the implementation of these methods in R. These components have the same course code, the same assignments (and therefore the same grade), and cannot be taken for credit separately (although you may audit any part of the course without auditing the other). Furthermore, I will make a concerted effort to attend all of Kirill’s lectures as well, and he has had significant input on this syllabus. Nevertheless, these are separated components with their own readings, somewhat similar to Nick and Kirill’s components of PLAD7100.

At the start of the semester, I will introduce R and R Markdown to you, and explain the basic functioning of R Studio and how it treats data. Then, we will discuss “data wrangling”: the process of turning messy real world data into something that we can start thinking about analyzing. The final component of the class before the midterm will look at implementing, graphing, and diagnosing linear regression in R. After the midterm, we will discuss more specialized functionalities of R, including random number generation (RNG, which nerds like I call “RNG-esus”), basic programming with loops, writing your own functions, and finally implementing and graphing binary outcome models.

Required Readings: I will assign readings from *R Cookbook* by Long and Teetor and *R for Data Science* by Wickham, Çetinkaya-Rundel and Golemund. You do not have to buy these texts: URLs to free online versions (as well as other helpful online R sources) are placed on the Course Canvas. At the end of the syllabus you will find a breakdown of required readings per week: when I assign readings outside of Long and Teetor or Wickham *et al* they will be linked with a URL in the syllabus.

Grading and Assignments: Your final course grade for this course will be the same as the component taught by Kirill, please see his syllabus for further instructions and details.

Student Resources

My door is always open if you want to talk about doing research as a graduate student, how to approach your Professors, how to prepare for being a graduate teaching assistant next semester, or how to prepare for your comprehensive exams. However, I am not a trained counselor. The following resources are provided to students by the University, in case informal connections prove inadequate. Do not hesitate to reach out to them.

UVA Writing Center

The Writing Center is available for use by all current UVA students, regardless of year, school, or major. It advises on any kind of writing, at all stages of the writing process, regardless of whether the student is a native speaker or a learner of English. Information about how to schedule a meeting can be found at: <https://writingrhetoric.as.virginia.edu/welcome-writing-center>

Student Disability Access Center (SDAC)

SDAC provides academic accommodations, support services, and advocacy throughout the UVA community. If you have a learning disability, such as but not limited to AD/HD, blind or low vision, Autism Spectrum Disorder, or chronic health conditions, have your SDAC officer reach out to me. You can find them at: <https://www.studenthealth.virginia.edu/SDAC>

Just Report It (JRI)

JRI is the University's online system for individuals experiencing sexual and gender-based harassment and violence, bias and discrimination, hazing, interference with speech rights, and other forms of intimidation. In case you or anyone you know is experiencing these things, you can find them at: <https://justreportit.virginia.edu/>

Counseling & Psychological Services (CAPS)

CAPS is the primary student mental health clinic on Grounds. It provides professional consultation and referral services to students, faculty, and staff. Do not let the stigma about seeking help stop you from contacting them. If you are experiencing severe mental stress, you can find them at: <https://www.studenthealth.virginia.edu/CAPS>

Maxine Platzner Lynn Women's Center

The Women's Center provides individual, couples, and group counseling services to the UVA and Charlottesville communities. They can help students who have relationship problems with their partner and/or family. You can find them at: <https://womenscenter.virginia.edu/>

Course Outline & Readings

- January 18 – Introduction to R & R Markdown
 - Long & Teeter: 1.1 through 1.12, 3.1 through 3.10, and 16.1 through 16.7
- January 25 – Vectors, Matrices, and Data Frames, aka “Everything is an Object”
 - Long & Teeter: 2.1 through 2.14, Introduction to 5, 5.14 through 5.17
- February 01 – Graphing with *ggplot*
 - Wickham *et al*: Chapter 1, Chapter 9, Chapter 10, Chapter 11

- February 08 – Data Wrangling with *tidyverse* I: Importing and Cleaning
 - Wickham *et al*: Chapter 7, Chapter 20, Chapter 3, Chapter 5, Chapter 8
- February 15 – Data Wrangling with *tidyverse* II: Transforming and Joining Data
 - Wickham *et al*: Chapter 12, Chapter 13, Chapter 16, Chapter 18, Chapter 19
- February 22 – Linear Regression in R
 - Long & Teetor: 11.1 through 11.4, 11.7, 11.9
 - [Stargazer package documentation by Marek Hlavac on CRAN](#)
- February 29 – Generating Marginal Effects in R
 - [The Marginal Effects Zoo by Vincent Arel-Bundock](#): Get Started, Tutorial (Plots), have a look at Functions if you have time.
- March 07 – Spring recess, no class
- March 14 – Regression Diagnostics in R
 - Long & Teetor: 11:15 through 11.18
 - [R for Political Science: Check model assumptions with easystats](#)
- March 21 – Random Number Generation
 - Long & Teetor: Introduction to 8, 8.1 through 8.11
- March 28 – Intro to Programming in R with “for” Loops & Creating Functions
 - Long & Teetor: 15.1 through 15.4, 15.6, 15.9 through 15.11
- April 04 – MPSA, no class
- April 11 – Integrating with PLAD8120 & PLAD8500
 - Daniel Dauber, Chapter 14 (Mixed Methods in R) of R for Non-Programmers.
 - Jasjeet Sekhon. 2011. Multivariate and Propensity Score Matching Software with Automated Balance Optimization: The Matching package for R. *Journal of Statistical Software*. **Just section 3.1.**
- April 18 – Optimization & Estimating GLMs
 - Henningsen & Toomet. [maxLik: A package for maximum likelihood estimation in R.](#)
 - Long & Teetor: 13.1, 13.2, 13.7
- April 25 – Graphing and Communicating GLMs
 - [The Marginal Effects Zoo by Vincent Arel-Bundock](#): Case Study (Logit), Case Study (Categorical Outcomes)