Advanced Methods of Political Analysis

Place: 246 Gambrell Hall
Dates: 01/09/23 - 04/24/23
Time: T 6:00 PM-8:45 PM

Professor: Matthew Wilson
Email: wilso929@mailbox.sc.edu
Office: 337 Gambrell Hall
Office Hours: T 3:00 PM - 5:00 PM
& *by appointment*

COURSE DESCRIPTION:

This graduate seminar covers statistical techniques for measuring and interpreting the relationship between variables, with a focus on linear regression. This includes a review of some of the basics of statistics and significance tests, an overview of ordinary least squares (OLS) and generalized linear models (GLM), and choices associated with statistical modeling, including model diagnostics, model selection procedures, and dealing with missing data. The course should enable students to evaluate empirical relationships using linear regression and provide them with a foundation for understanding more advanced modeling techniques.

EXPECTED LEARNING OUTCOMES:

As a result of the class, students will be able to:

- import and transform data, perform statistical tests, and estimate linear models in R.
- identify the assumptions and approaches of OLS and GLM.
- interpret the results of a linear model.
- diagnose and correct issues related to model misspecification.

COURSE MATERIALS:

The course requires regular access to a computer and focuses on programming in R.[1]
It follows the material in three required texts:

- Fox Jr., John. 2016. *Applied Regression Analysis and Generalized Linear Models.* Third Edition. Thousand Oaks, CA: SAGE Publications.
- Fox Jr., John and Sanford Weisberg. 2019. *An R Companion to Applied Regression.* Third Edition. Thousand Oaks, CA: SAGE Publications.
- Neumayer, Eric and Thomas Plümper. 2017. *Robustness Tests for Quantitative Research.* New York, NY: Cambridge University Press.
  (Free; Ebook available from the University library.)

[1]R is an open source programming language/environment for statistical computing and graphics, available here: `https://www.r-project.org/`.
Students are also recommended to download and use the free RStudio software application, available here: `https://rstudio.com/products/rstudio/download/`

Though not required, the course will also cover material from the following texts:

- Diez, David, Mine Çetinkaya-Rundel, and Christopher D. Barr. 2019. *OpenIntro Statistics*. Fourth Edition. (Free; available on Blackboard.)
- Wickham, Hadley, and Garrett Grolemund. 2017. *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data.* 1st Edition. (Free; available here: `https://r4ds.had.co.nz/`)

COURSE REQUIREMENTS:

1. *Attendance and Participation* (10%)
2. *Problem sets and replication file* (12 x 5% each = 60%, due by 11:59 PM on the next Sunday.)
   After each class, students must complete the corresponding problem set and submit it through Blackboard before 11:59 PM on the following Sunday.
   Submissions must include both 1) responses to the questions and/or interpretations of the output and 2) the code necessary to complete each exercise in R.
   The assignment will be graded based on the correctness of the code/output and the thoroughness of description and interpretation.
3. *Research Design assignment* (15%, due by 11:59 PM on 24 April)
   Additional information will be provided separately.
4. *Replication assignment* (15%, due by 11:59 PM on 24 April)
   Additional information will be provided separately.

GRADING SCALE:

A: 90-100; B+: 87-89; B: 80-86; C+: 77-79; C:70-76; D+: 67-69; D: 60-66; F: 0-59.

CLASS POLICIES:

Failure to follow class rules will affect the student's participation grade.

1. The use of cell phones is not permitted.
2. Computers are allowed to take notes only.
3. Please do not read outside materials.
4. Sleeping in class is not allowed.
5. Grades will not be changed if an issue is reported after two weeks have passed.

ADDITIONAL INFORMATION:

Students are responsible for knowing both university and course schedules.
The academic calendar is available at: `https://www.sc.edu/about/offices_and_divisions/registrar/academic_calendars/2022-23_calendar.php`.

Information on graduate academic regulations is available at: `https://academicbulletins.sc.edu/graduate/policies-regulations/graduate-academic-regulations/`.

FINE PRINT:

Academic integrity. I will enforce rigorous standards of academic integrity in all aspects of this course. For the detailed policy of the University of South Carolina regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, see the University Honor Code: `http://www.sc.edu/policies/ppm/staf625.pdf`. Should you have any questions about possibly improper research citations or references, or any activity that may be interpreted as academic dishonesty, please see me before the assignment is due to discuss the matter.

Personal integrity. I am committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. I will not tolerate discrimination and harassment on the basis of identity or status, including race, color, national origin, religion, sex, gender, age, disability, sexual orientation, genetics, or veteran status. For more information on the University Student Non-Discrimination and Non-Harassment Policy, see `https://www.sc.edu/about/offices_and_divisions/equal_opportunities_programs/documents/student_non-discrimination_and_non-harassment_policy.pdf`. If you want to speak to someone about an incident involving harrassment, sexual assault, or interpersonal violence, you can call 803-777-8248 to talk to a trained interpersonal violence advocate.

Accommodations. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Student Disability Resource Center. All disability accommodations must be approved through the Office of Student Disability Services. For more information, see `https://sc.edu/about/offices_and_divisions/student_disability_resource_center/`. Special accommodations are also available for veterans on duty and for parents. Although the University does not have a formal policy on children in the classroom, breastfeeding in class is welcome as needed.

Adverse weather commitment. In the event of inclement or threatening weather, everyone should use their best judgment regarding travel to and from campus; safety should be the main concern. If you cannot get to class because of adverse weather conditions, you should contact me as soon as possible. Similarly, if I am unable to reach our class location, I will notify you of any cancellation or change as soon as possible to prevent you from embarking on any unnecessary travel. If you cannot get to class because of weather conditions, I will make allowances relative to required attendance policies, as well as class activities. For weather-related news and announcements, see `https://sc.edu/uofsc/weather/`.

CLASS SCHEDULE:

01/10 Introductions
R basics; reading and manipulating data; replication file etiquette
Readings:
Fox and Weisberg, Chapters 1,2
`https://datacarpentry.org/R-ecology-lesson/01-intro-to-r.html`

01/17† Types of data; visualizing and transforming data
Readings:
Fox, Chapters 3, 4
Fox and Weisberg, Chapter 3
OpenIntro, Chapters 2, 4

01/24† Fundamentals of statistics and statistical tests
Readings:
OpenIntro, Chapters 3, 5
(See also OpenIntro, Chapter 6)

01/31† Ordinary Least Squares I: Bivariate
Readings:
Fox, Chapters 5.1, 9.1, 9.2, 9.3, 9.4
Fox and Weisberg, Chapters 4, 5
OpenIntro, Chapters 7, 8

02/07† Ordinary Least Squares Review

02/14† Ordinary Least Squares II: Multivariate
Readings:
Fox, Chapters 5.1, 9.1, 9.2, 9.3, 9.4
Fox and Weisberg, Chapters 4, 5
OpenIntro, Chapters 7, 8

02/21† Ordinary Least Squares III: Matrix Algebra
Readings:
Fox, Chapters 5.2, 9.5
OpenIntro, Chapter 9.1

02/28† Generalized Linear Modeling and Maximum Likelihood: introduction
Readings:
Fox, Chapters 14, 15
Fox and Weisberg, Chapter 6
OpenIntro, Chapter 9.5

03/07 [Spring Break; no class]

03/14† Generalized Linear Modeling and Maximum Likelihood II

03/21† Types of variables and relationships; Model selection
Readings:
Fox, Chapter 22
OpenIntro, Chapter 9.2

03/28† Missing data
Readings:
Fox, Chapter 20

04/04† Prediction and bootstrapping
Readings:
Fox, Chapter 21

04/11† Embracing uncertainty
Readings:
Skim Neumayer and Plümper

04/18 Extensions; Summary and conclusion
Readings:
Skim Fox, Chapters 16, 17, 18, 19

†Problem set due by 11:59 PM on the following Sunday.