

Advanced Methods of Political Analysis

Professor: Matthew Wilson
Room: 204 Gambrell Hall **Email:** wilso929@mailbox.sc.edu
Dates: 01/14/20 - 04/21/20 **Office:** 337 Gambrell Hall
Time: T 6:00 PM-8:45 PM **Office Hours:** T 4:00 PM -5:30 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 exposes students to programming and statistical analysis in R and covers 'best practices' regarding replication files and presenting the results of analyses. It 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.
- elaborate on challenges of model specification and research design in political science

REQUIRED MATERIALS:

The course requires regular access to a computer and focuses on programming in R.¹ It primarily follows the material in two texts (strongly recommended):

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.

Students are not required to purchase books but are expected to follow along with the material contained in these texts. Students are also responsible for reading the articles posted on Blackboard and covered in this course. Additional reading materials may be assigned.

¹R is a programming language/environment for statistical computing and graphics that is available here: <https://www.r-project.org/>. Students may also wish to download and use the RStudio software application, available here: <https://rstudio.com/products/rstudio/download/>

COURSE REQUIREMENTS:

1. *Problem sets/do-file* (12 x 5% each = 60%, due by 11:59 PM on Monday of the next week)
Following each class, students must complete the corresponding problem set and submit it through Blackboard before 11:59 PM on Monday before the next class. Submissions must include both 1) descriptions of the commands and 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 as well as on the thoroughness of description and interpretation.
2. *Class notes* (10%, due by 11:59 PM on Monday of the next week)
For one assigned week, each student must submit notes covering the material that was addressed in class through Blackboard before 11:59 PM on Monday before the next class. The document must be created in LaTeX, though there are no restrictions on the layout of the document. The notes must incorporate descriptions of the commands and interpretations of the output, accompanying tables and figures, and the code necessary to complete each exercise in R, for that week's problem set (which counts for the above assignment for that week). Students may incorporate content from outside sources. The assignment will be graded based on the thoroughness of the submission.
3. *Article presentation* (10%, due on assigned date)
For one assigned week, each student must present on the articles due to be covered in class. The presentation must outline the logic of the article, focusing on how it relates to the course content for that week. Students should aim for a 15-minute presentation. The assignment will be graded based on the thoroughness of the presentation, as well as the student's ability to explain the main ideas of the papers.
4. *Analysis/Replication* (20%, due by 11:59 PM on 24 April)
Each student must submit a paper through Blackboard, before 11:59 PM on 24 April, that utilizes the skills developed in this class to conduct an original analysis or replication. The paper should:
 - outline a research design for testing an empirical argument;
 - summarize and visually represent the dataset(s) and relevant variables;
 - present a regression model and describe the results;
 - include diagnostic tests of the model(s);
 - illustrate quantities of interest; and
 - consider potential extensions (more advanced techniques and further tests).

There is no minimum requirement regarding page or word length. The assignment will be graded based on the extent to which it satisfactorily accomplishes each objective and the correctness of description and interpretation. Students may use material from other classes with the professor's consent.

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.

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/2019-20_calendar.php.

Information on graduate academic regulations is available at:
<http://bulletin.sc.edu/content.php?catoid=97&navoid=2837>.

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 harassment, 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:

- 01/14** R basics and do-file etiquette; reading and manipulating data
(Fox and Weisberg, Chapters 1 & 2)
Blackboard:
"Coding Style and Good Computing Practices."
"Seven deadly sins of contemporary quantitative political analysis."
- 01/21[†]** Types of data; visualizing and transforming data
(Fox, Chapters 3 & 4; Fox and Weisberg, Chapter 3)
Blackboard:
"Data Visualization in Sociology."
"Data Visualization with R."
- 01/28[†]** Fundamentals of statistics and statistical tests
(Fox, Chapters 1 & 2)
Blackboard:
"Abandon Statistical Significance."
"Do Statistical Reporting Standards Affect What Is Published?"
"The Statistical Crisis in Science."
- 02/04[†]** Ordinary Least Squares I: theory
(Fox, Chapters 5, 6, & 9)
Blackboard:
"Is OLS Dead?"
"Statistical Models and Shoe Leather."
"How Not to Lie with Statistics."
- 02/11[†]** Ordinary Least Squares II: application
(Fox and Weisberg, Chapters 4 & 5)
Blackboard:
"Let's Put Garbage-Can Regressions and Garbage-Can Probits Where They Belong."
"Strategic Misspecification in Regression Models."
- 02/18[†]** Generalized Linear Modeling and Maximum Likelihood I: theory
(Fox, Chapters 14 & 15)
Blackboard:
"A General Linear Approach to the Analysis of Nonmetric Data."
"The Unifying Role of Iterative Generalized Least Squares in Algorithms."
- 02/25[†]** Generalized Linear Modeling and Maximum Likelihood II: application
(Fox and Weisberg, Chapter 6)
Blackboard:
"Statistical Models for Political Science Event Counts."
"Regression Models with Ordinal Variables."

- 03/03[†]** Linear-Model Diagnostics
(Fox, Chapters 11, 12, & 13; Fox and Weisberg, Chapter 8)
Blackboard:
"Regression Diagnostics."
"Use of Regression Diagnostics in Political Science Research."
"The Effect of Outliers on Regression Analysis."
- 03/10** [*Spring Break*]
- 03/17[†]** Types of variables and relationships
(Fox, Chapters 7 & 8)
Blackboard:
"Understanding Interaction Models."
"Interactions in Generalized Linear Models."
- 03/24[†]** Model selection
(Fox, Chapter 22, section 22.1; Fox and Weisberg, Chapter 4, section 4.5)
Blackboard:
"A Simple Distribution-Free Test for Nonnested Model Selection."
"Model Selection Techniques."
- 03/31[†]** Missing data
(Fox, Chapter 20)
Blackboard:
"A Unified Approach to Measurement Error and Missing Data."
"What to Do about Missing Values in Time-Series Cross-Section Data."
"How Multiple Imputation Makes a Difference."
- 04/07[†]** Prediction and bootstrapping
(Fox, Chapters 21 & 22, sections 22.2 & 22.3)
Blackboard:
"Bootstrap Statistical Inference."
"Evaluating forecasts of political conflict dynamics."
- 04/14[†]** Displaying quantities of interest
Blackboard:
"Making the Most of Statistical Analyses."
"Using Graphs Instead of Tables in Political Science."
- 04/21** Extensions; Summary and conclusion
(Fox, Chapters 16, 17, & 18)
Blackboard:
"The Statistics of Causal Inference."
"How to Make Causal Inferences with Time-Series Cross-Sectional Data..."

[†]Problem set due by 11:59 PM on Friday.