POL SCI 702
Advanced Techniques of Political Science Research

Spring 2019
Wednesdays, 4:00 pm – 6:40 pm
Curtin Hall 119

Instructor Information

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Office Hours: Tuesdays, 4:00 pm – 6:00 pm, or by appointment.

I Course Description

This class is a second graduate course for political methodology that builds explicitly on the foundation laid in POL SCI 701. In that class, you learned the nuts and bolts behind statistical inference as well as the statistical software R. In this course, we extend those tools to cover various linear and non-linear models. Therefore, the main goal for this semester is not only to become a proficient *consumer* of quantitative research, but also to set the groundwork to pursue your own projects using advanced statistical modeling techniques. The topics that we will intensively discuss include:

1. Ordinary Least Squared (OLS)
2. OLS diagnostics
3. Maximum Likelihood Estimation (MLE)
4. Generalized linear models
5. Model visualization and interpretation
6. Panel and multilevel modeling.

II Textbooks and Additional Materials

Required

Gelman, Andrew, and Jennifer Hill. 2007. *Data analysis using regression and multilevel/hierarchical models*. Cambridge University Press

Any additional reading materials will be available electronically on Canvas.

Recommended

Long, J Scott. 1997. *Regression models for categorical and limited dependent variables*. Thousand Oaks: Sage Publications (newer version using Stata is also available)

Fox, John. 2015. *Applied regression analysis and generalized linear models*. 3 ed. Sage Publications (older edition is fine)

Wickham, Hadley, and Garrett Grolemund. 2016. *R for data science: import, tidy, transform, visualize, and model data*. O'Reilly Media, Inc (free version available online!)

Additional Resources (Optional)

King, Gary. 1998. *Unifying political methodology: The likelihood theory of statistical inference*. University of Michigan Press

Kennedy, Peter. 2003. *A guide to econometrics*. MIT press

Wooldridge, Jeffrey M. 2013. *Introductory econometrics: a modern approach*. Cengage Learning

Gailmard, Sean. 2014. *Statistical modeling and inference for social science*. Cambridge University Press

Fox, John, and Sanford Weisberg. 2018. *An R companion to applied regression*. 3 ed. Sage Publications

Monogan, James E. 2015. *Political analysis using R*. Springer

III Course Requirements and Grading

Final course grades will be based upon five components:

1. **Bi-Weekly problem sets (20%):** You will get bi-weekly problem sets of various lengths and types. You should consider your colleagues a resource, and I strongly encourage you to discuss the problem sets with them. However, each student must turn in their own, original answers that need to be typed with all the R codes/results accompanied. Of the 6 problem sets, I will take the average of the 5 highest grades, meaning that you can do poorly on 1 problem set without it impacting your grade. Problems sets have to be submitted in print by the beginning of each assigned class. Late submissions will not be accepted. Exceptions are made only in the most severe and extraordinary circumstances.
2. **DataCamp courses (20%):** Every two weeks, you will also be expected to complete an assigned DataCamp course (see schedule below). Note that you will receive full credit for completion of each course independent of your performance. The `DataCamp` courses are supposed to be a useful learning resource to practice your skills, they are not a direct form of assessment. Beyond completing the mandatory courses, I encourage you to make use of the opportunity and check out additional courses according to your interests.
3. **Technical replication report (20%):** Throughout the semester, you will work on a replication of a published research paper in your area of interest (see King, 2006, for details and tips). After spring break, you have to submit a first report that consists of a direct replication. This report should be written using R-markdown and has to include all necessary R code to produce the results. The goal is to fully reproduce and explain each step in the published analysis.
4. **Full replication paper (30%):** At the end of the semester, you are expected to submit a full replication paper, which builds on your initial technical report but extends the analysis and/or improves the result presentation. This paper should have the format of a journal article (or class paper) and therefore does not include code chunks etc. Further details will be discussed in class.
5. **Class Participation (10%):** Even though this course is largely lecture-based, we learn from discussion. Note that quality is more important than quantity.

Students who take this course under the Pass/Fail option must receive a grade of C or higher in order to obtain a Pass on their final grade. A final grade of Incomplete will only be given under exceptional circumstances and is solely at the discretion of Professor Kraft.

In general, make-ups for any course requirements will not be given. Students who miss any requirements because of scheduled activities of an official university student organization, a religious holiday, or a verifiable illness should contact me in advance so that alternative arrangements can be made.

IV Course Schedule

Date	Topics	**Readings** / `DataCamp`	Assignment
1/23	Introduction	Gelman/Hill Ch. 1-2, King (2006)	
1/30 2/06	OLS Assumptions & Properties	Gelman/Hill Ch. 3-4, Fox Ch. 6-7 `Cleaning Data in R`	
2/13 2/20	MLE Intro, Logit & Probit	Gelman/Hill Ch. 5, Long Ch. 3-4 `Data Manipulation in R with dplyr`	PS1 due
2/27	**No Class – Individual Meetings**		
3/06 3/13	Generalized Linear Models	Gelman/Hill Ch. 6, Long Ch. 5-8 `Generalized Linear Models in R` [Optional: `Survival Analysis in R`]	PS2 due
3/20	**Spring Break – No Class – Technical Replication Report due 3/27!**		
3/27 4/03	Visualization & Diagnostics	Gelman/Hill Ch. 7-8 King, Tomz, and Wittenberg (2000) Brambor, Clark, and Golder (2006) Berry, Golder, and Milton (2012) `Data Visualization with ggplot2 (Part 1)`	PS3 due
4/10 4/17	Causal Inference	Gelman/Hill Ch. 9-10 Sekhon (2009) Green et al. (2009) Sovey and Green (2011) `Data Visualization with ggplot2 (Part 2)`	PS4 due
4/24 5/01	Multilevel Modeling	Gelman/Hill Ch. 11-15, Stegmueller (2013) `Hierarchical and Mixed Effects Models`	PS5 due
5/08	What's next?		PS6 due
5/15	**Full Replication Paper due**		

Note: Schedule may be subject to change according to the progress of the course.

V Expected Time Commitment

This is a three-credit course, so the expected time commitment from students is approximately 144 hours. Students will spend 40 hours in class over the course of the semester. Approximately 30% of the remaining time will be spent preparing for class by doing assigned readings and taking notes. 40% will be spent working on coding assignments and problem sets. A further 30% will be spent working on the replication project.

VI Office Hours

Feel free to stop by my office during regularly scheduled office hours (Tuesdays 4:00 pm – 6:00 pm). If you are unable to attend office hours, contact me via email to arrange an appointment. I usually work in my office during work hours, but I unfortunately cannot guarantee that I will be able to meet with people who come to my office without first scheduling a time to see me.

VII Academic Integrity

No form of academic dishonesty will be tolerated. The University of Wisconsin-Milwaukee has detailed its policies on academic integrity (http://uwm.edu/academicaffairs/facultystaff/policies/academic-misconduct/). You should acquaint yourself with policies concerning cheating, fabrication, plagiarism, and academic interference. Any submission of work in this course constitutes a certificate that the work complies with university policies on academic integrity.

VIII Student Disabilities

The University of Wisconsin-Milwaukee supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform me of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. I, will work either directly with you or in coordination with the Accessibility Resource Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. Please also see http://uwm.edu/arc/ for further information.

IX University Policies

The University of Wisconsin-Milwaukee has several additional policies concerning issues such as accommodations for religious observances, students called to active military duty, discriminatory conduct, or sexual harassment available for you here: https://uwm.edu/secu/syllabus-links/. I strongly encourage you to access this link and familiarize yourself with these policies and procedures.

References

Berry, William D, Matt Golder, and Daniel Milton. 2012. "Improving tests of theories positing interaction." *The Journal of Politics* 74 (03): 653–671.

Brambor, Thomas, William Roberts Clark, and Matt Golder. 2006. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 14 (1): 63-82.

Fox, John. 2015. *Applied regression analysis and generalized linear models*. 3 ed. Sage Publications.

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Gailmard, Sean. 2014. *Statistical modeling and inference for social science*. Cambridge University Press.

Gelman, Andrew, and Jennifer Hill. 2007. *Data analysis using regression and multilevel/hierarchical models*. Cambridge University Press.

Green, Donald P, Terence Y Leong, Holger L Kern, Alan S Gerber, and Christopher W Larimer. 2009. "Testing the accuracy of regression discontinuity analysis using experimental benchmarks." *Political Analysis* 17 (4): 400–417.

Kennedy, Peter. 2003. *A guide to econometrics*. MIT press.

King, Gary. 1998. *Unifying political methodology: The likelihood theory of statistical inference*. University of Michigan Press.

King, Gary. 2006. "Publication, publication." *PS: Political Science & Politics* 39 (01): 119–125.

King, Gary, Michael Tomz, and Jason Wittenberg. 2000. "Making the most of statistical analyses: Improving interpretation and presentation." *American journal of political science* 44 (2): 347–361.

Long, J Scott. 1997. *Regression models for categorical and limited dependent variables.* Thousand Oaks: Sage Publications.

Monogan, James E. 2015. *Political analysis using R*. Springer.

Sekhon, Jasjeet S. 2009. "Opiates for the matches: Matching methods for causal inference." *Annual Review of Political Science* 12: 487–508.

Sovey, Allison J, and Donald P Green. 2011. "Instrumental variables estimation in political science: A readers' guide." *American Journal of Political Science* 55 (1): 188–200.

Stegmueller, Daniel. 2013. "How many countries for multilevel modeling? A comparison of frequentist and Bayesian approaches." *American Journal of Political Science* 57 (3): 748–761.

Wickham, Hadley, and Garrett Grolemund. 2016. *R for data science: import, tidy, transform, visualize, and model data*. O'Reilly Media, Inc.

Wooldridge, Jeffrey M. 2013. *Introductory econometrics: a modern approach*. Cengage Learning.