



POL SCI 702 Advanced Techniques of Political Science Research

Spring 2021

Mondays, 3:00 pm – 5:40 pm (on Collaborate Ultra)

Instructor Information

Professor: Patrick Kraft, PhD
Office: Bolton 658
Email: kraftp@uwm.edu
Office Hours: 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.

This is an online course so all of our interactions will take place remotely through Canvas. Each week, I am going to post lecture videos and problem sets on our Canvas course page (<https://uwm.edu/canvas/>). In addition to the online content I will host weekly Q&A sessions via Collaborate Ultra. These meetings are intended as an open forum to answer your questions about the course material, so make sure to review all the readings and lecture videos before each session. Attendance at the weekly Q&A sessions is required. Furthermore, you may post any remaining questions on our Canvas discussion board or schedule remote individual meetings with me via email.

II Textbook and Additional Material

Required

There is one required textbook for the course and it is available at the bookstore:

Gelman, Andrew, Jennifer Hill, and Aki Vehtari. 2020. *Regression and other stories*. Cambridge University Press

Any additional required readings will be available electronically on Canvas.

Furthermore, I recommend the following resources that are available online:

- The Plain Person's Guide to Plain Text Social Science: <http://plain-text.co>
- Math Prefresher for Political Scientists: <https://iqss.github.io/prefresher>
- R for Data Science (Wickham and Grolemund, 2016): <https://r4ds.had.co.nz>
- Data Visualization (Healy, 2018): <https://socviz.co>
- Fundamentals of Data Visualization (Wilke, 2019): <https://clauswilke.com/dataviz/>

We will be using RStudio Cloud for the programming portion of the course. Get started by creating your own (free) account at <https://rstudio.cloud> and (if you are new to R) work through their [primers](#). These interactive tutorials will help you familiarize yourself with basic programming concepts and R. On Canvas, you will find more information about how to join our shared RStudio Cloud workspace for the course.

There are countless other resources available online, but I want to highlight a great set of YouTube videos in case you want to learn more about specific topics covered in our course. You'll find links to these videos on Canvas as well:

- Gary King's lecture videos on quantitative social science methods:
<https://www.youtube.com/channel/UCtrwX29xpuWc9y0-0PKrHSQ/playlists>
<https://projects.iq.harvard.edu/gov2001>

Additional Readings (Optional)

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

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

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

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

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

Angrist, Joshua D, and Jörn-Steffen Pischke. 2008. *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press

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

III Schedule

Date	Topics	Textbook	Assignments due
01/25	Course Logistics		
02/01	Introduction: Data Visualization & Measurement	ch. 1-2	
02/08	Probability Theory & Statistical Inference	ch. 3-5	PS 1
02/15	Linear Regression Review	ch. 6-8	
02/22	Linear Regression & Bayesian Inference	ch. 9-10	PS 2
03/01	Assumptions, Diagnostics, & Model Evaluation	ch. 11	
03/08	Transformations & Other Topics	ch. 12	PS 3
03/15	<i>Replication Proposal Session</i>		In-class presentation
03/22	Spring Break – No Class		
03/29	OLS Review Session	no readings	Technical replication
04/05	Logistic Regression I	ch. 13	
04/12	Logistic Regression II	ch. 14	PS 4
04/19	Generalized Linear Models	ch. 15	
04/26	Statistical Power, Poststratification, & Imputation	ch. 16-17	PS 5
05/03	Causal Inference I	ch. 18-19	
05/10	Causal Inference II	ch. 20-22	PS 6
05/17	Final Replication Due – No Class		

Note: Schedule may be subject to change depending on our progress during the semester.

Additional required and/or recommended readings will be available on Canvas

IV Grading and Work Load

Your final grade will be determined based on the following three components:

1. **Bi-Weekly problem sets (50% = 5 * 10%):** The main focus of this course will be your bi-weekly assignments. I strongly encourage you to work in groups and discuss each question with your peers. However, each student must write up and submit their own original solution. Problem sets have to be submitted via Canvas by the end of the specified due date (usually by midnight on Mondays). *Of the 6 problem sets, I will take the average of the 5 highest grades*, meaning that you can do poorly on 1 assignment without it impacting your grade.
2. **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.
3. **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.

Grading Scheme

I am planning to use the following grading scheme. Adjustments may only be made to improve grades:

93-100	A	77-79	C+	60-62	D-
90-92	A-	73-76	C	0-59	F
87-89	B+	70-72	C-		
83-86	B	67-69	D+		
80-82	B-	63-66	D		

Percentages ending in a decimal of .5 or greater will be rounded up to the next whole number.

Pass/Fail: 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.

Late submission policy: Problem sets submitted after their respective due dates will only be graded for partial credit. For each day after the deadline, I will reduce the score by one grade point. I will make exceptions to this policy only in the most severe and rare circumstances (severe illness, etc.).

Campus network or Canvas outage: Due dates for assignments will be changed to the next day (due by midnight) if access to Canvas is not available for an extended period of time (greater than one entire evening, i.e., 6pm – 11pm).

Work Load: This is a full credit course (3 credits), so the expected time commitment from students is 144 hours throughout the semester, which amounts to approximately 10 hours per week. Students will spend 40% of their time reviewing the course material (completing assigned readings, watching lecture videos, taking notes). 30% will be spent working on coding assignments and problem sets. A further 30% will be spent working on the replication project.

Activity	Estimated Time Commitment
Reviewing course material	58 hours
Completing bi-weekly problem sets	43 hours
Working on replication project	43 hours

V Acknowledgements

I have adapted the ideas and language from the work of several educators for this syllabus and the course material. For example, I have borrowed liberally from other courses on social science research methods and statistics, as taught by [Andrew Gelman](#), [Gary King](#), [Michael Peress](#), [Thomas Gschwend](#), and others. I appreciate their contributions to the discipline and thank all educators who make their teaching material available to others. To pay it forward, I will share my own material with anyone who is interested.

VI COVID Policies

Panther Community Health and Safety Standards

UWM has implemented reasonable health and safety protocols, taking into account recommendations by local, state and national public health authorities, in response to the COVID-19 pandemic. As a member of our campus community you are expected to abide by the [Panther Community Health and Safety Standards](#) and the [Interim COVID-Related Health & Safety Rules \(SAAP 10-12\)](#), which were developed in accordance with public health guidelines. These standards apply to anyone who is physically present on campus, UWM grounds, or participating in a UWM-sponsored activity.

With respect to instructional spaces (classrooms, labs, performance spaces, etc.):

- Six-foot social distancing must always be maintained.
- Masks are always required on campus, with limited exceptions—environments where hazards exist that create a greater risk by wearing a mask (for example, when operating equipment in a lab with the risk of a mask strap getting caught in machinery, or when flammable materials are being used).
- A student who comes to class without wearing a mask will be asked to put on a mask or to leave to get one at a mask handout station. Failure to do so could result in student conduct processes.
- You should check daily for COVID symptoms by completing the self-check at <https://uwm.edu/coronavirus/symptom-monitor/>. Symptoms may appear 2-14 days after exposure to the virus and include fever, cough, or shortness of breath or difficulty breathing. See the [CDC's Website](#) for more information about COVID-19 symptoms.

Students who test positive for or who are diagnosed based on symptoms with COVID-19 should complete this Dean of Students form:

https://cm.maxient.com/reportingform.php?UnivofWisconsinMilwaukee&layout_id=4

By doing so, students will get information on resources, help UWM identify individuals they may have come into contact with on campus so that UWM can work with the local health department, and allow UWM to clean campus areas you visited as appropriate.

Attendance Policy

Do not attend your in-person class if you have COVID-19, if you are experiencing symptoms consistent with COVID-19, if you have been in close contact with others who have symptoms, if you need to care for an individual with COVID-19, or have other health concerns related to COVID-19.

Students who miss class due to the above conditions will not be penalized for their absence and will not be asked to provide formal documentation from a healthcare provider.

If you are unable to attend class, take the following steps.

- Notify me in advance of the absence or inability to participate, if possible.
- Participate in class activities online and submit assignments electronically, to the extent possible.
- Reach out to me if illness will require late submission or other modifications to deadlines.
- If remaining in a class and fulfilling the necessary requirements becomes impossible due to illness or other COVID-related circumstances, contact me to discuss other options.

As your instructor, I will trust your word when you say you are ill, and in turn, I expect that you will report the reason for your absences truthfully.

Synchronous Online Class Recording

Our class sessions will be audio-visually recorded for students who are unable to attend at the scheduled time. Students who participate with their camera engaged or who utilize a profile image are agreeing to have their audio/video or image recorded. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded.

Navigate Student Success Platform and Mobile App

Students are encouraged to use a tool called Navigate. This tool can help you learn about academic resources, set up study groups in your courses, make appointments with your academic advisor, get reminders on important dates, and much more. In addition, Navigate allows instructors to send Progress Reports to students throughout the term, allowing for updates on your academic progress in a course in addition to your grade. You can log into the platform here: <https://uwmilwaukee.campus.eab.com/> or by finding the Navigate link under the Current Students tab on the [UWM home page](#). More information on how you can use Navigate and the app, including tutorials, can be found on [UWM's Navigate website](#).

Other

All individual student meetings with faculty and teaching assistants will happen online.

VII University Policies

Drop and Add dates

Please see the following website for full details on the types of withdrawals that are available: <https://uwm.edu/onestop/dates-and-deadlines/interactive-adddrop-calendar/>

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.

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.

Other 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

- Angrist, Joshua D, and Jörn-Steffen Pischke. 2008. *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.
- 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, Jennifer Hill, and Aki Vehtari. 2020. *Regression and other stories*. Cambridge University Press.
- Healy, Kieran. 2018. *Data visualization: a practical introduction*. Princeton University 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.
- Long, J Scott. 1997. *Regression models for categorical and limited dependent variables*. Thousand Oaks: Sage Publications.
- Wickham, Hadley, and Garrett Grolemund. 2016. *R for data science: import, tidy, transform, visualize, and model data*. O'Reilly Media, Inc.
- Wilke, Claus O. 2019. *Fundamentals of data visualization: a primer on making informative and compelling figures*. O'Reilly Media.
- Wooldridge, Jeffrey M. 2013. *Introductory econometrics: a modern approach*. Cengage Learning.