POL419H1S: Quantitative Methods and Data Analysis

University of Toronto
Winter 2016

Meeting Room:	SS 561
Meeting Time:	Friday, 10:00am – 12:00pm
Instructor:	Kenichi Ariga
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Office:	SS 3047
Office Hours:	Tuesday, 1:00pm – 3:00pm

Overview

This is an advanced-level seminar on quantitative empirical research methods for political science for those who have taken POL232, POL242, or equivalent, and have basic understanding of statistical inference and linear regression model.

The primary goals of this class are:

1. To learn the basics of *statistical computing* using R, a freely available, increasingly popular statistical software (http://www.r-project.org); and
2. To understand the theoretical foundations, various methods, and applications for *causal inference* in political science research.

Part 1. Statistical Computing

Quantitative political science research requires the use of computers. In the past two decades, the development of affordable yet very powerful personal computers has revolutionized the use of statistical analyses in political science. Various statistical models have been developed and made readily available for researchers. The number of political scientists who have been trained for applying those models has increased, and the volume of applied empirical work using quantitative data and methods has skyrocketed. One of the key driving forces behind these advancements is the wide adaptation of statistical software among political scientists.

In this class you will learn the basics of how to use R to conduct statistical analyses in political science research. Being designed as a political science course rather than a computer programming course, the class will place emphasis on using the program, applying models, and interpreting results rather than on learning how to program. By the end of the semester, you are expected to be able to conduct a basic quantitative empirical analysis using R on your own.

Part 2. Causal Inference in Political Science Research

Those who have taken courses on statistical inference and regression must have heard a mantra that goes "correlation is not causation." It correctly describes the fact that statistically and substantively significant coefficients in a linear regression model do not necessarily imply a causal relationship of the variables in question. Quantitative empirical evidence in political science research — many of which has been based on observational data — is to be carefully interpreted with this fact in mind.

Recent development in quantitative empirical analysis on social science research, however, has shifted its attention to the question of when our analysis can provide empirical support to a causal claim. Based on the counterfactual framework — also called the Rubin causal model, specific conditions under which statistical analysis of observational data can provide causal inference have been identified. Moreover, many researchers have also begun to adopt various "design-based" researches — experiments and natural experiments — in which they try to identify a causal relationship mainly from how to design empirical research rather than from how to statistically adjust observed data.

The second part of this class will review these recent attempts of causal inference in political science research. It will first cover the basic theoretical framework of causal inference and the principles of various research designs. Then there will be a reading seminar on recent applications in political science research of major research designs and methods for causal inference, such as laboratory experiments, field experiments, survey experiments, matching, natural experiments, instrumental variable analysis, and regression discontinuity design. Students are expected to learn the basic theoretical framework of causal inference and various research designs applied in the current political science research.

Textbook

Thad Dunning. 2012. *Natural Experiments in the Social Sciences: A Design-Based Approach.* Cambridge: Cambridge University Press.

The textbook is available at the UofT BookStore. All other readings on the syllabus will be made available through the class Blackboard site.

Blackboard / Learning Portal

The class Blackboard site (or the Learning Portal: https://portal.utoronto.ca/) will be the primary means through which class announcements and assignments will be distributed. Readings and datasets will be made available in the class Blackboard site as well. Its Discussion Board will be the primary medium by which you will ask simple questions about the course materials and get them answered (more on this below). It will be your responsibility to obtain access to the class Blackboard site and regularly check it. There will be an important update to the class Blackboard site at least once a week.

Discussion Board

We will use the Discussion Board in the class Blackboard site as the main medium through which you can ask simple questions regarding class materials and get answers. Given the nature of the course materials, someone else may have the same question as yours and s/he would benefit from your posting the question and getting an answer through the Discussion Board.

You are also encouraged to post an answer to the questions posted by your classmates so that we can maintain a mutually-supporting learning community from which all of you will benefit. As stated above, your response to your classmate's questions on the Discussion Board will be reflected on your class participation mark.

The instructor will regularly check the Discussion Board (once on Mondays, Wednesdays and Fridays) and answer questions which have not been adequately addressed by peers. For more complex questions or those that would require an extensive treatment, you are best advised to visit the office hours.

Course Requirements
Your grade will be determined by the following components:

1. Two Data Analysis Essays (Part 1): 55%
   Best scored essay: 30%
   Second-best essay: 25%

In the first part of the class, there will be two essay assignments. In both assignments, you will conduct data analysis using R and write a short essay on the results.

Assignment 1	Posted:	Jan. 22 (Fri.)	Due:	Feb. 11 (Thu.)	5:00pm
Assignment 2	Posted:	Feb. 12 (Fri.)	Due:	Mar. 3 (Thu.)	5:00pm

2. Seminar Presentation (Part 2): 20%

In the second part of the class, we will have reading seminars. Each week, we will read and discuss several articles published in leading political science journals. For each article, one student will play the role of an author, make a presentation on the main findings of the article, and participate in the discussion from the author's perspective. Another student will play a role of a discussant and make a presentation to offer constructive critiques to the article and raise important discussion questions. Together, they will lead the discussion on each article. You will be assigned to either role at least once (the exact number of occasions will be decided and adjusted based on the number of students taking the class). This seminar presentation will count for 10% of your final mark.

3. Class Participation: 25%

Your class participation marks will be determined by the following four items:

a. R Tutorials & R Exercises (Part 1): 10%

In the first part of the class, a series of self-study R tutorials will be assigned. You should read and practice what's in them on R. There will also be R exercises based on the above tutorials. You are required to do all these exercises. When you complete each R tutorial and exercise, you should report it through the class Blackboard site. Completion of each R tutorial and exercise will be weighted equally.

b. Lectures, Discussion Board Answers, and Collaboration (Part 1): 4%

This component of the participation mark will be determined by:
1) whether you are actively engaged in class lab sessions (i.e., regularly attend the class, actively raise questions, participate in class discussion, help your classmates);

2) how often and well you respond to your classmates' questions on the class Discussion Board; and
3) whether you collaborate with your classmates in essay assignments (more on this below).

c. Seminar Participation (Part 2): 10%

For the reading seminar in the second part of the class, you are required to post a short paragraph of critiques and discussion questions to each of the assigned readings of the week on the Discussion Board of the class Blackboard site before noon on Thursday. The post will be used as a reference for our in-class discussions. In addition, you are expected to actively participate in the in-class discussions of these articles. Your post on the Discussion Board and your participation in the in-class discussions will count toward 10% of your final mark.

d. Feedback Survey: 1%

There will be an anonymous online feedback survey on the class through the Blackboard at the end of the semester. Your participation in the survey will count toward 1% of your final mark.

Group Work and Collaboration

Group work and collaboration is encouraged in this class. Given somewhat technical nature of the class materials, it is essential to have an opportunity to discuss with your classmates the concepts and methods you learn in class and how to apply them. Everyone has different strengths and weaknesses in their understanding of materials and learning style. Through working together, you are expected to facilitate learning for each other and deepen your understanding of the materials, which would be difficult if you worked alone.

Collaboration in a team is encouraged in this class so much so that the submission by a team is allowed for the data analysis essay assignments. At most three students may participate in one group. If you submit your assignment as a group, everyone in the group will receive the same mark for that assignment. The group submission of the essay assignments will also be taken into consideration when the "Lectures, Discussion Board Answers, and Collaboration" component of your class participation mark is determined.

Collaboration in a team of multiple scholars is a norm for contemporary social science research in general, and quantitative empirical political science research in particular. As an introductory course on the methods of such research, this class will provide you with an opportunity to practice scholarly collaboration by allowing the group submission of the assignments.

Turnitin

Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

Students who wish to not use Turnitin.com may make an alternative arrangement with the instructor. They will need to let the instructor know well before the deadline of the assignment and ask for the alternative way to submit the essay. They will be required to save every version/draft of their essay electronically, and submit all of them at the time they submit the essay. They will also be required to hand in all notes, outlines, and bibliographic research at the same time.

Late Penalties
All work is late if submitted after the date and time specified as the due date. Any assignments handed in late will result in a penalty of 10-percentage point reduction per day (e.g., from 90% to 80%). Submitting assignments within 24 hours from the due date and time will be considered one day late; submitting after 24 hours but before 48 hours will be two days late, and so forth. Assignments handed in more than five calendar days late will receive a zero grade.

Extension
Extension may be granted only when there is a legitimate reason, such as an unforeseeable medical emergency and an accessibility issue, and there is an acceptable official documentation, which verifies the specific reason given, such as the UofT Medical Certificate, the Accessibility Services Letter, and the College Registrar's Letter. Students who know in advance they will need an extension for a legitimate reason should contact the instructor as early as possible before the deadline. Those who missed the deadline for a legitimate, unforeseeable reason should contact the instructor as soon as possible and no later than one week after returning to class.

Grade Appeals
Grade appeals must be received within two weeks from when the grade is assigned. When you appeal your grade, you are required to submit a documentation substantiating why you believe the grade is not appropriate.

Office Hours
You are welcome to visit during the instructor's office hours, which will be held during the time and date specified at the beginning of the syllabus, if you have any questions on the class materials.

Email Policy
If you have questions of personal nature (e.g., accessibility, deadline extension for legitimate reasons), you may email the instructor and expect a response within two working days. Please start the subject heading of your email with "POL419:..." I will not respond to, however, any questions over email that are of substantive nature concerning the class materials. You will need to post those questions on the Discussion Board or visit office hours.

Please note that I will not be able to answer emails or Discussion Board questions during weekends.

In the case of your questions of substantive nature on the Discussion Board or those of personal nature over email not answered within two working days (excluding weekends), send

me an email to let me know they have not been addressed. Please include "POL419: Unanswered Question" in the subject heading of your email.

Accessibility
The University of Toronto is committed to accessibility. If you require accommodation for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services at (416) 978-8060 or www.accessibility.utoronto.ca as soon as possible.

Academic Integrity
Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves.

You are expected to be familiar with the Code of Behaviour on Academic Matters, available at http://www.artsci.utoronto.ca/osai/students, which is the rule book for academic behaviour at the U of T. Potential offenses include, but are not limited to, plagiarism, cheating on tests and exams, fraudulent medical documentation and improper collaboration on marked work.

For specific examples of the potential academic offences, please read *What is Academic Misconduct* (http://www.artsci.utoronto.ca/osai/The-rules/what-is-academic-misconduct) at the Office of Student Academic Integrity's website. Please note that, as stated in this site, "(n)ot knowing the University's expectations is not an excuse." Under the Code, "the offense shall likewise be deemed to have been committed if the person ought reasonably to have known." (*Code of Behaviour on Academic Matters*, web version, p.2)

For further clarification and information on plagiarism, please see *Writing at the University of Toronto* (http://www.writing.utoronto.ca/advice/using-sources/).

The University of Toronto treats cases of academic misconduct very seriously. All suspected cases of academic dishonesty will be investigated following the procedures outlined in the Code. The consequences for academic misconduct can be severe, including a failure in the course and a notation on your transcript. If you have any questions about what is or is not permitted in this course, do not hesitate to contact the instructor.

Class Schedule

Part I: Introduction to Statistical Computing (Lab Sessions)

The self-study R tutorials written by the instructor will be used in this part of the class.

Jan. 15. Introduction
- Introduction to R & RStudio.
- Very basic operations of R.

- Descriptive Statistics & Visualization in R.

Jan. 22. Data Analysis using R (1)
- Linear Regression Analysis and Data Management in R.

Assignment 1 Posted

Jan. 29. Data Analysis using R (2)
- Linear Regression Analysis and Data Management in R, continued.

Feb. 5. Assignment 1 Consultation
- Q & A on your project for Assignment 1.

Assignment 1 Due: Feb. 11 (Thr.), 5:00pm

Feb. 12. Statistical Simulation
- Monte Carlo Simulation.

Assignment 2 Posted

Reading Week

Part II: Causal Inference in Political Science Research

Feb. 26. Basic Theoretical Framework of Causal Inference (Lecture)
- Dunning 2012, Chapters 1, 2, 3, 4, and 5.1-5.3.
- *Recommended*: Dunning 2012, Chapters 8, 9, and 10.

Assignment 2 Due: Mar. 3 (Thr.), 5:00pm

Reading Seminar: Mar. 4, 11, 18, Apr. 1 & 8.

The reading list below is tentative. It will be finalized by the first lecture after the reading week.

Laboratory Experiments

Tali Mendelberg, Christopher F. Karpowitz, and Nicholas Goedert. 2014. "Does Descriptive Representation Facilitate Women's Distinctive Voice? How Gender Composition and Decision Rules Affect Deliberation." *American Journal of Political Science* 58(2).

Mutz, Diana C. 2007. "Effects of "In-Your-Face" Television Discourse on Perceptions of a Legitimate Opposition." *American Political Science Review* 101(4).

Field Experiments

Andrew Beath, Fotini Christia, and Ruben Enikolopov. 2013. "Empowering Women through Development Aid: Evidence from a Field Experiment in Afghanistan." *American Political Science Review* 107(3).

Survey Experiments

Daniel Corstange and Nikolay Marinov. 2012 "Taking Sides in Other People's Elections: The Polarizing Effect of Foreign Intervention." *American Journal of Political Science* 56(3).

Lyall, Jason, Graeme Blair, and Kosuke Imai. 2013. "Explaining Support for Combatants during Wartime: A Survey Experiment in Afghanistan." *American Political Science Review* 107(4).

Observational Studies: Matching

Cindy D. Kam, and Carl L. Palmer. 2008. "Reconsidering the Effects of Education on Political Participation." *Journal of Politics* 70(3).

Standard Natural Experiments

Mahvish Shami. 2012. "Collective Action, Clientelism, and Connectivity." *American Political Science Review* 106(3).

Arindrajit Dube, Oeindrila Dube, Omar Gracia-Ponce. 2013. "Cross-Border Spillover: U.S. Gun Laws and Violence in Mexico." *American Political Science Review* 107(3).

Instrumental Variable

Matthew Adam Kocher, Thomas B. Pepinsky, and Stathis N. Kalyvas. 2011. "Aerial Bombing and Counterinsurgency in the Vietnam War." *American Journal of Political Science* 55(2).

Kristopher W. Ramsay. 2011. "Revisiting the Resource Curse: Natural Disasters, the Price of Oil, and Democracy." *International Organization* 65.

Regression Discontinuity

Jeremy Ferwerda and Nicholas L. Miller. 2014. "Political Devolution and Resistance to Foreign Rule: A Natural Experiment." *American Political Science Review* 108 (3).

Syllabus Change Policy

The policies and contents of this syllabus may be changed by the instructor with advanced notice. If any, such a change will be announced during lectures.