

# POLSCI 9590A: Intro to Methodology Fall, 2019

**Instructor:**

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## 1 Overview and Course Objectives

This course is meant to get students thinking about how data are used to make social, political and economic decisions and how we can answer questions we care about with data. The time when political scientists could happily exist in a statistics-free world has long since passed. We live in a world where many decisions are made using data. This has a number of interesting implications.

1. It is incumbent on those of us who wish to be savvy consumers to understand how data are being used to make decisions and how to discriminate good from bad uses of data.
2. We have to have some basic understanding of research design and probability to evaluate advances in health, medicine, politics, economics, etc... When looking at media reports of studies, how can we figure out whether the study was done well or poorly? Does the study generalize? What actionable intelligence really exists?
3. As political scientists, we answer questions about policy effectiveness, the efficacy of citizen interactions with government, etc... with data. But, we need to know and understand how.

Throughout the course, you will be asked to engage, and in some cases produce, quantitative work.

One of the interesting aspects of how stats courses (particularly those in the social sciences) have evolved is that they often continue to be perceived as “math classes.” One of my goals here is to (mostly) disabuse you of this notion. This is largely not a math class. That is to say, we will be *doing* (in terms of paper and pencil) very little math.

We will be *looking at* mathematical notation from time to time. We use mathematical notation because it is precise - with terms and operators defined, we could all look at a statistical function and understand its main components and how they fit together. Similarly, mathematical notation is concise - it allows us to represent some quite abstract and complicated ideas in relatively little space.

Instead of thinking about this as a math class, this is a class that part psychology, part story-telling, part visual design and part data analysis (obviously). Statistics in the social sciences are often (as in this course) focused on applications rather than complicated mathematical derivations.

## 2 Course Text(s)

The required text for the course is:

Hahn, Michael and Jenny Godley (2017) *An Introduction to Statistics for Canadian Social Scientists*. 3<sup>rd</sup> ed. Oxford University Press.

Other readings will be made available electronically through the course's OWL site.

## 3 Requirements

The course has a number of requirements, including attendance, reading, quizzes, and written work of different sorts. Here is a breakdown of the different elements:

### **Participation** 10%

There are quizzes in the short videos. In total, there are about 2 hours of videos to watch. They are designed to make sure that you're understanding the material. I will use your participation in the quizzes as your participation grade.

### **Homework** 60%

There will be four homework assignments. Grades for those four assignments will count as 60% of your grade (15% each). You can work in groups, but each person needs to turn in his or her own work, in his or her own words.

### **Final Exam** 30%

The final exam is a non-collaborative, open book and notes assignment designed to get you to produce a small set of results in R and tell me what they mean.

All assignments will be turned in through the your dropbox folder on the course's OWL site. Without exception, all assignments should be submitted as a .rmd file (we will talk more about this during the course).

## 4 Absences, Late Assignments and Makeups

If illness prevents turning in assignments on time, the illness must be documented according to Western's Policy on Accommodation for Illness.

([http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_illness.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf))

## 5 Academic Offenses

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

## 6 Course Outline

Many of the course readings are identified below. From time to time, I may assign other readings that will be posted to the course's OWL site.

1. Class 1 (9/8): Introduction
  
2. Class 2 (9/13): Why Learn About Statistics?/What are data?
  - Readings: Hahn and Godley: Chapters 1 & 2
  - Videos:
    - Chapter 02: 1. Mathematical Operations (06:22)
    - Chapter 02: 2. Data, Observations and Variables (09:08)
  
3. Class 3 (9/15) Lab 1: Data Management.
  - Hadley Wickham *R for Data Science* Chapters 1,2,4,5 (sections 5.1-5.5)
  
4. Class 4 (9/20): Univariate Statistics and Graphs
  - Readings: Hahn and Godley: Chapters 3; Andersen and Armstrong
  - Videos:
    - Chapter 03: 1. Frequencies (04:32)
    - Chapter 03: 2. Rates, Ratios and Percentiles (05:42)
    - Chapter 03: 3. Visualizing Data (05:21)

5. Class 5 (9/22) Lab 2: Graphs.
  - *R for Data Science* Chapter 3
  - Andersen and Armstrong Chapter 3 (sections 3.1-3.2)
6. Class 6 (9/27): Univariate Statistics, Graphs and Probability
  - Readings: Hahn and Godley: Chapters 4 & 5.
  - Videos:
    - Chapter 04: Probabilities (10:36)
    - Chapter 05: Describing Distributions (05:21)
7. Class 7 (9/29): Data @ Western Workshop (Kristi Thompson and Liz Hill, Data Library)
8. Class 8 (10/4): Measures of Central Tendency and Dispersion
  - Readings: Hahn and Godley: Chapters 6 & 7
  - Andersen and Armstrong Chapter 4 (section 4.2)
  - Videos:
    - Chapter 06: 1. Measures of Centre (07:49)
    - Chapter 06: 2. Measures of Spread (03:29)
    - Chapter 07: Probabilities Under the Normal Distribution (09:01)
9. Class 9 (10/6) Lab 3: Sampling Simulations
10. Class 10 (10/11): Sampling and Generalization
  - Readings: Hahn and Godley: Chapters 8 & 9
  - Videos:
    - Chapter 09: 1. Sampling Distributions (04:38)
    - Chapter 09: 2. Confidence Intervals (08:14)
11. Class 11 (10/13) Lab 4: Understanding Confidence Intervals and Permutation Tests.
12. Class 12 (10/18): Bivariate Statistics
  - Readings: Hahn and Godley: Chapters 10 & 11
  - Videos:
    - Chapter 10: Hypotheses and Hypothesis Testing (11:40)
13. Class 13 (10/20) Lab 5: Presenting Bivariate Statistics.
14. Class 14 (10/25): Bivariate Statistics for Nominal and Ordinal Data

- Readings: Hahn and Godley: Chapters 12 & 13
  - Andersen and Armstrong Chapter 4 (Section 4.2)
  - Videos:
    - Chapter 12: Contingency Tables (10:03)
15. Class 15 (10/27) Lab 6: Hypothesis Tests for Contingency Table Statistics.
16. **11/1-11/5 Fall Reading Week**
17. Class 16 (11/8): Bivariate Statistics for Interval/Ratio Data
- Readings: Hahn and Godley: Chapters 14
  - Andersen and Armstrong Chapter 4 (section 4.3)
  - Videos:
    - Chapter 14: Pearson Correlation Coefficient (02:48)
18. Class 17 (11/10) Lab 7: Correlations, hypothesis tests for correlations.
19. Class 18 (11/15): OLS Regression I
- Readings: Hahn and Godley: Chapter 16
  - Andersen and Armstrong Chapter 2 (section 2.3) and Chapter 5 (sections 5.1-5.6).
  - Videos:
    - Chapter 16: 1. OLS Regression (06:38)
    - Chapter 16: 2. Multiple OLS Regression (09:53)
20. Class 19 (11/17) Lab 8: Linear Regression Lab 1
21. Class 20 (11/22): OLS Regression II
- Readings: Hahn and Godley: Chapter 18
22. Class 21 (11/24) Lab 9: Linear Regression Lab 2
23. Class 22 (11/29): Reading Regression Output
- Readings TBD
24. Class 23 (12/1) Wrap-up
25. Class 24 (12/6): Final Exam I
26. Class 25 (12/8): Final Exam II