Conduct of Inquiry I
Government 612

Ryan T. Moore*

16 November 2015 at 21:09

Course Information

Government GOVT 612
Conduct of Inquiry I
Thursday, 2.35pm–5.15pm, East Quad Building 200

Instructor Information

Ryan T. Moore, Ph.D.
Assistant Professor of Government
Office: Ward 226
Telephone: 202.885.6470
Fax: 202.885.2967
Homepage: http://www.ryantmoore.org
Email: rtm (at) american (dot) edu
Office Hours: Wednesday, 10am-noon or by appointment
(Please use https://calendly.com/ryantmoore to schedule times.)

Ghazal Nadi
Office Hours Location: Hurst Building, 2nd floor, SPA section
Email: gp4917a (at) american.edu
Office Hours: Tuesday, noon-2pm or by appointment

Course Description

This course introduces students to quantitative analysis in the social sciences. The course has three primary goals: to introduce students to a variety of analytic strategies in modern social research, to lay statistical foundations for advanced work focusing on the linear model in Conduct of Inquiry II and beyond, and to enable students to implement methods and work with data using a modern

*Department of Government, American University, Ward Circle Building 226, 4400 Massachusetts Avenue NW, Washington DC 20016-8130. tel: 202.885.6470; fax: 202.885.2967; rtm (at) american (dot) edu; http://ryantmoore.com.

programming language, R. We examine causal inference, measurement, visualization, linear modeling and regression, probability, statistical inference, and some special topics in statistical discovery including clustering, text analysis, network data, and spatial data. Throughout, we develop the important mathematical background required while giving attention to applied examples.

Students enrolled in this course should also enroll in its lab section, Conduct of Inquiry Laboratory I, GOVT 096-001, for the fall semester.

Learning Objectives

By the end of the course, you should be able to

- Translate political phenomena into mathematical notation
- Differentiate causal from descriptive statistical analyses
- Understand the value and limitations of a variety of statistical approaches
- Evaluate substantive hypotheses using statistical methods
- Use R to import and manipulate data, implement the techniques of the course, and produce publication-quality graphics
- Typeset social scientific methods and results legibly, likely using LaTeX

Readings

Readings should be completed before the course meeting under which they are listed below. The course readings are a mixture of academic articles and book sections. Readings are listed in the approximate order in which I suggest doing them. The primary textbook for the course is

> Imai, Kosuke. *A First Course in Quantitative Social Science*. Princetion University Press, Princeton, NJ, 2016.

and the associated datasets for examples and exercises are all available at https://github.com/kosukeimai/qss.

There are many other textbooks and articles that address topics from our primary textbook in greater detail. Please contact us if there are additional topics or subtopics for which you would like more supplementary sources.

- Causal Inference

  > Stephen L. Morgan and Christopher Winship. *Counterfactuals and Causal Inference*. Cambridge University Press, New York, 2007.

  > Guido W. Imbens and Donald B. Rubin. *Causal Inference in Statistics, Social, and Biomedical Sciences*. Cambridge University Press, New York, NY, 2015.

- Introductory statistics

  > David Freedman, Robert Pisani, and Roger Purves. *Statistics*. WW Norton & Company, Ltd, New York, NY, 4th edition, 2007.

  (or any older edition)

Requirements and Evaluation

Students are required to do the weekly reading, attend class, complete all assignments and exams, contribute significantly to in-class group work, and participate in course discussions about the material. Using the course email list to ask and answer questions is strongly encouraged, and will contribute to your participation evaluation.

Assignment	Weight	Due date
Problem Sets	40%	Weekly
Midterm Exam	20%	22 October
Paper Proposal	5%	29 October
Final Exam	25%	10 December
Participation	10%	Weekly

Table 1: Course Assessment Summary

No late work will be accepted. If you cannot submit an assignment on time, arrange to submit it early. We encourage you to use office hours to discuss any specific assignments, difficulties, or questions about the course.

Academic integrity is a core value of institutions of higher learning. It is your responsibility to avoid and report plagiarism, cheating, and dishonesty. Please (re-)read the University policy on academic integrity at http://www.american.edu/academics/integrity/code.cfm, particularly Sections I and II.

Software and Statistics Support

The primary software for the course is R. See ryantmoore.com/writings/htr.pdf for help getting started. Support for statistical software is available through CTRL. See http://j.mp/ZrBr2Z for CTRL's workshop schedule.

The Department of Mathematics and Statistics offers statistical consulting services, with extensive hours. For the schedule and contact information, see http://j.mp/1EmVqkY.

The library itself offers support for various software. For example, they can help you troubleshoot issues with your LaTeX installation.

Graduate Certificate in Applied Statistics

If you are interested in political methodology or applied statistics, consider completing the Graduate Certificate in Applied Statistics. In addition to learning exciting new techniques, certification can help you distinguish your skills and commitment to methods from those of others applying for the same positions you are.

More information is available at http://www.american.edu/cas/mathstat/CERT-GAS.cfm.

Intellectual Property

Course content is the intellectual property of the instructor or student who created it, and may not be distributed without consent.

Course Evaluation

The course evaluation will take place in class towards the end of the semester. Students who submit the evaluation will earn one percentage point toward the participation grade.

Further Information from American University

For more information on Academic Integrity, Emergency Preparedness, Academic Support, and Social Media, please see ryantmoore.com/files/class/auSyllLanguage.pdf

Calendar

I. Introduction. Preliminaries.

3 September

American Political Science Association conference. No course meeting.

10 September

Introduction. Course policies and requirements. Computing. Introduction to R. Data manipulation.
PS 0 due.

Required reading:

This syllabus.

Imai, §1.1-1.3. (I recommend having R open while you read, and following along with the commands presented.)

II. Causal Inference.

17 September

Causal Inference I: Randomized Experiments.
Logicals and Conditionals in R.
PS 1 due: Imai, exercises 1.4.1, #1-6.

Required reading.

Imai, §2.1-2.4.

Bertrand, Marianne and Sendhil Mullainathan. "Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination". *American Economic Review*, 94(4):991–1013, 2004.

Gerber, Alan S., Donald P. Green, and Christopher W. Larimer. "Social Pressure and Voter Turnout: Evidence from a Large-Scale Field Experiment". *American Political Science Review*, 102(1):33–48, 2008.

LaCour, Michael J. and Donald P. Green. "When Contact Changes Minds: An Experiment on Transmission of Support for Gay Equality". *Science*, 346(6215):1366–1369, 2014.

Supplementary reading.

Paul Holland. Statistics and causal inference. *The Journal of the American Statistical Association*, 81(396):945–960, 1986.

24 September

Causal Inference II: Observational Studies.
Descriptive statistics in R.
PS 2 due: Imai, exercises 2.8.2, #1-6. Consider exercise #7 an optional bonus opportunity.

Required reading.

Imai, §2.5-2.7.

David Card and Alan B. Krueger. Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *The American Economic Review*, 90(5):1397–1420, 1994.

III. Measurement and Visualization.

1 October

Measurement. Visualization. Survey Sampling. Correlation.
Missing data and graphics in R.
PS 3 due: Imai, exercises 2.8.3, #1-5.

Required reading.

Imai, §3.1-3.6.

8 October

Visualization. Clustering algorithms.
Graphics and clustering in R.
PS 4 due: Imai, exercises §3.9.1, #1-5.
(Note that §3.9.2, #1-4 address measurement in surveys across countries.)

Required reading.

Imai, §3.7-3.8.

IV. Linear Modeling.

15 October

Prediction. The linear model.
Loops and linear regression in R.
PS 5 due: Imai, exercises 3.9.3, #1-7.

Required reading.

Imai, §4.1-4.2.

22 October

Midterm Exam.

29 October

Regression and Causation. Introduction to Multiple Regression.
Multiple regression in R.
Paper topic due.

Required reading:

Imai, §4.3-4.4.

V. Statistical Discovery.

5 November

Regression and Causation. Regression discontinuity designs.

Required reading:

Andrew C. Eggers and Jens Hainmueller. MPs for Sale? Returns to Office in Postwar British Politics. *American Political Science Review*, 103(4):513–533, 2009.

VI. Probability, Uncertainty, and Inference.

12 November

Probability.
Probability and distributions in R.
PS 6 due: Imai, exercises §4.5.3, #1-7.

Required reading:

Imai, §6.1-6.3.

19 November

Statistical uncertainty.
PS 7 due: posted to Blackboard

Required reading:

Imai, §6.4-6.6.

26 November

Thanksgiving break. No class meeting.

3 December

Statistical Uncertainty.
Modeling.
PS 8 due: Imai, exercises §6.7.2, #1-6 (or, esp. for comparative politics, §6.7.3, #1-5)

Required reading.

Imai, §7.1-7.2.

VII. Assessments

10 December

Final exam, 2.35-5.05pm, Location TBA.