

The University of Michigan, Winter 2016  
Political Science 300, G322 Dentistry Bldg.

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## Quantitative Empirical Methods of Political Science<sub>(v3.0: 15 March 2016)</sub>

This course offers an introduction to the methods political scientists use to construct, to estimate, and to evaluate systematically empirical representations of theoretical propositions about politics. The course emphasizes the formulation of positive political theories; the derivation of hypotheses from, and the specification of empirical models of, those theories; and the use of data to test those hypotheses and estimate those empirical models. No background in statistics is required. We use and discuss statistical concepts and reasoning, but the course instruction will include all the mathematics and statistics needed, from the ground up. Problem sets (10 total, approx. weekly, 5% each), class & section participation (15%), & a take-home final (35%) comprise the course's graded exercises. Lecture notes and other course materials will be provided before class sessions; students should have read those and bring them to class. Everyone is expected to come prepared for, and to participate in, *all* class & section sessions.

The course has one required text:

**K&W:** Kellstedt, Paul & Guy D. Whitten. 2013. *The Fundamentals of Political Science Research*, 2<sup>nd</sup> ed. Cambridge UP.

All other class materials will be available through the course CANVAS site, although we draw sizable selections from the following texts (so you might consider them recommended, not required):

**F&K:** Franzese, Robert J., Jr. & Cindy D. Kam. 2007. *Modeling and Interpreting Interactive Hypotheses in Regression Analyses*, UMich Press.

**FPP:** Freedman, David, Robert Pisani, & Roger Pervis. 1998. *Statistics*, 3<sup>rd</sup> ed. New York: W. W. Norton.

**H&J:** Hanushek, Eric A. & John E. Jackson. 1977. *Statistical Methods for Social Scientists*. NY: Academic Press.

**S&W:** Stock, James H. & Mark W. Watson, 2006. *Introduction to Econometrics*, 2<sup>nd</sup> ed. Addison-Wesley.

Some assignments will require work in a spreadsheet, like *Excel* or *Numbers* or *Google Sheets*, or in a statistical software package, like *Stata* or *R*. We will demonstrate primarily in *Excel* and *Stata*. You can access all these software & more via UM's Virtual Sites (<http://virtuallsites.umich.edu>), and some are free, like *R* & *Google's* apps. You can work in groups on assignments if and as you wish, but each student should produce their own final answers for their own, individual submissions. Please be aware that, although working together can help you break through initially on some of the more challenging items, relying too much on your peers over the semester can leave your understanding of the material lacking and accumulate to a large problem for the final. Please do form and work in groups if this is helpful for you, but also be sure you understand fully the material in each assignment by yourself, individually, before proceeding.

## **University, College, Department, and Course Statements**

### **Accommodations for Students with Disabilities**

If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Services for Students with Disabilities (SSD) office to help us determine appropriate academic accommodations. SSD (734-763-3000; <http://ssd.umich.edu>) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. Any information you provide is private and confidential and will be treated as such.

### **Religious and Academic Conflicts**

Although the University of Michigan, as an institution, does not observe religious holidays, its policy is that every reasonable effort should be made to help students avoid negative academic consequences when their religious obligations conflict with academic requirements. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence. Students who expect to miss classes, examinations, or other assignments as a consequence of their religious observance shall be provided with a reasonable alternative opportunity to complete such academic responsibilities. It is the obligation of students to provide faculty with reasonable notice of the dates of religious holidays on which they will be absent. Such notice must be given by the drop/add deadline of the given term. Students who are absent on days of examinations or class assignments shall be offered an opportunity to make up the work, without penalty, unless it can be demonstrated that a make-up opportunity would interfere unreasonably with delivery of the course. Should disagreement arise over any aspect of this policy, the parties involved should contact the Director of Undergraduate Studies. Final appeals will be resolved by the Provost.

### **Students Representing the University of Michigan**

There may be instances when students must miss class due to their commitment to officially represent the University. These students may be involved in the performing arts, scientific or artistic endeavors, or intercollegiate athletics. Absence from classes while representing the University does not relieve students from responsibility for any part of the course missed during the period of absence. Students should provide reasonable notice for dates of anticipated absences and submit an individualized class excuse form.

### **Student Mental Health and Wellbeing**

The University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) at (734) 764-8312 and <https://caps.umich.edu> during and after hours, on weekends and holidays, or through its counselors physically located in schools on both North and Central Campus. You may also consult University Health Service (UHS) at (734) 764-8320 and [www.uhs.umich.edu/mentalhealthsvcs](http://www.uhs.umich.edu/mentalhealthsvcs), or for alcohol or drug concerns, [www.uhs.umich.edu/aodresources](http://www.uhs.umich.edu/aodresources). For a listing of other mental health resources available on and off campus, visit: <http://umich.edu/~mhealth>.

## Course Schedule

**Week 1:** Wednesday 1/6 — Welcome & Course Description, including a first look at some empirical analyses of some of the best-developed positive-theoretical propositions in political science. (We'll see them again later.)

1. Franklin, Mark N. 2002. "The Dynamics of Electoral Participation," in Lawrence LeDuc, Richard G. Niemi, & Pippa Norris, eds., *Comparing Democracies 2* (Sage Publications), ch. 7, pp. 148-68.
2. Erikson, Robert S., Michael B. MacKuen, & James A. Stimson. 2000. "Bankers or Peasants Revisited: Economic Expectations and Presidential Approval," *Electoral Studies* 19:295-312.
3. Hellwig, Timothy & David Samuels. 2007. "Voting in Open Economies: The Electoral Consequences of Globalization," *Comparative Political Studies* 40(3):283-306.
4. Clark, William Roberts & Matt Golder. 2006. "Rehabilitating Duverger's Theory: Testing the Mechanical and Strategic Modifying Effects of Electoral Laws," *Comparative Political Studies* 39(6):679-708.
5. Rousseau, David L., Christopher Gelpi, Dan Reiter, & Paul K. Huth. 1996. "Assessing the Dyadic Nature of the Democratic Peace, 1918-88," *The American Political Science Review* 90(3):512-33.

**BACKGROUND:** Franzese, Robert J., Jr. 2007. "Multi-Causality, Context-Conditionality, and Endogeneity," in *Oxford Handbook of Comparative Politics*, C. Boix, S. Stokes, eds., Oxford University Press, pp. 27-72.

### I. Positive Social-Science Theory and Strategies of Empirical Social-Science Research

Our introduction begins by clarifying what *positive*, as opposed to normative, social-scientific theory, e.g., political-science theory, looks like and is, and how it works. We then discuss, also in introductory fashion, how positive social-science theory may be systematically and objectively evaluated empirically. The latter discussion includes highlighting the distinction between experimental and observational studies, examines the weaknesses of observational studies (& some of experimental studies), and asks what strategies one can best apply when experimentation is not feasible and what can one learn from non-experimental studies. (For the most part, political science, as a *social* science, is a non-experimental science.)

**Week 2:** Monday 1/11–Wednesday 1/13 — Introduction to Positive Social-Science Theory & its Systematic, Objective Empirical Evaluation

1. Continue with "Background Reading" and the 5 examples of empirical research in political science.
2. Olson, Mancur. 1982. *The Rise and Decline of Nations*. (Yale UP). Ch. 1, "The Questions & the Standards a Satisfactory Answer Must Meet," pp. 1-16.

**Assignment 1:** Distributed Wednesday 1/13

**MLK Day:** Monday 1/18 — Classes do not meet.

**Week 3:** Wednesday 1/20 — (Cont.) Positive Social-Science Theory & its Systematic, Objective Empirical Evaluation

1. **K&W** Chs. 1-2, "The Scientific Study of Politics" & "The Art of Theory Building," pp. 1-50.
2. Arthur L. Stinchcombe. 1968. *Constructing Social Theories*. New York: Harcourt, Brace & World, pp. 3-56.

### II. Design: Experimental & Observational Studies and Operationalization & Measurement: Variables

A critical part of any empirical analysis is the choice and construction of specific measures, or variables, that accurately represent the theoretical or propositional concepts. In this section, we want to discuss the various criteria that must be satisfied in order to claim one has "good" measures for the central concepts.

**Week 4:** Monday 1/25–Wednesday 1/27 — Designs of Empirical Political-Science Research

1. **K&W** Ch. 3, "Evaluating Causal Relationships," pp. 51-68.
2. **K&W** Ch. 4, "Research Design," pp. 69-91.
3. **FPP**, Chs. 1-2, "Controlled Experiments" and "Observational Studies," pp. 3-20, 27-8.

**Assignment 1:** Due Wednesday 1/27

**Assignment 2:** Distributed Wednesday 1/27

**Week 5a:** Monday 2/1 — Concepts, Operationalization, & Measurement: Variables, Distributions.

1. W. Phillips Shively. 1990. *The Craft of Political Research*. Englewood Cliffs, NJ: Prentice-Hall. pps. 44-78.
2. **K&W** Sects. 5.1-5.8, “Getting to Know Your Data: Evaluating Measurement & Variations,” 92-114.
3. **S&W** Sect. 2.1, pp.17-23.

### **III. Summarizing and Describing Data**

Many empirical studies begin with, and the simplest analyses rely mostly or exclusively, on displaying and comparing descriptive statistics for individual variables. Some of these comparisons are graphical, and others tabulate or present sample statistics such as mean and variance.

**Week 5b:** Wednesday 2/3 — Univariate Summary & Descriptive Statistics: Histograms, Means, Variances, etc.

1. **K&W** Sects. 5.9-5.12, “Getting to Know Your Data: Evaluating Measurement & Variations,” 114-128.
2. **FPP**, Chs. 3-4.
3. Garner, Roberta. 2010. *The Joy of Stats: A Short Guide to Introductory Statistics in the Social Sciences*. U. Toronto Press, 2<sup>nd</sup> ed., Ch. 2.
4. Wonnacott, Thomas H. & Ronald J. Wonnacott. 1990. *Introductory Statistics for Business and Economics*. 4<sup>th</sup> Ed. New York, NY: John Wiley & Sons, Ch. 2 except Sec. 2.4.
5. **S&W**, Sect. 2.2, pp.23-29.

**Assignment 3:** Distributed Wednesday 2/3

**Assignment 2:** Due Friday 2/5

**Week 6:** Mon 2/8–Weds 2/10 — Bivariate Summaries & Statistics: Scatterplots, Crosstabs, Covariance, Correlations, etc.

Analyses involving pairs of variables are often done by plotting the values associated with each variable for given data points. The information in these scatterplots can then be summarized in the correlation coefficient.

1. **FPP**, Chs. 8-9.
2. **H&J**, pp. 19-23.
3. **S&W**, Ch. 2 pp.34-35 and Ch. 3 pp. 92-96.
4. Christopher H. Achen. 1977. “Measuring Representation: Perils of the Correlation Coefficient.” *American Journal of Political Science*. 21(4):805-815.

**Assignment 4:** Distributed Wednesday 2/10

**Assignment 3:** Due Friday 2/12

### **IV. More Probability & Statistical-Inference; Bivariate Analysis**

This section re-grounds us formally in the probability & statistics theory underlying statistical inference, in general, including in social science, and begins their application in various forms of bivariate analysis.

**Week 7a:** Monday 2/15 — Probability, Statistics, and Statistical Inference

1. **K&W**, Ch. 6, pp. 129-44.
2. Garner, *The Joy of Stats*, Ch. 3, pp. 87-150.
3. **S&W**, Ch. 3, pp 45-57, 65-83.

**Week 7b:** Wednesday 2/17 — Bivariate Analyses

1. **K&W**, Ch. 7, pp. 145-70.
2. **S&W**, Ch. 3, pp. 83-92.

## V. The Linear-Regression Model

The most frequently used means for modeling relationships between variables (outcomes & explanators) is the linear-regression model, and its extensions to the generalized linear model (GLM) in which a linear-additive argument enters a nonlinear function, extending the applicability of regression analyses to qualitative and limited dependent-variables. Regression analyses figured prominently in the examples discussed in Sec. IV, and this section develops their logic, application, and interpretation more fully.

**Weeks 8:** Monday 2/22–Wednesday 2/24 – Linear-Regression Model: Bivariate

1. **K&W**, Ch. 8, pp. 171-196.
2. Christopher H. Achen. 1978. “Measuring Representation,” *American Journal of Political Science* 22(3):475-510.

**Assignment 4:** Due Friday 2/26

**Week 9:** *Winter Break! Have a great vacation!!*–Monday 2/29–Wednesday 3/4

**Week 10-11:** Monday 3/7–Wednesday 3/9–Monday 3/14–Wednesday 3/16 — Linear-Regression Model: Multivariate

1. **K&W**, Ch. 9, pp. 197-219.
2. **H&J**, Ch. 2, pp. 24-43.
3. **H&J**, Sect. 3.3 (MC experiment: distribution of b), 3.4-3.6 (inference & interpretation), pp. 60-72.
4. **H&J**, Sects. 3.1-3.2 (distribution of regression coefficients & properties of least-squares estimator), pp. 45-59.
5. **H&J**, Appendix I, Sects. I.3-I.4 (more-formal discussion of statistical inference), pp. 336-45.

**Assignment 5:** Distributed Monday 3/7

**Assignment 6:** Distributed Wednesday 3/16

**Assignment 5:** Due Friday 3/18

## VII. Regression Analyses

Extensions and Issues in Application of the Linear-Regression Model, and Introduction to the Binary-Outcome Case of the Generalized Linear model.

**Week 12:** Monday 3/21–Wednesday 3/23 — Further Issues & Considerations in Applied Linear-Regression

1. **K&W**, Ch. 10, pp. 220-46.
2. **H&J**, Ch. 4, pp. 75-108.
3. Fox, John. 1991. *Regression Diagnostics*. Newbury Park: Sage Publications, pp. 21-40 (outliers & high-leverage pts).

**Assignment 7:** Distributed Wednesday 3/23

**Assignment 6:** Due Friday 3/25

**Week 13:** Monday 3/28–Wednesday 3/30 — Extensions of Linear-Regression Model: Interaction Models

1. **F&K**, Chs. 1-4, pp. 1-102.
2. Brambor, Thomas, William Roberts Clark, and Matt Golder. 2006. “Understanding interaction models: Improving empirical analyses.” *Political Analysis* 14(1):63-82.

**Assignment 8:** Distributed Wednesday 3/30

**Assignment 7:** Due Friday 4/1

**Weeks 14:** Monday 4/4–Wednesday 4/6 — Extensions of Linear-Regression Model: Dynamic Models

1. **K&W**, Sects. 11.3-4, pp. 256-68.
2. Keele, Luke and Suzanna De Boef. 2008. “Taking Time Seriously.” *American Journal of Political Science* 52(1):184-200. [Terminology Corrigendum: long-run multiplier (LRM) is  $1/(1-\alpha)$ ; long-run (steady-state) effect is  $\beta/(1-\alpha)$ .]

**Assignment 9:** Distributed Wednesday 4/6

**Assignment 8:** Due Friday 4/8

**Week 15:** Monday 4/11–Wednesday 4/13 — Models for Binary Outcomes: Estimation & Interpretation

1. **K&W**, Sect. 11.2, pp. 248-55.
2. Aldrich, J., Nelson, F. 1984. *Linear Probability, Logit, & Probit Models*. Sage Publications. Chs. 1-3, pp. 9-65.

**Assignment 10:** Distributed Wednesday 4/13

**Assignment 9:** Due Friday 4/15

**Week 16a:** Monday 4/18 — Models for Binary Outcomes: Estimation & Interpretation (continued) AND/OR, as time allows:

Close Review of the Example Empirical Analyses of some Classic Positive-Theoretical Propositions in political science; these cover some of the most thoroughly developed and best empirically supported theories in political science. Now we are equipped to follow and understand them fully.

1. Franklin, Mark N. 2002. "The Dynamics of Electoral Participation," in Lawrence LeDuc, Richard G. Niemi, & Pippa Norris, eds., *Comparing Democracies 2* (Sage Publications), ch. 7, pp. 148-68.
2. Erikson, Robert S., Michael B. MacKuen, & James A. Stimson. 2000. "Bankers or Peasants Revisited: Economic Expectations and Presidential Approval," *Electoral Studies* 19:295-312.
3. Hellwig, Timothy and David Samuels. 2007. "Voting in Open Economies: The Electoral Consequences of Globalization," *Comparative Political Studies* 40(3):283-306.
4. Clark, William Roberts & Matt Golder. 2006. "Rehabilitating Duverger's Theory: Testing the Mechanical and Strategic Modifying Effects of Electoral Laws," *Comparative Political Studies* 39(6):679-708.
5. Rousseau, David L., Christopher Gelpi, Dan Reiter, & Paul K. Huth. 1996. "Assessing the Dyadic Nature of the Democratic Peace, 1918-88," *The American Political Science Review* 90(3):512-33.

**Assignment 10:** Due Tuesday 4/19

**Thursday, April 28 at 3:30pm: Final Exam Due**