

Theory & Methodology of Political Research

Higher School of Economics 2017-18

Fridays 6-9 PM

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Course Description: In this course we cover research methods for political science in four distinct modules: 1) Prerequisites (*two lectures*), including calculus, probability theory, linear algebra, and basics of working with a statistical software 2) Fundamentals of regression analysis (*five lectures*): including regression analysis, diagnostics of inference, regressions with time series data, nonlinear regression methods and finally causal inference using regression 3) Fundamentals of game theory and rational choice (*five lectures*): including pure and mixed equilibria in games of simultaneous and sequential moves, games of imperfect information, repeated games and bargaining models 4) Panel data analysis, hierarchical and multilevel models, fixed and random effects, and policy evaluation methods in political science (*five lectures*) including causal analysis methods, controlled experiments, field experiments, and natural and quasi-experiments of history covering differences-in-differences, matching, regression discontinuity, and instrumental variable methods

Each of the modules of the course is followed by an assignment for a total of four. Seminars are dedicated to the discussion of the techniques utilized in the assignments, as well as review of practical matters, such as software usage and data processing and analysis.

Weekly lectures outline the core theory and methodology of political science, and demonstrate the usage of these methods in the political science literature. There are required readings assigned for each lecture.

Seminars are scheduled to help students to develop their practical skills via working with theoretical examples, data processing exercises, and in-class discussions with the instructor.

Evaluation: The grade for this course is based on four assignments (total of 60%), attendance in lectures and seminars (10%), and a final exam (30%). The final exam is closed-notes. All exams are held in class.

Readings: Selected chapters from textbooks, and relevant papers are assigned each week. Students are expected to have read the material before attending the lecture. In case required readings are not available online or are not in the required texts, a scanned version will be provided on the course's website.

Office Hours: Instructor OH: Fridays 2:30 to 4:00 PM and by appointment, Teaching Assistant OH: TBD

Prerequisites: Prior exposure to linear algebra, probability and statistics, and statistical software is recommended.

Course Type: Compulsory

Learning Objectives: The analytical knowledge and empirical toolbox necessary for designing and implementing a multi-method political science inquiry

Learning Outcomes: Design and execution of the main modules of a political science inquiry: 1) data collection and basic processing 2) modeling strategic decision making 3) quantitative analysis of panel-structured data 4) policy evaluation and casual inference

Course Plan: Instruction in 17 lectures covering quantitative methods of research in political science: prerequisites, fundamentals of research methodology (regression analysis and game theory), research design and data collection methods—both qualitative and quantitative—methods of panel data, and policy impact evaluation. The goal is to encourage students to combine all the aforementioned components in their future work.

There will be presentation slides for each session. After each assignment, there will be a seminar for practicing the skills necessary – including those for working on the assignment objectives.

Required Textbooks: The following textbooks can be consulted for further learning. Additional readings are assigned per week.

- **Prerequisites:** (JG) Jeff Gill (2006) *Essential Mathematics for Political and Social Research* Cambridge University Press
- **Econometrics:** (JW1) Jeffrey Wooldridge (2013) *Introductory Econometrics* South-Western, 5th edition

- **Game Theory:** (MO) Martin Osborne (2004) *An Introduction to Game Theory* Oxford University Press
- **Research Design:** (KKV) Gary King, Robert Keohane and Sidney Verba (1997) *Designing Social Inquiry: Scientific Inference in Qualitative Research* Princeton University Press
- **Policy Evaluation/Quantitative Research Design:** (AP1) Joshua Angrist and Jörn-Steffen Pischke (2014) *Mastering Metrics, The Path from Cause to Effect* Princeton University Press

Recommended Textbooks:

- **Econometrics:** (GH) Andrew Gelman and Jennifer Hill (2006) *Data Analysis Using Regression and Multilevel/Hierarchical Models*, Cambridge University Press
- **Game Theory:** (DSR) Avinash Dixit, Susan Skeath and David H. Reiley Jr. (2014) *Games of Strategy* W. W. Norton & Company
- **Panel Data Methods:** (JW2) Jeffrey Wooldridge (2010) *Econometric Analysis of Cross Section and Panel Data* MIT Press
- **Policy Evaluation/Research Design:** (AP2) Joshua Angrist and Jörn-Steffen Pischke (2009) *Mostly Harmless Econometrics: An Empiricist's Companion* Princeton University Press

Outline and Schedule

Part 1: PREREQUISITES, Calculus, Probability, Linear Algebra

- **Lecture 1: Overview of the Course—Basic mathematics of social science** First a full overview of the course, outlining the elements of a political scientific inquiry—then we start with the fundamentals of linear algebra, vector operations and probability theory, as well as some essential calculus refreshers. A good understanding of vector operations and probability theory is key to research design and data management in political science.

– Required Reading

- * *Research Design*: KKV, Ch. 1
- * *Linear Algebra: Vector operations*: JG, Ch.s 3 and 4
- * *Fundamentals of Probability*: JG, Ch.s 7 and 8
- * *Calculus*: JG, Ch. 5

– Recommended Reading

- * Carl P. Simon and Lawrence E. Blume (1994) *Mathematics for Economists*, Chapters on vector analysis and probability

• **Lecture 2: Social Science Data** Introduction to Data Processing

– Required Reading

- * *Research Design*: KKV, Ch. 2 and Ch. 3
- * *Data as vectors & fits and prediction (Matrix and vector algebra + Probability theory)*: JW1, Ch. 1
- * *R Introduction*: Two intro s to R, available at <https://cran.r-project.org/doc/manuals/R-intro.pdf>, and <http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf>

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- * ASSIGNMENT 1, Due TBD
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Part 2: FUNDAMENTALS, Regression Analysis

• **Lecture 3: Fundamentals of regression analysis, simple Ordinary Least Squares (OLS)**

– Required Reading

- * *OLS, fundamentals and goodness of fit*: JW1, Ch. 2
- * *Maximum Likelihood (ML) estimation and hypothesis testing*: JW1, Appendix C

– **Lecture 4: Multiple Regressions–Definition and Diagnostics of Inference**

* Required Reading

- *Fundamentals & Inference tests*: JW1, Ch.s 3, 4
- *Multiple Regression Issues*: JW1, Ch.s 5,6

– **Lecture 5: Multiple Regression-II**

* Required Reading

- *Discrete Variables*: JW1, Ch. 7
- *Heteroskedacity*: JW1, Ch. 8
- *Regression Issues*: JW1, Ch. 9

– **Lecture 6: Nonlinear Regression: Logit and Probit, GLM, Poisson, Negative Binomial**

* Required Reading

- *Logit and Probit*: JW1, Ch. 17
- *GLM*: JW2, Ch. 13
- *Probit, Logit, Poisson & Negative Binomial*: JW2, Ch. 15, 18

– **Lecture 7: Regression & Causal Inference, Instrumental Variable Analysis (IV) & Two Stage Least Squares (2SLS)**

* Required Reading

- *IV and 2SLS*: JW1, Ch. 15
- *Causal Inference*: GH, Ch. 9, 10

* ASSIGNMENT 2, Due TBD

Part 3: FUNDAMENTALS, Game Theory & Rational Choice

– **Lecture 8: Fundamentals–Nash Equilibrium in Simultaneous-Move games**

* Required Reading

- *Fundamentals, Discrete Strategy Nash Equilibrium*: MO, Ch.s 1,2, and 3
- * Recommended Reading
 - DSR, Ch.s 1, 2, and 4
- **Lecture 9: Equilibria in Sequential Games**
 - * Required Reading
 - *Backward Induction and Subgame Perfect Equilibria*: MO, Ch.s 5, 6, and 7
 - * Recommended Reading
 - DSR Ch. 3
- **Lecture 10: Mixed Strategy Equilibria**
 - * Required Reading
 - *Mixed Strategy Equilibria*: MO, Ch. 4
 - * Recommended Reading
 - DSR, Ch.s 5,6, and 7
- **Lecture 11: Games of Imperfect Information**
 - * Required Reading
 - *Bayesian Games, Bayesian Subgame Perfect Equilibria (SPE), Signaling Games*: MO, Ch.s 9 and 10
 - * Recommended Reading
 - DSR, Ch. 8
- **Lecture 12: Repeated Games and Game Theory Section Wrap-up**
 - * Required Reading
 - *Repeated Games (PD)*: MO, Ch.s 14 and 15
 - * Recommended Reading
 - DSR, Ch. 10

* ASSIGNMENT 3, Due TBD

Part 4: QUANTITATIVE METHODS, PANEL DATA, POLICY EVALUATION METHODS

– Lecture 13: Instrumental Variable Designs and Causal Analysis

- * Required Reading

- *Instrumental Variable Methods*: AP1, Ch.3

- * Recommended Reading

- Guido Imbens and Jeffrey Wooldridge (2009) Recent Developments in the Econometrics of Program Evaluation *Journal of Economic Literature* 47(1): 5–86.

– Lecture 14: Econometrics of Panel Data Analysis- Fixed Effects, Random Effects, First Difference

- * Required Reading

- *Policy Analysis with Panel Data*: JW1, Ch. 13

- *Fixed Effects, Random Effects*: JW1, Ch. 14

– Lecture 15: Temporal and Cross Sectional Dependency-Hierarchical Models

- * Required Reading

- *Dependency in Time, Forecast*: JW1, Ch. 18

- *Hierarchical Linear Models, Clustering*: JW2, Ch. 20

- * Recommended Reading

- *Multilevel Models*: GH, Ch.s 11, 12, 13

- *Ordered Response Models*: JW2, Ch. 16

– Lecture 16: Policy Evaluation and Causal Analysis

- * Required Reading

- *Matching*: AP1, Ch. 2

- *Regression Discontinuity*: AP1, Ch. 4

- *Differences-in-Differences*: AP1, Ch. 5

– Lecture 17: Controlled Experiments (Mathematics and Methods), Field Experiments, Natural and Quasi Experiments

- * Required Reading

- *Randomization*: AP1. Ch. 1, AP2. Ch. 2
- *Causal Inference*: Stephen L. Morgan and Christopher Winship (2007) (MW) *Counterfactuals and Causal Inference: Methods and Principles for Social Research* Cambridge University Press, Ch.s 2, 3, 4, 5
- Daron Acemoglu, Simon Johnson and James A. Robinson (2002) Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution, *The Quarterly Journal of Economics* 117 (4): 1231–1294
- *Sample Cases*: Jared Diamond and James Robinson ed.s (2011) *Natural Experiments of History*, Belknap Press, Selections

* Recommended Reading

- *Experiments*: Alan Gerber and Donald Green (2012) *Field Experiments* W. W. Norton

* ASSIGNMENT 4, Due TBD

– Final Exam
