

University of Rochester Political Science

PSCI 281
Formal Models in Political Science

Anna Denisenko
Spring 2024

Syllabus

Office: 109D, Harkness Hall, W. Allen Wallis Institute of Political Economy

E-mail: adenise2@ur.rochester.edu

Office Hours: MW 3:00 PM - 4:00 PM

Course Description: This course serves as an introduction to the use of mathematical models in political science. It covers an extensive range of models relevant to various aspects of the field. Our exploration will include various areas of 'positive political theory', with a focus on social choice theory and game theory. We will study mathematical foundations of voting, utilitarianism, and party behavior in elections, consistently anchoring our analysis on the individual's role in shaping big-picture political patterns.

This course has two objectives, which is reflected in its structure. First, it aims to familiarize students with the instruments of positive political theory, in application to classic political scenarios such as voting, legislative politics, and political participation. Second, the course provides a concise survey of the relevant literature in formal theory, emphasizing topics related to electoral processes.

While there are no strict mathematical prerequisites, a basic understanding of mathematical reasoning and logic is essential.

Course Requirements:

1. (40% of the grade) There will be **six assigned problem sets** covering the lecture material and readings. Collaboration on homeworks is permitted, however each student must write up and submit their answers individually. If you choose to work with classmates, please write the names of any individuals with whom you consulted at the top of your assignment. This disclosure will protect you in the event of any concerns about academic integrity.

All problem sets must be submitted by **9 am EST on the due date**. No late assignments – the worst of six grades will be dropped.

2. (30% of the grade) An in-class midterm exam on March 18. You may use the lecture slides, your notes, and any assigned readings during the exam (open-book). The midterms will focus on content from prior lecture materials.

3. (30% of the grade) 10-15 page paper due at the end of the semester. Students must identify a relevant question, draft a model to gain leverage on the question, and integrate their work within the scope of the existing literature. This model may be an original one or an adaptation of a pre-existing model.

Course Schedule: The course will convene twice a week, on Mondays and Wednesdays 12:30 PM -- 1:45 PM in [Hylan Building room 305](#).

Course Readings:

1. *The Mathematics of Politics 2nd Edition*, by E. Arthur Robinson Jr. and Daniel H. Ullman,
2. *Analyzing Politics: Rationality, Behavior and Institutions, 2nd Edition*, by Kenneth A. Shepsle

Academic Integrity: All assignments and activities associated with this course must be performed in accordance with the [University of Rochester's Academic Honesty Policy](#).

Course Timeline

Week 1: Logistics and Introduction

Week 2: Two Candidates Voting

- *Highlights: Selection Criteria, May's Theorem*
- Robinson and Ullman, Chapter 1

Weeks 3-4: Social Choice Functions

- *Highlights: Rationality, Transitivity, Completeness, Transitivity, Borda Rule, Pareto Criterion, Condorcet Criterion*
- Robinson and Ullman, Chapters 2-5
- Shepsle, Chapters 2,4 (pp. 13-30, pp. 53-61)

Week 5: Arrow Theorem

- *Highlights: Condorcet Paradox, Arrow Theorem*
- Shepsle, Chapter 4 (pp. 67- 86)

Week 6: Spatial Models of Majority Voting

- *Highlights: Single-Peaked Preferences, Median-Voter Theorem, Downs's Model*
- Shepsle, Chapter 5
- * Downs, Anthony. "An economic theory of political action in a democracy." *Journal of political economy* 65.2 (1957): 135-150.

Week 7: Measuring Voting Power

- *Highlights: Banzhaf Power Index, Shapley-Shubik Power Index*
- Robinson and Ullman, Sections 19.3, 19.4

Week 8: Apportionment (week 8)

- *Highlights: Hamilton's Method, Jefferson's Method, Alabama Paradox*

Week 9: Midterm

Weeks 10-15:

Is it Rational to Vote?

- Shepsle, (pp. 67- 86)
- Dowding, Keith. "Is it rational to vote? Five types of answer and a suggestion." *The British Journal of Politics and International Relations* 7.3 (2005): 442-459.

Elections and Natural Disasters

- Achen, Christopher H., and Larry M. Bartels. "Blind retrospection: Electoral responses to drought, flu, and shark attacks." (2004): 1.
- Ashworth, Scott, Ethan Bueno de Mesquita, and Amanda Friedenberg. "Accountability and information in elections." *American Economic Journal: Microeconomics* 9.2 (2017): 95-138.
- * Fowler, Anthony, and Andrew B. Hall. "Do shark attacks influence presidential elections? Reassessing a prominent finding on voter competence." *The Journal of Politics* 80.4 (2018): 1423-1437.

Voter Learning

- Ashworth, Scott, and Ethan Bueno De Mesquita. "Is voter competence good for voters?: Information, rationality, and democratic performance." *American Political Science Review* 108.3 (2014): 565-587.
- Prato, Carlo, and Stephane Wolton. "The voters' curses: Why we need Goldilocks voters." *American Journal of Political Science* 60.3 (2016): 726-737.
- Gordon, Sanford C., Gregory A. Huber, and Dimitri Landa. "Challenger entry and voter learning." *American Political Science Review* 101.2 (2007): 303-320.

Retrospective and Forward Looking Voting

- Fearon, James D. "Electoral accountability and the control of politicians: selecting good types versus sanctioning poor performance." *Democracy, accountability, and representation* (1999): 55-97.
- Ferejohn, John. "Incumbent performance and electoral control." *Public choice* (1986): 5-25.

Politicians Entry

- Shotts, Kenneth, and Scott Ashworth. "Challengers, democratic contestation, and electoral accountability." APSA 2011 Annual Meeting Paper. 2011.
- Gordon, Sanford C., Gregory A. Huber, and Dimitri Landa. "Challenger entry and voter learning." *American Political Science Review* 101.2 (2007): 303-320.

Incumbency Advantage (and Disadvantage)

- Ashworth, Scott, and Ethan Bueno de Mesquita. "Electoral selection and the incumbency advantage." Princeton, NJ: Princeton University Mimeo (2005).
- Gordon, Sanford C., and Dimitri Landa. "Do the advantages of incumbency advantage incumbents?." *The Journal of Politics* 71.4 (2009): 1481-1498.

Between-Election Interventions

- Denisenko, Anna. "Strategic Replacements and Popular Support: Political Consequences of Authoritarian Replacement of Elected Officials." Forthcoming JOP