Autumn 2019
POLS 40801 & POLS 20750
Social Choice Theory

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T, Th: 11:00-12:20
Pick 506

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Course description

This course is the first quarter of the PhD level sequence in Political Science that is devoted to formal theory. It serves as a prerequisite to Game Theory I in the Winter Quarter. This quarter will be taught as an introduction to decision theory and social choice.

In 1950, Kenneth Arrow said that in a capitalist society there are "essentially two ways by which social choices can be made: voting or the market." The former is typically used to make political decisions and the latter to make economic decisions. This course is devoted to the former.

Social Choice takes on the input side a set of individuals who have well-defined and heterogenous preferences over a set of alternatives. It then, on the output side, examines how these preferences can be aggregated into a collective choice or a collective preference. This aggregation happens through the use of a *preference aggregation rule*. If you have ever participated in a process involving voting you have used a preference aggregation rule.

The goal of Social Choice Theory is to examine the properties of the preference aggregation rules with the aim of finding rules that have normatively desirable outcomes. In light of this, Social Choice has a lot in common with normative political philosophy, but as a formal theory, it arrives at conclusions using the rigorous tools of deductive reasoning: logic and mathematics. When we take the collection of individual preferences as input we are representing ways of ordering a set of objects that correspond to states of the world (in politics, these state can be "Joe Biden is President", "Donald Trump is President" or "Elizabeth Warren is President"). The main theorems we will study will be concerned not only with

how difficult such aggregation exercises are, but also with how hard it is to satisfy jointly innocuous properties we want preference aggregation rules to satisfy.

In light of this, social choice provides us with the tools for analyzing what voting mechanisms can and cannot accomplish, sometimes to the dismay of policy-makers and pundits.

The course will be centered around several social-choice theoretic results, such as Arrow's Impossibility Theorem, the McKelvey-Schofield chaos theorems, the Gibbard-Satherwaite theorem, the Plot conditions, and the debate surrounding principles of justice between John Rawls and Utilitarians. All these results have changed the way political scientists think about voting, democracy, and justice.

Required and Recommended Materials

The textbook for this class is **Positive Political Theory I** by Austin-Smith and Banks, University of Michigan Press 2000 [ASB].

We will cover chapters 1, 2, 3, 4 and 5 of this textbook as well as some specific chapters from the other books below.

Although the class material will be presented according to the notation from Austin-Smith and Banks' textbook, there is no one perfect Social Choice Theory textbook. You are welcome to consult the following introductory books and re-read the chapters corresponding to the material we covered in class. You may find a different textbook to be a better fit for your needs.

1. Kelly, Jerry S. "Social choice theory: An introduction. Springer Science." & Business Media, 2013.

2. Taylor, Alan D. "Social choice and the mathematics of manipulation." Cambridge University Press, 2005.

3. Luce, R. Duncan, and Howard Raiffa. "Games and decisions: Introduction and critical survey." Courier Corporation, 1989. (We will cover one chapter from this book) [G &D]

4. Austen-Smith, David, and Jeffrey S. Banks. "Positive political theory II: strategy and structure." University of Michigan Press, 2009. (We will cover one chapter from this book)

5. Rawls, John. "A Theory of Justice." Harvard University Press, 2009 (we will cover several sections from this book).

6. Patty, John W., and Elizabeth Maggie Penn. "Social choice and legitimacy: The Possibilities of Impossibility." Cambridge University Press, 2014 (This book is an excellent source of additional reading on Arrow's Theorem).

7. Arrow, Kenneth J. "Social choice and individual values." Vol. 12. Yale University Press, 2012.

Mathematical prerequisites

The mathematical prerequisites for this course are modest. I expect you to be familiar basic set theoretic operations and some formal logic. However, we will spend the first week on an overview of this material. If you have done proofs in any of your previous classes, this will be a large asset. I will also be distributing a handout on the first day of class, which summarizes the material. For those of you who would like more background on set theory, proofs and logic, the most comprehensive presentation I can recommend is:

Velleman, Daniel J. How to prove it: A structured approach. Cambridge University Press, 2019.

Exams

There will be two closed-book, in-class exams in this class: a midterm on November 5^{th} and a final during finals week. Each exam will be worth 25%.

Grading

Grades will be assigned according to the following rubric:

A	81-100%
B	61-80%
C	41-60%
D	26-40%
F	0-25%

Pluses and minuses will be awarded at the discretion of course staff.

There will be 4 substantial problem sets, each worth 10%.

The final 10% will be awarded for a presentation you will give to the class. The presentations will take place during the last two class sessions. You will prepare a 15 minute presentation on the reading in the last section of this syllabus. You will also lead a 5 minute Q&A.

Problem Sets

Most Thursdays, starting next Thursday (except for Thanksgiving week and before exams), you will be handed a short problem set. You must come to class or to office hours following class to receive the assignment. I will *not* distribute assignments electronically. The assignments may be completed in groups of 2 or 3 students. Each group will hand in one PRINTED and TYPED submission one week later. Handwritten assignments or assignments in electronic format (e-mail) will not be accepted. No late assignments will be accepted, as select problems on the assignments will be solved in class the day they are due (the last 45 minutes of the Thursday class).

The purpose of the written homework in this course is to develop your skills in understanding and communicating social choice. It is not to give you busy work or drill. Don't

think of your homework as a certificate proving that you have done the assignment. Think of it as an exercise in learning and in reporting what you have learned. There is a lot of truth in the statement *if you can't explain it, you don't understand it.* Communicate with the reader. Don't write to the instructor (who already knows how to do the problems), but explain your solutions to someone who needs help, perhaps a classmate who has been absent. Start at the beginning, and be clear, logical and complete.

The purpose of group work is two-fold. First, by sharing ideas you will be able to learn from each other, allowing you to clarify what you have learned from the lectures and readings. Second, you will become accustomed to working with other people. Few occupations call for working in isolation. The goal for group assignments is for each group member to understand the entire assignment. Frequently a major part of an assignment will be to summarize the various components of the problem at hand. To do this, you will need to understand the entire assignment. Therefore you should not divide the problems among your group members: each person should work on every part and you should collaborate and discuss your results. Problem sets will be due the Thursday a week after they were handed out.

Socratic method

In class, I will frequently engage in what is known in some law schools as the "Socratic method", that is, I will call on students without prior warning to answer questions related to the readings or lectures. Therefore, it is in your interest to come prepared for each class.

Piazza

This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email team@piazza.com. Find our class page at: https://piazza.com/uchicago/fall2019/pols40801pols20750/home

One way to earn extra credit in the course is to answer a question posted by a class mate. This extra credit will contribute to the plus and minus portion of your grade and will be at the discretion of the teaching staff.

Laptop Policy

In the class I will be following a no laptop policy. If you wish to take notes on the handouts, you must print them before coming to class. Recent research shows that having laptops open in the classroom is detrimental to the learning process. You can read more about this research here: https://www-ncbi-nlm-nih-gov.proxy.uchicago.edu/pubmed/28182528

Calendar

October 1: Logistics and Formal Logic
October 3: Set Theory and Proofs
Read Handout distributed in class
October 8: Introduction to Decision Theory
G & D: Chapter 2 (can skip first and last section), A-S & B 1.1
October 10: Introduction to Latex
Joint session withe Bianca Di Giovanni's section of Social Science Inquiry I.
October 15: Decision Making Behind the Veil of Ignorance

Rawls, John. A theory of justice. Harvard university press, 2009 pp. 136-182 (chapters 24-29).

Harsanyi, John C. "Can the maximin principle serve as a basis for morality? A critique of John Rawls's theory." American political science review 69.2 (1975): 594-606.

October 17: Rationalizable Choice
A-S & B 1.2, 1.3, 1.4, 1.5., 1.6.
October 22: Arrow's Theorem
A-S & B 2.1
October 24: Arrow's Theorem cont'd A-S & B 2.2
October 29: Arrow Extensions: Quasitransitivity & Acyclicity
A-S & B 2.3, 2.4
October 31: Catch-up and review session
November 5: Midterm
November 7: Simple Rules and Nakamura number
A-S & B 3.1, 3.2
November 12: Voting and Counting Rules
A-S & B 3.4, 3.5, 3.6
November 14: Domaine restrictions
A-S & B 4.1, 4.2
November 19: Single-Peakedness
A-S & B 4.3, 4.4, 4.5
November 21: The Spatial Model, May's Theorem
A-S & B 3.5 & select parts of 5
November 26: Strategy Proofness
A-S & B II Select parts of chapter 2
December 1: Presentation session I
Students 1-5
December 3: Presentation session II
Students 6-9

Readings for presentations
Voting

1. Penn, Elizabeth Maggie. "A model of farsighted voting." American Journal of Political Science 53.1 (2009): 36-54.

2. Penn, Elizabeth Maggie, John W. Patty, and Sean Gailmard. "Manipulation and Single-Peakedness: A General Result." American Journal of Political Science 55.2 (2011): 436-449.

3. Miller, Nicholas R. "A New Solution Set for Tournaments and Majority Voting," American Journal of Political Science, 24(1), 68-96

4. McKelvey, R. and R. Niemi (1978) "A multistage game representation of sophisticated voting for binary procedures." Journal of Economic Theory, 18, 1-22

Fair Division, Apportionment and Rationing

5. Brams, S. J. and D. M. Kilgour (2001). "Competitive Fair Division." The Journal of Political Economy 109(2): 418-443.

6. Aumann, R. and M. Maschler (1985). "Game Theoretic Analysis of a Bankruptcy Problem from the Talmud." Journal of Economic Theory 36: 195-213.

7. Elster, J. (1992). Local Justice. How Institutions Allocate Scarce Goods and Necessary Burdens. New York, Russel Sage Foundation.

8. Kaminski, M., M. (2000). "Hydraulic Rationing." Mathematical Social Sciences.

9. O'Neil, B. (1982). "A Problem of Rights Arbitration from the Talmud." Mathematical Social Sciences 2: 345-371.

10. Young, P. (1987). "On Dividing an Amount according to Individual claims and Liabilities." Mathematics of Operations Research 12(No. 3 August 1987): 398 -414.

11. Young, P. (1994). "Equity in Theory and Practice." Princeton, Princeton University Press: 190 - 199 (Claims and Liabilities).

12. Young, P. (1994). "Equity in Theory and Practice." Princeton, Princeton University Press: 65-80 (Equity, Equality and Proportionality).