

## PSC 281/ECO 282 Formal Models in Political Science

Spring, 2009  
T, Th 12:30–1:45  
Bausch & Lomb 270

Professor Duggan  
Office: Harkness 111A  
Hours: MW 10-11:00am  
Email: [dugg@troi.cc.rochester.edu](mailto:dugg@troi.cc.rochester.edu)

The course covers a variety of formal models used in political science. We will study the mathematical foundations of majority voting (and applications to left-right politics), general preference aggregation rules, strategic incentives for misrepresentation of preferences, the mathematical foundations of utilitarianism, the implications of coalition formation, and connections to game-theoretic models. Much of the analysis is axiomatic: after setting up a problem in mathematical terms, we formulate postulates — or “axioms” — and deduce sometimes unexpected implications of our axioms. The goal of the course is to give insight into new ways of thinking about political processes and to demonstrate the value of formal analysis.

We will adhere to fairly high standards of rigor: there will be some mathematical notation, and I will sometimes provide the ideas behind the proofs of the theorems presented in class. There are no formal prerequisites for the course, but some aptitude for logical or mathematical reasoning is desirable.

**Readings:** The main textbook for the course is *A Primer on Social Choice Theory*, by Wulf Gaertner. Lectures will be based on — but not limited to — the material in this book. An optional text, *Analyzing Politics*, by Shepsle and Bonchek, is informal yet informative.

**Course work:** Work in the course will consist of readings from the textbook; homeworks assigned approximately every two weeks; possibly some short quizzes throughout the semester; a mid-term; and a final. One or two homeworks may take the form of a short essay.

Collaboration on homeworks is permitted if it facilitates the understanding of course material for the students involved. Students may not copy work from others.

The worst of the homework grades will be dropped, and, for this reason, I will not accept late homeworks. (If you come to me with pressing circumstances, like illness, *before* an assignment is due, we may be able to work out an alternative arrangement.)

Note: Because I drop the worst homework grade, the homework policy provides you with some insurance against random disasters (like, “I forgot the homework was due.”); you should try not to take advantage of it too early in the semester.

**Class attendance:** Attendance of the lectures is not required, but it does factor into the “participation” component of the course grade, as explained below. Furthermore, because lectures will not strictly follow the textbook, failure to attend lectures will hamper your understanding of the material and quite possibly have an adverse affect on grades for homework, exams, etc. I will attempt to make copies of lecture notes available online, but these are intended to be a complement — not a substitute – for class attendance.

**Grading:** Final grades will be determined on the basis of course work with the following weights: 20% homework, 30% mid-term, 40% final, and 10% participation. Your “participation” mark will depend on attendance, participation in class (asking/answering questions), quizzes (if any), and generally demonstrating an interest in the material.

**Outline:** Below, I list the main topics to be covered during the semester and their approximate timing. The mid-term exam is tentatively scheduled for Thursday, March 5 (week 8). This is the last Thursday before Spring break – please plan accordingly.

Week

1. Introduction to axiomatic social choice
2. Majority rule: May’s theorem
3. Spatial model: Black’s median voter theorem
4. Spatial model: multidimensional model
5. Preference aggregation: Arrow’s theorem
6. Preference aggregation: cycles
7. review & midterm
8. Social choices: a panoply of procedures
9. Strategic manipulation: Gibbard-Satterthwaite theorem
10. Strategic manipulation: back to the median
11. Utility functions
12. Welfare economics: Bentham to Rawls
13. Welfare economics: axiomatic foundations
14. Axiomatic bargaining & review