International politics is about strategic interaction among actors, especially states, in the world arena. When governments make choices about the size of their military forces, whether to reduce barriers to trade, or whether to comply with international agreements on environmental issues, they take into account the likely responses and actions of others. This course introduces the logic of strategic interaction in international politics by way of simple game theory. The principles of game theory are introduced, and you will learn how to solve simple games. Mathematical topics covered include probabilities, set theory, summation notation and infinite series, linear equations, and quadratic equations. The games are motivated and illustrated with examples drawn from international politics. The logic of strategic interaction and techniques of game theory developed in this class have wide applications outside the field of international relations.

When we study international relations, we take into account the incentives for states to anticipate the likely actions and responses of other states. States cannot gain their objectives in the international arena if they behave naively, ignoring the potential for others to react to their actions. As Thomas Schelling put it, international politics is a realm of “interdependent decision.” States strategize. Analysts study this strategic interaction using both informal and mathematical methods. One mathematical approach to strategic interaction is called game theory, and basic game theory includes the use of algebra, set theory, and probability theory.

The strategic analysis of international politics has deep historical roots. It began with studies of deterrence and bargaining. Over time, studies of these issues have become more mathematical in their approach. They have also been supplemented by studies of other types of international interaction, such as trade, cooperation, and environmental issues. Today, the use of game theory is standard in the analysis of international relations. The type of game theory used ranges from very simple to highly sophisticated.

The study of international strategic interaction thus provides an ideal framework for introducing the basics of game theory. From the perspective of quantitative reasoning, perhaps the most important set of lessons will be the logic of strategic interaction and the notion of an equilibrium. Introducing basic game theory also allows you to use the following mathematical tools: algebra, set theory, functions, and probability theory.
Structure of the course

The major textbook for this course is *Games of Strategy*, 3d ed. (Dixit, Skeath, and Reiley). The organization of the course generally follows that of Dixit, Skeath, and Reiley. We will begin by introducing the basic elements of game theory. We then move on to two different ways to present games, the extensive form and the strategic (or normal) form. We follow with some special topics, then turn to the notion of repeated games. We then move on to consider how incomplete information can be integrated into game theory, and finish with some applications and extensions.

Assigned readings follow. Most weeks include readings from Dixit and Skeath and a supplemental reading that relates these techniques to the study of international relations.

Discussion sections will meet once a week. It is very important that you complete the assigned reading before lectures and come prepared to discuss it in depth in sections. Sections will also be used to discuss problem sets. You will have eight problem sets due over the course of the semester, as indicated in the reading list. Problem sets are due in lecture on the date indicated. There are two in-class midterms and a final examination.

Grading

Grades will be calculated using the following formula:

- Problem sets 25%
- Exams 75% (25% each)

Please note: The material in this course is cumulative. That is, each week builds on the material covered in previous weeks. That means that the work, particularly the math, gets more difficult over the course of the semester. Please be aware that students who are able to breeze through the first test often find that they need to work significantly harder on the second and third tests to achieve the same grade.

Discussion sections will be used to go over material from lecture, problem sets, and exams. Your TA will work through more examples of games and answer any questions you have about lectures or readings. You should make a point of attending section if you are having any difficulty with the material. Section participation will be taken into account if your grade based on exams and problem sets is near a cutoff (say, on the margin between B and AB).
Books


TA information

Patrick Kearney
Email: pmkearney@wisc.edu

Topics, readings, and schedule

September 4  Introduction

September 6 and 11  Overview of game theory
   D&S chp. 1
   Schelling, pp. 3-20

September 13 and 18  Elements of games
   D&S chp. 2, pp. 17-27

September 20  Rationality
   D&S chp. 2, pp. 27-41; chp. 7, pp. 251-58

September 25  Extensive form
   Problem set 1 due
   D&S chp. 3, pp. 47-57

September 27  More on extensive form
   D&S chp. 3, pp. 57-79

October 2  Strategic form; discrete strategies
   Problem set 2 due
   D&S chp. 4, pp. 89-104
   Schelling, pp. 83-118

October 4  Minmax and other pure strategy equilibria
   D&S chp. 4, pp. 104-120
   Schelling, pp. 119-161

October 9  Mixed strategies
   Problem set 3 due
   D&S chp. 7, pp. 213-230
   Schelling, pp. 175-203
October 11  **Exam 1**

October 16  More on mixed strategies
D&S chp. 8, pp. 262-68

October 18 and 23  Spatial models  **Problem set 4 due October 23**

October 25 and 30  Repeated games  **Problem set 5 due October 30**
D&S chp. 11

November 1  Structure-induced equilibria
D&S chp. 10

November 6  Uncertainty
D&S chp. 9, pp. 307-17

November 8  **Exam 2**

November 13 and 15  Bayes’ Theorem  **Problem set 6 due November 15**
D&S chp. 7, pp. 224-26; chp. 9, pp. 359-61

November 20 and 27  Signaling  **Problem set 7 due November 27**
D&S chp. 9, pp. 323-44

November 29  Bargaining
D&S chp. 18
Schelling pp. 21-80

December 4  Application: The Cuban Missile Crisis  **Problem set 8 due**
D&S chp. 15

December 6  Experiments; evolutionary game theory
D&S chp. 13
December 11  Review Session

December 13  Exam 3