Professor Lisa Martin
Spring 2020
North Hall 417
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Office hours: Tuesdays 1:30-3:30

University of Wisconsin-Madison
Analysis of International Relations
Political Science 348
3 credits
https://canvas.wisc.edu/courses/187960

Class attributes: Social Science; Counts as Liberal Arts and Science credit in L&S; Quantitative Reasoning Part B; Intermediate

Meeting time and location: Humanities 1111, Tuesdays and Thursdays 11:00-11:50

Instructional mode: face-to-face only

This class meets for three, 50-minute class periods each week over the fall/spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc.) for about 2 hours out of the classroom for every class period. The syllabus includes additional information about meeting times and expectations for student work.

Official course description: Focuses on how to analyze problems in international politics by the use of game theory. Examples include governments making choices about the size of their military forces, barriers to trade, or international agreements on environmental issues. Analysts study strategic interaction using both informal and mathematical methods. Provides a good introduction to the basics of game theory -- a tool useful in many different settings -- as well as an introduction to the study of world politics. From the perspective of quantitative reasoning, one of the most important set of lessons center on the logic of strategic interaction and the notion of equilibrium. Along with basic game theory students will also be introduced to the pragmatic use of mathematical tools including algebra, set theory, functions, and probability theory. Enroll Info: Not open to students with credit for POLI SCI 376 prior to fall 2017

Requisites: Satisfied Quantitative Reasoning (QR) A requirement and (POLI SCI 140 or INTL ST 101) or (POLI SCI 103 taken prior to Fall 2017)

Course learning outcomes:

1. Master the basics of non-cooperative game theory
2. Understand the logic of strategic interaction in politics
3. Know how to apply game theory to international interactions
4. Be able to write down and solve simple non-cooperative games

Learning Disabilities

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform me of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. I will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

Students with disabilities should contact the McBurney Center for guidance. We will be happy to accommodate your needs as instructed by the center.

http://mcburney.wisc.edu

Detailed course description

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 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, and linear 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 also 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.

Structure of the course

The major textbook for this course is *Games of Strategy*, 4th 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, Skeath, and Reiley and a supplemental reading from Humphreys (2017) or elsewhere 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 three in-class midterms.

Grading

Grades will be calculated using the following formula:

Problem sets   25%

Exams   75%   (25% each)

We will use the usual link between scores and letter grades:

A	93-100
AB	88-92
B	83-87
BC	78-82
C	70-77
D	60-69
F	Below 60

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.   This course satisfies QR requirements, so requires you to work through mathematical problems.

Collaboration policy: You are encouraged to work together on problem sets. However, you should write down all of your own answers to the questions.   Tests will look very much like problem sets, so you need to be sure you can do this work independently.   Please meet with me or your TA if you are having trouble with any of the material.

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).

Late assignment policy

Problem sets are due in class on the date noted in the syllabus.   Please turn in a hard copy of the problem set at this time.   Problem sets will be discussed in section after they are turned in, therefore we need to have a strict policy regarding late problem sets. Each problem set is worth 10 points.   2 points will be deducted for each day that a problem set is turned in late.

Books

Avinash Dixit, Susan Skeath, and David H. Reiley, Jr., *Games of Strategy* (New York: Norton, 2015), Fourth edition, DSR in reading list.   Please be sure to purchase the **fourth** edition.

Macartan Humphreys, *Political Games: Mathematical Insights on Fighting, Voting, Lying, & Other Affairs of State* (New York: Norton, 2017).   Also available as an ebook.   This book has an excellent glossary that is helpful if you are having difficulty understanding any of the central concepts of the course.

These books are available through the University Bookstore or online merchants, and I've requested that they be put on reserve.   Additional supplemental readings will be posted on learn@uw.

TA information

Yumi Park, Sections 303, 306, and 307
Email: yumi.park@wisc.edu
Office Hours: Wednesdays 8:50-10:50 am, North Hall TA office

Lotem Bassan, Sections 302, 304, and 305
Email: lbassan@wisc.edu
Office Hours: Thursdays 9:50-11:50 am, North Hall TA office

Topics, readings, and schedule

January 21   Introduction

January 23   Overview of game theory
          DSR chp. 1
          Humphreys vii-x; xxi-xxii

January 28   Elements of games
          DSR chp. 2, pp. 17-27

January 30   Rationality
          DSR chp. 2, pp. 27-41; chp. 7, pp. 263-67

February 4   Extensive form   **Problem set 1 due**
          DSR chp. 3, pp. 48-57
          Humphreys xvii-xix

February 6   More on extensive form
          DSR chp. 3, pp. 57-80
          Humphreys 128-129

February 11   Normal form; discrete strategies   **Problem set 2 due**
          DSR chp. 4, pp. 91-106
          Humphreys xi-xvi

February 13   Minmax and other pure strategy equilibria
          DSR chp. 4, pp. 106-120
          Humphreys 130-131

February 18   **Midterm 1**

February 20   Using normal form games to understand international relations

Humphreys 1-7

February 25   Mixed strategies
          DSR chp. 7, pp. 214-233
          Humphreys 132-133

February 27   More on mixed strategies
          DSR chp. 7, pp. 233-49
          Mark Walker and John Wooders, "Minimax Play at Wimbledon," *American Economic Review* 91, no. 5 (December 2001), pp. 1521-38

March 3   Institutions   **Problem set 3 due**

          DSR chp. 9
          Humphreys 89-93

March 5   Majority rule and the median voter

          Humphreys 22-47

March 10 and 12   Repeated games   **Problem set 4 due March 12**
          DSR chp. 10
          Axelrod, Robert. 1981.   "The Emergence of Cooperation among Egoists." *American Political Science Review* 75: 306-318.

March 24   Thinking about the future

          Humphreys 9-13

March 26   **Midterm 2**

March 31   Uncertainty   **Problem set 5 due**
          DSR chp.89, pp. 271-81
          Humphreys xix-xxi

April 2 and 7   Bayes' Theorem
          DSR chp. 8, pp. 338-41
          Humphreys 135-136

April 9	Signaling 1	**Problem set 6 due**
   DSR chp. 8, pp. 304-19

April 14	Signaling 2; Reputation
   Humphreys 59-63; 114-115

April 16 and 21	Bargaining	**Problem set 7 due April 16**
   DSR chp. 17
   Humphreys 69-77

April 23	Application: The Cuban Missile Crisis	**Problem set 8 due**
   DSR chp. 14

April 28	Review Session

April 30	**Midterm 3**