Course Description & Overview

Understanding international politics requires us to understand strategic interactions among various kinds of actors; from states, to international organizations, to non-state organizations like terrorist groups, to individual leaders. These interactions are strategic in that individuals cannot accomplish outcomes in isolation, but must account for the choices of others when trying to achieve desired outcomes. For example, when governments consider whether to invade another country, they must take into account what they expect the targeted country and its allies will do in response. Similarly, choices about the size of the military, compliance in international agreements on environmental issues, or reductions of trade barriers are examples of complex, “interdependent decision” making (Thomas Schelling).

The study of International Relations is the study of the interactions between the governments and peoples of other states. When these actors face choices, they have to account for the ways other actors are likely to respond, and how they in turn will have to react, and so on. Therefore, states strategize. As analysts of International Relations, we study this strategic interaction using both informal and mathematical methods. One formal mathematical approach to strategic interaction is called game theory, which formalizes the incentives and behavior of international actors in stylized situations. This provides us with tools for analyzing a wide variety of issues, with the goal of understanding the logic that leads to various outcomes.

The strategic analysis of international politics has deep historical roots, beginning with studies of deterrence and bargaining. Today the models of game theory are widely used in political science and are used to study everything from trade cooperation, to environmental issues, to war. These models range from very simple games, to computationally complex and highly sophisticated formal models. Through this course, you will learn to solve simple versions of games. This will require some mathematical tools and a familiarity with basic probability theory and high-school level algebra is assumed.

In this course, we will cover the basics of game theory, formalizing our assumptions about decision making and incentives. Most importantly, we will develop the notion of an equilibrium to study political outcomes. The models in this class will become progressively more complicated, allowing us to account for the aspects of a situation simple models leave out. The goal of this course is for you to internalize this kind of rigorous, analytic thinking and bring it to your continuing studies of international relations, politics more broadly, and any issues where individuals or groups must interact.
Course Resources

There are two required books for this course. The major textbook for the course is Games of Strategy, Fourth Edition, 2015, by Avinash Dixit, Susan Skeath and David Reiley, Jr. (Noted below as DSR).

Macartan Humphreys, Political Games: Mathematical Insights on Fighting, Voting, Lying, & Other Affairs of State (New York: Norton, 2017), will be used to augment the readings in DSR. This book has an excellent glossary that is helpful if you are having difficulty understanding any of the central concepts of the course. It is also available as an ebook. These books are available through the University Bookstore or online retailers, and I’ve requested that they be put on reserve. Other required readings, handouts, problem sets, solution sets, and lecture slides will be posted on Learn@UW.

The organization of the course roughly follows that of DSR. We will begin by introducing the basic elements of game theory. We then move on to two different ways to present games, the strategic (normal) form and the extensive form. This will be followed with some special topics, and then we will 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.

Assignments and Grading

- Two Midterms 40% (20% Each)
- Final Exam 25%
- Seven Problem Sets 25%
- Section Participation 10%

Note that this class meets for three 50-minute class periods each week over the spring semester (2 lectures and one discussion section) and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 2 hours out of classroom for every class period.

The first midterm exam will take place on March 12, and the second midterm will take place on April 4. The final will be on May 7. All exams will be closed book. Students may not use materials other than a non-graphing calculator and pencil/pen unless they have a special need. In order to perform well on the exam, you should attend sections, which meet once a week. Section participation and attendance is worth 10% of the grade. Your score will be determined by your TA, both as a function of your attendance and your participation. This will require you to come to section having already done the assigned readings and with prepared questions in mind. Your TA is there to assist you but they rely on you to know what you need assistance with.

You should note that this course’s material is cumulative. That is, each week builds on the material covered in previous weeks. That means that the material 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 following tests. To ensure you are keeping up, there will be seven problem sets assigned throughout the course. The problem sets will be due at the beginning of lecture on the specified dates. You must turn in a hard copy at that time (electronic copies will not be accepted). The problem sets will cover the majority of the material on which you will be tested. These problem sets are your best opportunity to gain practical knowledge of the techniques, mechanisms, and lessons we will be covering. The problem sets will be released approximately a week in advance of the due date so that you have time to discuss any questions you have with your TA or me. Note, however, that neither your TA or I will simply give you the answers. Instead, we will try to help you understand the logic of the underlying problem, so that you can find the answer yourself.
Learning Outcomes

Students in this class will learn to utilize the tools of modern game theory to formally analyze strategic interactions between key political actors. Students will learn to break down complex political situations by identifying key actors, strategies, and elements of the strategic environment. They will learn to use these elements to find equilibria. As a result, students will develop the ability to understand and critique advanced research in international relations, and to apply formal mathematical tools to the analysis of real-world political problems. Students will also be able to identify both the applications and the potential limitations of concepts of rationality, and to communicate complex game theoretic concepts to their peers.

Late Assignment and Regrading Policy

In general, late work will not be excused and make up exams will not be offered. In general, late problem sets will be graded but can only receive a maximum grade of 50% if you get it in within four days of the due date. After four days, no late work will be accepted. Only in the case of an extraordinary situation or emergency will late work be graded for full credit or a make up exam be scheduled. Proof of the extraordinary circumstance will be required. If you require a special accommodation, you must speak to your TA at least one week before the exam date.

If you feel any assignment has been graded incorrectly, you may request a regrade. You will have to provide a cover letter explaining why you feel a regrade is required. I will regrade the entire assignment and your revised grade may be higher or lower than your original grade.

Academic Integrity

I have zero tolerance for any instance of cheating on an exam or any other academic misconduct. Please review UW-Madison policy and procedure for academic misconduct at [http://students.wisc.edu/doso/docs/UWS14.pdf](http://students.wisc.edu/doso/docs/UWS14.pdf). If you cheat, the least I will do is fail you.

Disabilities

I will make every effort to accommodate students with disabilities or special needs. Please get in contact with me as soon as possible to make arrangements if you have a special need. Information about students will be limited to a need to know basis and your confidentiality will be guarded as much as possible. For more information on University policy and procedures, contact the McBurney Disability Resource Center, 1305 Linden Drive, 608.263.2741, or visit [http://www.mcburney.wisc.edu](http://www.mcburney.wisc.edu).
Schedule

Note: Readings marked by asterisks are posted on Learn@UW.

January 24: Course Overview

January 29: Introduction to Game Theory

DSR Ch 1 and pp. 36-37
Humphreys vii-x; xxi-xxii


January 31: Elements of Games and Equilibrium

DSR ch. 2, pp. 17-27

February 5: Rationality and Expected Utility

DSR pp. 27-41 and 263-67


February 7: Strategic Form Games

DSR chap. 4, pp.91-108
Humphreys xi-xvi

*Schelling, pp. 83-118

February 12: Pure-Strategy Equilibria and Minimaxing

DSR chap 4, pp. 108-120
Humphreys 130-131


February 14 and 19: Mixed-Strategy Nash Equilibria

DSR chap. 7
Humphreys 132-133

Problem Set 1 due February 19
February 21 and 26: Extensive Form Games and Rollback Equilibrium

DSR chp. 3
Humphreys xvii-xix, and 128-129

Problem Set 2 due February 26

February 28: Institutions

DSR chp. 9
Humphreys 89-93

March 5 and 7: Spatial Models

Humphreys 22-47
*Bueno de Mesquita, Bruce, 2006. *Principles of International Politics, 4th ed., Ch. 2

Problem Set 3 due March 5

March 12: Exam I

March 14 and 19: Repeated Games

DSR Chp. 10

March 21: Uncertainty

DSR chp. 8, pp. 271-273, 279-304
Humphreys xix-xxi

Problem Set 4 Due

March 26 and 28: Spring Break

April 2: Midterm Review

April 4: Exam II

April 9: Bayes’ Theorem

DSR chp. 8, pp. 338-341
Humphreys 135-136
April 11 and 16: Signaling

DSR chp. 8, pp. 304-320
Humphreys 59-63; 114-115
Problem Set 5 due April 16

April 18: Application- The Cuban Missile Crisis

DSR chp. 14

April 23 and 25: Bargaining

DSR chp. 17
Humphreys 69-77
Problem Set 6 due April 23

April 30: Experimental Game Theory

Problem Set 7 due

May 02: Exam Review and Wrap Up

May 7, 7:45 AM: Final Exam