

**SPS 510 — Spring 2021**  
**Formal Modeling**

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Class: W, 3:00-5:45pm , Remote  
Office Hours: By appointment

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## Course Description

This course introduces graduate students to formal modeling and game theory as a mathematical way to represent the theoretical foundations of your work. Over the course, we will work through models of social behavior (with examples drawn from political science, economics, public policy/administration, and criminal justice) and learn the foundations of how to build our own. At the end of the semester, students will become proficient in both understanding formal models as well as begin to build their own.

## Course Format

I am offering this class in a hybrid model. The majority of our time together will be in a remote classroom where we collectively work on problems. Each course section will contain some lecturing, some group work, and some discussion. Additionally, the class will have asynchronous activities and collaboration, including homework, discussion, and other tasks.

## Required Text

There is one book required for this course.

1. Osborne, Martin J. 2004 “A Introduction to Game Theory.” New York: Oxford University Press.

I have several books to choose from in designing this course. The books range from easier than our book to much more complicated. My goal in this class is to minimize the math to its essential components while also providing a reference book that you can easily refer to in the future when working on game theoretic work. So, there are friendlier books that may assist you in understanding the material. A few options are:

## Optional Texts

1. Dixit, A.K. and Skeath, S., 2015. Games of Strategy. WW Norton & Company.
2. Spaniel, W., 2014. Game theory 101: the complete textbook. CreateSpace.

The above two books are for undergraduates and typically have far less math than Osborne. These are great for getting an intuitive understanding of many of the models but are less good for implementing models in your own work or using as a reference to fully understand a model.

If you want to dive deeper into game theory, here are a few options that I recommend.

1. Gibbons, R., 1992. A primer in game theory.
2. Morrow, J.D., 1994. Game theory for political scientists. Princeton University Press.
3. Myerson, R.B., 2013. Game theory. Harvard university press.

Of the five recommended books, I considered recommending the first four at one point or another. Myerson is a fantastic text for a second semester Game Theory course and would be otherwise far too dense for our class. However, it is a fantastic reference text. If you are considering any of these texts, feel free to chat with me about it and I can help guide your decision.

## Course Requirements

### 1. Discussion 20%

It is not nearly enough for students to be present, but they must also engage in the material and give life to the theories as well as combat them within the confines of the classroom. As such, student participation and discussion is pivotal to both the course as well as the graduate student experience. At the conclusion of each class, students will hand in a one paragraph summary of how they participated and their own participation score on a scale of one to ten. The instructor will assign a final grade after assessing the student's self-assessment.

### 2. Weekly homework: 10%

After class, there will be a short homework assignment that applies concepts from the week. Homework is due by the following class period.

### 3. Asynchronous Activities 10%

Students will have various asynchronous activities throughout the week as noted on Blackboard. Completing these tasks on time and fully will result in a full grade.

### 4. Discussion Memos 10%

Students will write two short memos (3 pages maximum) on a reading assigned for the day. The memo will be distributed to class by **5pm the night previous to class via Blackboard** (so people have a chance to read it). If you are not familiar with how to send emails via Blackboard, consult with another student or with the instructor. The memo is four parts in single spaced text: a brief (no longer than one paragraph) summary of the work, 1 paragraph explaining the model, 2 paragraphs synthesizing the material with other works or critiquing the work directly, four (4) solid discussion questions, and one citation or link to material (film, academic article, newspaper article, youtube video, song, board game, video game, etc.) related to the reading. Students will assume the lead for discussing the material for the day they have adopted.

### 5. Final Paper 30%

Near the end of the semester, students will hand in a 25 page paper that is a formal model; the model may not need to be entirely original, but needs to be adapted to your work and show novel thoughts. As such, the paper should include the following elements:

- (a) Title page (1 page)
- (b) Abstract (1 page)
- (c) Introduction (1-3 pages)
- (d) Literature Review (4-5 pages)
- (e) Theory Section and formal model (4-7 pages)
- (f) Test of model (4-7 pages, qualitative or quantitative)
- (g) Conclusion (1-2 pages)
- (h) Bibliography (2-4 pages)

The paper will propose a formal model that explains some phenomenon in their area of expertise. The literature review must cite at least 15 relevant sources, the theory must propose a causal mechanism, and the model should be simplification that uncovers some important puzzle. **This paper is due May 5th**

## 6. Midterm and Final 20%

Each exam will have some number of questions on them related to the material that we covered. You will have two hours to complete the exam.

## General Guidelines and Information

1. **Student well-being:** If you are struggling for any reason (COVID, relationship, family, or life's stresses) and believe these may impact your performance in the course, I encourage you to contact the Dean of Students at (208) 426-1527 or email deanofstudents@boisestate.edu for support. Additionally, if you are comfortable doing so, please reach out to me and I will provide any resources or accommodations that I can. If you notice a significant change in your mood, sleep, feelings of hopelessness or a lack of self worth, consider connecting immediately with Counseling Services (1529 Belmont Street, Norco Building) at (208) 426-1459 or email healthservices@boisestate.edu.
2. **Lectures will begin on time.** Avoid arriving late to class; otherwise, you may miss important material, quizzes, or information about class assignments. However, being late is better than not showing up at all. If you do arrive late, attempt to arrive quietly into class and avoid making too much of a disruption. The same is true if you have to leave class early. If you miss any information due to your absence, ask a classmate for notes and to help you catch up. In general, it is a good policy to find people within the class that you can share notes with and be able to study collectively.
3. **Study guides and extra credit.** I do not offer either of these.
4. **Please avoid classroom disruptions.** Turn your cellphones to silent before class begins.
5. **Use the APSA style of reference.** To standardize citations and references, follow the guidelines set out by the *American Political Science Association*. Information and guidelines can be found in the following PDF file: <https://connect.apsanet.org/stylemanual/>. You can also use a site like the Citation Machine to generate your bibliography.
6. **Cheating and plagiarism will result in failure.** All written work is subject to being submitted to SafeAssignment through Blackboard. This is a program that will find copied work from both published sources, the internet, and other work by students. Student who are found to be plagiarizing or cheating on a given assignment or test will automatically fail that assignment or test. If you wish to use your own work from another class, you must obtain permission from both instructors.
7. **SafeAssignment:** All written assignments must be turned in through SafeAssignment given the appropriate links on Blackboard. The digital copy is due by the start of class on the day the assignment is due to be turned in. Assignments not turned in digitally will not be graded and receive a zero for that assignment. If you have trouble with submitting an assignment, contact the instructor immediately.
8. **Missing exams and late assignments:** There will not be makeup exams or quizzes. Late paper assignments will be severely penalized—as such, having work completed early will increase your chances of avoiding penalties to your grade. The standard deduction will be one full letter grade per day that the assignment is late. That is, an B– will become a C–.
9. **Grade appeals.** If you believe that you were not graded appropriately for a given assignment and wish to contest that grade, you must do so in writing. Appeals will not be accepted for 48 hours from which the assignment was returned. The appeal should clearly state your objection and request that your work be re-evaluated. Re-evaluated work will be graded from scratch and the grade can be increase or decrease from the grade originally assigned.

10. **The syllabus.** the syllabus is a living document that can and will be altered throughout the duration of the course based both on need and design. Generally, this means readings will be removed or added as needed. All changes will be listed on Blackboard, so make sure to check announcements for any such change.
11. **Contacting the instructor.** The best way to get in touch with me is either through email. Any question that is of general interest to the entire class should may be answered in a way that provides the answer to the entire class.
12. **Accommodations:** To request academic accommodations for a disability contact the Education Accessibility Center by phone, (208) 426-1583, or e-mail, [eacinfo@boisestate.edu](mailto:eacinfo@boisestate.edu). Students are required to meet with a Disability Specialist prior to receiving accommodations and may be required to provide documentation to clarify accommodation requests. Information about a disability is confidential. More information on the accommodation process can be found at <https://www.boisestate.edu/eac/contact-us/>.

## Final Grades

A+:97-100%	A: 93-96%	A-: 90-92%
B+: 87-89%	B: 83-86%	B-:80-82%
C+: 77-79%	C: 73-76%	C-:70-72%
D+: 67-69%	D: 63-66%	D-: 60-62%
F: 0-59%		

## Course Schedule

This is the reading you are expected to have done by the time we meet in person. The date listed is the first day of the week.

### Week 1

*Introductions and Rationality*

January 11th

**Required Reading**                      None

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### Week 2

*Expected Utility, Lotteries, Decision Theory*

January 20th

**Required Reading**

**Articles:**

Osborne, Chapter 1

- McCubbins, Mathew D., and Michael F. Thies. "Rationality and the foundations of positive political theory." *Rebaisan [Leviathan]* 19 (1996): 7-32.

- Meier, K.J., Favero, N. and Zhu, L., 2015. "Performance gaps and managerial decisions: A Bayesian decision theory of managerial action." *Journal of Public Administration Research and Theory*, 25(4), pp.1221-1246.

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### Week 3

*Normal Form Games party I*

January 25th

**Required Reading**

**Articles:**

Osborne, Chapter 2.1-2.6

- Khadjavi, M. and Lange, A., 2013. "Prisoners and their dilemma." *Journal of Economic Behavior & Organization*, 92, pp.163-175.

- Hall, K., Smith, M., Russell, J.L., Lambeth, S.P., Schapiro, S.J. and Brosnan, S.F., 2019. "Chimpanzees rarely settle on consistent patterns of play in the hawk dove, assurance, and prisoner's dilemma games, in a token exchange task." *Animal behavior and cognition*, 6(1), p.48.

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## Week 4

### *Normal Form Games Part II*

February 1st

**Required Reading**

**Articles:**

Osborne, Chapter 2.7-2.10

- Tsebelis, G., 1995. "Decision making in political systems: Veto players in presidentialism, parliamentarism, multicameralism and multipartyism." *British journal of political science*, pp.289-325.
  - Farrell, J. and Rabin, M., 1996. "Cheap talk." *Journal of Economic perspectives*, 10(3), pp.103-118.
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## Week 5

### *Nash Equilibria in practice*

February 8th

**Required Reading**

**Articles:**

Osborne, Chapter 3

- Niou, E.M. and Ordeshook, P.C., 1994. "Less filling, tastes great': The realist-neoliberal debate." *World Politics*, pp.209-234.
  - Calvert, R.L., McCubbins, M.D. and Weingast, B.R., 1989. "A theory of political control and agency discretion." *American journal of political science*, pp.588-611.
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## Week 6

### *Mixed Strategy Games I*

February 17th

**Required Reading**

**Articles:**

Osborne, Chapter 4.1-4.5

- Harsanyi, J.C., 1980. "Can the maximin principle serve as a basis for morality? A critique of John Rawls's theory." In *Essays on ethics, social behavior, and scientific explanation* (pp. 37-63). Springer, Dordrecht.
  - Brosnan, S.F., Price, S.A., Leverett, K., Prôtôt, L., Beran, M. and Wilson, B.J., 2017. "Human and monkey responses in a symmetric game of conflict with asymmetric equilibria." *Journal of Economic Behavior & Organization*, 142, pp.293-306.
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## Week 7

### *Mixed Strategy Games II*

March 22nd

**Required Reading**

**Articles:**

Osborne, Chapter 4.6-4.10

- Bendor, J., 1988. "Formal models of bureaucracy." *British Journal of Political Science*, 18(3), pp.353-395.
  - Arbis, D. and Dixit, V.V., 2019. "Game theoretic model for lane changing: Incorporating conflict risks." *Accident Analysis & Prevention*, 125, pp.158-164.
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## Week 8

### *Review and Midterm*

March 1st

Review for exam/take exam

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## Week 9

### *Extensive Form Games I*

March 8th

#### **Required Reading**

#### **Articles:**

Osborne, Chapter 5

- Weingast, B.R., 1997. "The political foundations of democracy and the rule of the law." *American political science review*, 91(2), pp.245-263.
  - Drezner, D.W., 2003. "The hidden hand of economic coercion." *International Organization*, pp.643-659.
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## Week 10

### *Extensive Form Games II*

March 15th

#### **Required Reading**

#### **Articles:**

Osborne, Chapter 6

- Hammond, T.H., 1986. "Agenda control, organizational structure, and bureaucratic politics." *American Journal of Political Science*, pp.379-420.
  - Fearon, J.D., 1995. "Rationalist explanations for war." *International organization*, 49(3), pp.379-414.
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## Week 11

### *Extensive Form Games III*

March 22nd

#### **Required Reading**

#### **Articles:**

Osborne, Chapter 7

- Brehm, J. and Gates, S., 1993. "Donut shops and speed traps: Evaluating models of supervision on police behavior." *American Journal of Political Science*, pp.555-581.
  - Troesken, W. and Walsh, R., 2019. "Collective Action, White Flight, and the Origins of Racial Zoning Laws." *The Journal of Law, Economics, and Organization*, 35(2), pp.289-318.
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## Week 12

### *Repeated Games I*

March 29th

#### **Required Reading**

#### **Articles:**

Osborne, Chapter 14

- Yao, X. and Darwen, P.J., 1994. "An experimental study of n-person iterated prisoner's dilemma games." *Informatica*, 18(4), pp.435-450.
  - Pechenkina, A.O. and Bennett, D.S., 2017. "Violent and non-violent strategies of counterinsurgency." *Journal of Artificial Societies and Social Simulation*, 20(4).
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## Week 13

### *Incomplete Information Games I*

April 5th (ISA)

#### **Required Reading**

#### **Articles:**

**No Class, Online Only**

Osborne, Chapter 9

- Palfrey, T.R. and Rosenthal, H., 1988. "Private incentives in social dilemmas: The effects of incomplete information and altruism." *Journal of Public Economics*, 35(3), pp.309-332.
  - Spense, Michael. "Job market signaling." *The Quarterly Journal of Economics* 87.3 (1973): 355-374.
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## *Spring Break*

### **Week 14**

*Incomplete Information Games II*

April 19th

**Required Reading**

Osborne, Chapter 10

**Articles:**

- Goeree, J.K. and Holt, C.A., 2001. "Ten little treasures of game theory and ten intuitive contradictions." *American Economic Review*, 91(5), pp.1402-1422.

- Banks, J.S. and Weingast, B.R., 1992. "The political control of bureaucracies under asymmetric information." *American Journal of Political Science*, pp.509-524.

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### **Week 15**

*Final Paper and Presentations*

April 26th

Final papers are due at the beginning of class. Students will give 10-15 minute presentations on their argument, models, and findings.

### **Final**

Online, 2 hour time limit, **due by Wednesday (May 5th) at 5pm**