

ECON 505: Introduction to Game Theory

Course Syllabus

Théo Durandard

Fall 2025

Basic Information

Credits: 4 graduate hours

Meeting Times: Mondays and Wednesdays, 02:00PM - 03:20PM

Instructor: Théo Durandard

Email: theod@illinois.edu

Office Hours: Tuesday 4-5 pm by appointment only.

Course Description

This course explores game theory and strategic decision making. Game theory is the study of strategic interaction where one person's actions affect the actions of others. Introduces students to the tools for modeling and solving problems with strategic interaction. Will cover topics such as Nash equilibrium, dominance, voting, bargaining, auction, adverse selection, each of which have broad applications in economics, politics, psychology, and everyday life.

Topics covered

We will cover the following topics.

1. Rationality and Rational Choice
2. Uncertainty and Expected Utility
3. Static Games of Complete Information
4. Dynamic Games of Complete Information
5. Repeated Games
6. Static Games of Incomplete Information
7. Dynamic Games of Incomplete Information

Evaluation

I will assign four problem sets during the semester. Each will consist of 4-5 questions and be worth 5 points (1-1.25 point per question). In addition, there will be four quizzes and two midterm exams. The quizzes will be announced at least one class in advance and ask questions on the material we covered. Each will be graded on 3 points. The midterms will be open-book. They will consist of problems similar to the one on problem sets. Each will be worth 21 points. Finally, there will be one final exam, worth 34 points.

Your semester grade will be computed as the sum of your grades on the problem sets, the quizzes, the two midterm grades, and the final. Your grade will be the minimum of your obtained score and 100. This means that there is a minimum of 8 bonus points for the class.

Neither the grading scale (how numerical scores translate to letter grades) nor the distribution of final grades is fixed ahead of time. Letter grades depend on a mix of absolute and relative performance. Therefore, I cannot show a fixed grading scale or a target grade distribution ahead of time.

However, I expect a semester grade of over 90 to translate to an A, over 80 to translate to a B, and over 65 to translate to a C.

(Again remember that this is my expectation prior to the class. The final cutoffs between grades may vary significantly from these expected cutoffs depending on the difficulty of the midterm and problem sets I come up with, and on the class performance.)

Prerequisites

The formal prerequisites are MATH 415, ECON 500, and ECON 501, or equivalent. Technically speaking, only a basic knowledge of elementary calculus and probability theory is required. However, you should feel comfortable with standard mathematical reasoning.

Class materials

Lecture slides will be posted before class. Along with the problem sets, they will contain *all the material* you are responsible for. Some of these lectures will follow, more or less closely:

- Introduction to game theory by Martin J. Osborne,
- Game Theory: An Introduction by Steven Tadelis, and
- Game Theory for Applied Economists by Robert Gibbons.

Other useful references includes:

- Game Theory by Drew Fudenberg and Jean Tirole, and

- Game Theory: Analysis of Conflict by Roger Myerson (more advanced!).

There will be suggested readings for most classes. These readings are optional (in that you are not required to do them to pass the class). However, they may be useful to master the material. The additional readings will also be posted on Canvas.

Class schedule (subject to changes)

Week	Date	Topic	Important
Intro: What is Game Theory?			
1	8/25	Course introduction: What is Game Theory? <i>Suggested Readings:</i> Osborne, Chapter 1	
	8/27	Rational Decision Making and Uncertainty <i>Suggested Readings:</i> Tadelis, Chapter 1 and Sections 2.1, 2.2, and 2.3 in Chapter 2.	
Static Games of Complete Information			
2	9/1	Labor Day	No class HW1 posted
	9/3	Normal-Form Games, Dominant Strategies <i>Suggested Readings:</i> Tadelis, Chapter 3 and Section 4.1.	
3	9/8	Nash Equilibrium in Pure Strategies <i>Suggested Readings:</i> Tadelis, Section 5.1.	
	9/10	Applications: Cournot and Bertrand Duopoly <i>Suggested Readings:</i> Tadelis, Section 5.2.	
4	9/15	Application: The Problem of the Commons <i>Suggested Readings:</i> Tadelis, Section 5.2.	HW1 due, HW2 posted
	9/17	Mixed Strategies and Existence of Nash Equilibrium <i>Suggested Readings:</i> Tadelis, Chapter 6 (skip Section 6.3)	
5	9/22	Applications: Expert Diagnosis and Credence Goods	

Dynamic Games of Complete Information		
6	9/24	Dynamic Games of Complete and Perfect Information: Backward Induction <i>Suggested Readings:</i> Osborne, Chapter 5
	9/29	Applications: Stackelberg Model of Duopoly, Wages in Unionized Firm <i>Suggested Readings:</i> Osborne, Sections 6.2; Ali, S.N., Bernheim, B.D., Bloedel, A.W. and Battilana, S.C., 2023. "Who controls the agenda controls the legislature." American Economic Review, 113(11), pp. 3090-3128.
7	10/1	Review Session
	10/6	First in class midterm
	10/8	Dynamic Games of Complete and Imperfect Information: Subgame Perfection <i>Suggested Readings:</i> Tadelis, Chapters 8 and 9
8	10/13	Applications: Bank Runs, Protection for Sale, Tariffs and International Competition <i>Suggested Readings:</i> Grossman, Gene M, and Elhanan Helpman. "Protection for Sale." American Economic Review 84, no. 4 (1994): 833-50.
Repeated Games		
9	10/15	Finitely Repeated Games, Infinitely Repeated Games <i>Suggested Readings:</i> Tadelis, Sections 10.1, 10.2, and 10.3
	10/20	Applications: Collusion in Cournot Duopoly, Efficiency Wages <i>Suggested Readings:</i> Tadelis, Sections 10.4; Grossman, Gene M., and Elhanan Helpman. "Trade Wars and Trade Talks." Journal of Political Economy 103, no. 4 (1995): 675-708.
	10/22	Infinitely Repeated Games, Reputation, Folk Theorem <i>Suggested Readings:</i> Tadelis, Sections 10.5 and 10.6;
10	10/27	Sequential Bargaining <i>Suggested Readings:</i> Tadelis, Chapter 11; Baron, David P., and John A. Ferejohn. "Bargaining in Legislatures." American Political Science Review 83, no. 4 (1989): 1181-1206.
	10/29	Review Session
11	11/3	Second in class midterm

**HW2 due
Midterm 1**

HW3 posted

**HW3 due
Midterm 2**

Static Games of Incomplete Information		
12	11/5	Bayesian Games and Bayesian Nash Equilibrium <i>Suggested Readings:</i> Tadelis, Sections 12.1 and 12.2
	11/10	Applications: Committee voting, Electoral Competition, Wars <i>Suggested Readings:</i> Tadelis, Sections 12.1 and 12.2; Osborne, Sections 9.1-9.3 Fearon, James D. "Rationalist Explanations for War." <i>International Organization</i> 49, no. 3 (1995): 379–414.
	11/12	Application: Auctions, Revenue Equivalence <i>Suggested Readings:</i> Tadelis, Chapter 13 HW4 posted
Dynamic Games of Incomplete Information		
13	11/17	Perfect Bayesian Equilibrium <i>Suggested Readings:</i> Tadelis, Chapter 15
	11/19	Market for Lemons: Adverse Selection <i>Suggested Readings:</i> Akerlof, George. "The market for lemons: Qualitative uncertainty and the market mechanism." <i>Quarterly Journal of Economics</i> 84, 1970, pp. 488–500.
14	11/24	Fall break No class
	11/26	Fall break No class
15	12/1	Signaling Games <i>Suggested Readings:</i> Tadelis, Chapter 16; Spence, Michael. "Job market signaling." <i>Quarterly Journal of Economics</i> 87 (1973), pp. 355–374.
	12/3	Cheap talk <i>Suggested Readings:</i> Tadelis, Chapter 18; Crawford, Vincent P., and Joel Sobel. "Strategic Information Transmission." <i>Econometrica</i> , vol. 50, no. 6, 1982, pp. 1431–51. HW4 due
16	12/8	Catch up and Additional Topics
	12/10	Review Session for the final

This is not an easy course, so do not despair if you struggle; so do I. But:

If you need help understanding expectations, assignments, or instruction, please speak up or come and see me. I care a lot about not leaving anybody behind.

Academic Assistance

Students are encouraged to utilize the many resources we have throughout campus to assist with academics. We recommend that you seek them out starting early in the semester, not just in times of academic need, in order to develop good study habits and submit work which represents your full academic potential. Many resources are found on the Economics Website including details about the Economics Tutoring Center, Academic Advising, and other academic support options: <https://economics.illinois.edu/academics/undergraduate-program/academic-student-support>.

Academic Integrity

According to the Student Code, “It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions.” Please know that it is my responsibility as an instructor to uphold the academic integrity policy of the University, which can be found here: <https://studentcode.illinois.edu/article1/part4/1-401/>.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policies. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity. Read the full Student Code at <https://studentcode.illinois.edu/>.

Students with Disabilities

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TTY), or e-mail a message to disability@illinois.edu. DRES Website: www.disability.illinois.edu/.

Community of Care

As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or yours, we encourage you to refer this behavior to the Student Assistance Center (217-333-0050 or <http://odos.illinois.edu/community-of-care/referral/>). Based on your report, the staff in the Student Assistance Center reaches out to students to make sure they have the support they need to be healthy and safe. Further,

we understand the impact that struggles with mental health can have on your experience at Illinois. Significant stress, strained relationships, anxiety, excessive worry, alcohol/drug problems, a loss of motivation, or problems with eating and/or sleeping can all interfere with optimal academic performance. We encourage all students to reach out to talk with someone, and we want to make sure you are aware that you can access mental health support at the Counseling Center (<https://counselingcenter.illinois.edu/>) or McKinley Health Center (<https://mckinley.illinois.edu/>).

For mental health emergencies, you can call 911 or walk into the Counseling Center, no appointment needed.

Disruptive Behavior

Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office for Student Conflict Resolution for disciplinary action.

Emergency Response Recommendations

Emergency response recommendations can be found at the following website: <http://police.illinois.edu/emergency-preparedness/>. I encourage you to review this website and the campus building floor plans website within the first 10 days of class. <http://police.illinois.edu/emergency-preparedness/building-emergency-actionplans/>.

Religious Observances

The Religious Observance Accommodation Request form is available at <https://odos.illinois.edu/community-of-care/resources/students/religious-observances/>. Submit the form to the instructor and to the Office of the Dean of Students (helpdean@illinois.edu) by the end of the second week of the course; in the case of exams or assignments scheduled after this period, students should submit the form to the instructor and to the Office of the Dean of Students as soon as possible. Family Educational Rights and Privacy Act (FERPA) Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See <http://registrar.illinois.edu/ferpa> for more information on FERPA. Student information and records will not be released to anyone other than the student unless the student has provided written approval or as required by law.

Sexual Misconduct Reporting Obligation

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options. A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: <http://www.wecare.illinois.edu/resources/students/#confidential>. Other information about resources and reporting is available here: <http://wecare.illinois.edu/>.

Student Support

The Counseling Center is committed to providing a range of services intended to help students develop improved coping skills in order to address emotional, interpersonal, and academic concerns. Please visit their website to find valuable resources and services: <https://counselingcenter.illinois.edu/>.

Counseling Center Information: 217-333-3704

Location: Room 206, Student Services Building (610 East John Street, Champaign IL)

McKinley Mental Health Information: 217-333-2705

Location: 3rd Floor McKinley Health Center 1109 South Lincoln, Urbana, IL

Emergency Dean: The Emergency Dean may be reached at (217) 333-0050 and supports students who are experiencing an emergency situation after 5 pm, in which an immediate University response is needed and which cannot wait until the next business day. The Emergency Dean is not a substitute for trained emergency personnel such as 911, Police or Fire. If you are experiencing a life threatening emergency, call 911. Please review the Emergency Dean procedures: <http://odos.illinois.edu/emergency/>.

Academic Dates and Deadlines

Students should make note of important academic deadlines for making changes to their courses (add, drop, credit/no-credit, grade replacement, etc.). <https://registrar.illinois.edu/academic-calendars>

Please check with your academic department regarding specific procedures and policies.