

ECON 109 - Game Theory - Shishkin [SP22]

Economics 109: Game Theory (combined A and B)

Quarter: Spring 2022

Instructor: Prof. Denis Shishkin

TAs: Malte Lammert (mlammert@ucsd.edu (<mailto:mlammert@ucsd.edu>), office hours and grading), Kelvin Leong (mleong@ucsd.edu (<mailto:mleong@ucsd.edu>), office hours and discussion sessions), Freddie Papazyan (fpapazya@ucsd.edu (<mailto:fpapazya@ucsd.edu>), office hours and discussion sessions), Gabriel Canedo Riedel (gcanedoriedel@ucsd.edu (<mailto:gcanedoriedel@ucsd.edu>), grading).

Summary: This course examines strategic situations, in which each agent's behavior generally affects the well-being of the other agents. Game theory is a technical framework for rigorously analyzing decision-making in such settings. Almost every type of interaction between living things is strategic. As social scientists, we focus on human interaction, and we shall assume that people behave in a rational, deliberate manner. In addition to exploring theory in the abstract, we will consider a variety of applications from economics, political science, and law.

Schedule: All class meetings will take place **in-person** according to the schedule. It is recommended to attend the class you are assigned to.

- A00 Lectures Tuesday/Thursday 2 pm (Mosaic 0204), A01 Discussion sessions Wednesday 3 pm (Peterson 104)
- B00 Lectures Tuesday/Thursday 3:30 pm (Mosaic 0204), B01 Discussion sessions Wednesday 4 pm (Peterson 104)

If for a valid emergency reason you cannot make a class, you can either attend the one you are not assigned to (e.g. go to 4pm discussion session instead of 3pm one -- not encouraged on a regular basis), or watch the recording that will be posted on Canvas. Please, note that the class will not be broadcast live or available as a podcast. While recordings allow to accommodate remote learning in special cases, they do not allow for live questions/answers and may have low sound/video quality.

Office Hours:

- Prof. Denis Shishkin: Thursdays 11am (Econ building 209) -- also happy to chat after the lectures

if this time doesn't work for you

- Freddie Papazyan: Mondays 4pm (On Zoom at <https://ucsd.zoom.us/j/91252641180> (<https://ucsd.zoom.us/j/91252641180>) or in person at [Economics Building](https://economics.ucsd.edu/about/directions.html) (<https://economics.ucsd.edu/about/directions.html>) 116)
- Malte Lammert: Tuesdays 11am (<https://ucsd.zoom.us/j/95142049314> (<https://ucsd.zoom.us/j/95142049314>))
- Kelvin Leong: Fridays 9:30am (<https://ucsd.zoom.us/j/98705437604> (<https://ucsd.zoom.us/j/98705437604>))

Grading principles: The course will be graded on the curve according to Econ Department standards for Econ 109, which is roughly a 2.9 average GPA for the class and about 25-30 percent A grades. Prof. Shishkin will also track the performance of students who participate in classes. At the end of the quarter, the grading cutoffs may be adjusted downward to ensure that grades are set appropriately for this sample of students, which can only increase grades for other students in the class.

Grading weights: four problem sets 10% each, midterm exam 20%, final exam 40%.

Problem sets: problem sets will be due at 11:59pm on Wednesdays of weeks 3, 5 and Fridays of weeks 7, 9. Each will be available at least 1 week before its deadline and solutions will be available the next morning. The procedure to submit problem sets is the following: Before the deadline you need to upload a PDF with your answers to Gradescope (if you write on paper, you should use a scanner app e.g. Dropbox, Adobe Scan so that your answers are clearly readable and it's easier to grade faster). You should have been automatically enrolled on Gradescope (otherwise, use code N8W2GV).

Exams: The midterm exam will be on Tuesday, May 3rd during class time and the **final exam on Saturday, June 4th in MANDE (Mandeville Center in Muir) B-210 at 11:30am - 2:29pm**. Both exams will be in-person. A remote accommodation in the event of a valid emergency will be provided.

Required Textbook: Watson, J., *Strategy: An Introduction to Game Theory* (W.W. Norton), 3rd edition.

Procedure for Questions: It is best to ask questions during class meetings, discussion sessions, and in office hours. In all other cases, questions about the material or logistics are welcome on

Piazza (please, sign up at piazza.com/ucsd/spring2022/econ109

(<http://piazza.com/ucsd/spring2022/econ109>)). Do not send emails to Prof. Shishkin except to inform him of urgent matters relating to the course (such as letting him know of an illness that necessitates missing an examination).

Preliminary Plan [with relevant textbook chapters, note that sometimes we will skip material from textbook and add other material]:

Week 1: 3/29 - Intro, Extensive Forms [§1-2]; 3/31 - Strategies, Normal Forms [§3]

Week 2: 4/5 - Beliefs, Mixed Strategies, Dominance [§4-6]; 4/7 - Rationality, Best Response, Dominance [§6]

Week 3: 4/12 - Rationalizability and Iterated Dominance [§7]; 4/14 - Nash Equilibrium [§9]

Week 4: 4/19 - Applications of NE [§10]; 4/21 - Mixed NE [§11]

Week 5: 4/26 - Analyzing Extensive Form Games [§14-15]; 4/28 Applications of SPNE [§16];

Week 6: 5/3 - MIDTERM; 5/5 - Cooperative Bargaining [§18];

Week 7: 5/10 - Non-cooperative Bargaining [§19]; 5/12 - Finitely Repeated Games [§22];

Week 8: 5/17 - Infinitely Repeated Games [§22]; 5/19 - Incomplete Information Games, Bayesian Normal Forms, Bayesian Nash Equilibrium [§24,26];

Week 9: 5/24 - Applications of BNE: Market for Lemons, Auctions [§27]; 5/26 - Perfect Bayesian Equilibrium [§28];

Week 10: 5/24 - Applications of PBE: Job Market Signaling [§29]; 5/26 - Review;

Additional Policies:

1. Incidents in which students are suspected of cheating on exams will be reported to the administration.
2. Students have one week from the day in which the midterm examinations and quizzes are graded to report errors in grading and/or to request that problems be re-graded. If a student submits his/her exam for re-grading, then the student's entire exam will be re-graded by the professor (with no guarantee of a higher total score).
3. Tests (examinations and quizzes) will take place during scheduled class times (lectures and discussion sessions) that appear on the official University course schedule. Students are required to attend lectures and discussion sessions on the days in which tests are held. Students missing a test will be given a zero score for the test. No one will be excused from this rule, except in cases of urgent and serious health issues as well as for exceptions required by university policy. If a student cannot attend an examination or quiz due to an urgent health problem, then the student must report this to the professor as soon as possible. Following the health incident, the student

must present documentation to provide evidence that the health incident precluded taking the test (a physician's note is typically sufficient). The student will then be excused from the test and his or her course grade will be determined by appropriately scaling up the grades earned on the other tests. If the missed test is the final examination, then the student will be given an incomplete grade and will have to take the final examination set for the next offering of Econ 109 (in the following quarter) to complete the course.


Understanding the Course Prerequisites:

Students are encouraged (but not required) to enter Econ 109 with an understanding of the material covered in Econ 100abc, which include the following game-theory topics presented in Econ 100c:

- Normal-form (matrix) and extensive-form representations [familiarity with]
- Strategies and mixed strategies [operational understanding]
- Best response and dominance [definitions and operational understanding]
- Iterated dominance [definition and operational understanding]
- Nash equilibrium [definition and calculations, also for games requiring calculus]
- Cournot and Bertrand models of oligopoly [ability to calculate the Nash equilibria]
- Mixed-strategy Nash equilibrium [definition and ability to compute for 2x2 games]
- Backward induction and subgame perfection [rudimentary knowledge]
- Stackelberg oligopoly model [ability to calculate the subgame-perfect equilibrium]
- Adverse selection [rudimentary understanding, in particular of lemons markets]
- Moral hazard [rudimentary understanding]

These topics will be presented in Econ 109 at a deeper level than they are covered in Econ 100c. In most cases, Econ 109 will offer a review of what the students learned in Econ 100c, but it will be a rapid review. Econ 109 also covers more advanced topics and applications that are not covered in Econ 100c.

Course Summary:

Date	Details	Due
Fri Apr 1, 2022	 ECON 109 - Kelvin Leong's TA Office Hour https://canvas.ucsd.edu/calendar?event_id=737189&include_contexts=course_35546	9:30am to 10:30am

Mon Apr 4, 2022	 Freddie's Office Hours (https://canvas.ucsd.edu/calendar?event_id=745988&include_contexts=course_35546)	4pm to 5pm
Fri Apr 8, 2022	 ECON 109 - Kelvin Leong's TA Office Hour (https://canvas.ucsd.edu/calendar?event_id=737190&include_contexts=course_35546)	9:30am to 10:30am
Mon Apr 11, 2022	 Freddie's Office Hours (https://canvas.ucsd.edu/calendar?event_id=745989&include_contexts=course_35546)	4pm to 5pm
Wed Apr 13, 2022	 Problem Set 1 (https://canvas.ucsd.edu/courses/35546/assignments/485168)	due by 10pm
Fri Apr 15, 2022	 ECON 109 - Kelvin Leong's TA Office Hour (https://canvas.ucsd.edu/calendar?event_id=737191&include_contexts=course_35546)	9:30am to 10:30am
Mon Apr 18, 2022	 Freddie's Office Hours (https://canvas.ucsd.edu/calendar?event_id=745990&include_contexts=course_35546)	4pm to 5pm
Fri Apr 22, 2022	 ECON 109 - Kelvin Leong's TA Office Hour (https://canvas.ucsd.edu/calendar?event_id=737192&include_contexts=course_35546)	9:30am to 10:30am
Mon Apr 25, 2022	 Freddie's Office Hours (https://canvas.ucsd.edu/calendar?event_id=745991&include_contexts=course_35546)	4pm to 5pm
Wed Apr 27, 2022	 Problem Set 2 (https://canvas.ucsd.edu/courses/35546/assignments/485169)	due by 11:59pm
Fri Apr 29, 2022	 ECON 109 - Kelvin Leong's TA Office Hour (https://canvas.ucsd.edu/calendar?event_id=737193&include_contexts=course_35546)	9:30am to 10:30am

[event_id=737193&include_contexts=course_35546\)](#)

Mon May 2, 2022



Freddie's Office Hours

[https://canvas.ucsd.edu/calendar?](https://canvas.ucsd.edu/calendar?event_id=745992&include_contexts=course_35546)

[event_id=745992&include_contexts=course_35546\)](#)

4pm to 5pm

Tue May 3, 2022



Midterm

[https://canvas.ucsd.edu/courses/35546/assignments/485640\)](https://canvas.ucsd.edu/courses/35546/assignments/485640)

due by 11:59pm

Fri May 6, 2022



ECON 109 - Kelvin Leong's

TA Office Hour

[https://canvas.ucsd.edu/calendar?](https://canvas.ucsd.edu/calendar?event_id=737194&include_contexts=course_35546)

[event_id=737194&include_contexts=course_35546\)](#)

9:30am to 10:30am

Mon May 9, 2022



Freddie's Office Hours

[https://canvas.ucsd.edu/calendar?](https://canvas.ucsd.edu/calendar?event_id=745993&include_contexts=course_35546)

[event_id=745993&include_contexts=course_35546\)](#)

4pm to 5pm

Fri May 13, 2022



ECON 109 - Kelvin Leong's

TA Office Hour

[https://canvas.ucsd.edu/calendar?](https://canvas.ucsd.edu/calendar?event_id=737195&include_contexts=course_35546)

[event_id=737195&include_contexts=course_35546\)](#)

9:30am to 10:30am



Problem Set 3

[https://canvas.ucsd.edu/courses/35546/assignments/485172\)](https://canvas.ucsd.edu/courses/35546/assignments/485172)

due by 11:59pm

Mon May 16, 2022



Freddie's Office Hours

[https://canvas.ucsd.edu/calendar?](https://canvas.ucsd.edu/calendar?event_id=745994&include_contexts=course_35546)

[event_id=745994&include_contexts=course_35546\)](#)

4pm to 5pm

Fri May 20, 2022



ECON 109 - Kelvin Leong's

TA Office Hour

[https://canvas.ucsd.edu/calendar?](https://canvas.ucsd.edu/calendar?event_id=737196&include_contexts=course_35546)

[event_id=737196&include_contexts=course_35546\)](#)

9:30am to 10:30am

Mon May 23, 2022



Freddie's Office Hours

[https://canvas.ucsd.edu/calendar?](https://canvas.ucsd.edu/calendar?event_id=745995&include_contexts=course_35546)

[event_id=745995&include_contexts=course_35546\)](#)

4pm to 5pm



ECON 109 - Kelvin Leong's

TA Office Hour

9:30am to 10:30am

[https://canvas.ucsd.edu/calendar?
event_id=737197&include_contexts=course_35546](https://canvas.ucsd.edu/calendar?event_id=737197&include_contexts=course_35546)

Fri May 27, 2022

**Problem Set 4**

due by 11:59pm

<https://canvas.ucsd.edu/courses/35546/assignments/485173>

Mon May 30, 2022

**Freddie's Office Hours**

4pm to 5pm

[https://canvas.ucsd.edu/calendar?
event_id=745996&include_contexts=course_35546](https://canvas.ucsd.edu/calendar?event_id=745996&include_contexts=course_35546)

Fri Jun 3, 2022

**ECON 109 - Kelvin Leong's**

9:30am to 10:30am

TA Office Hour
[https://canvas.ucsd.edu/calendar?
event_id=737198&include_contexts=course_35546](https://canvas.ucsd.edu/calendar?event_id=737198&include_contexts=course_35546)

Sat Jun 4, 2022

**Final**

due by 11:59pm

<https://canvas.ucsd.edu/courses/35546/assignments/485643>

Mon Jun 6, 2022

**Freddie's Office Hours**

4pm to 5pm

[https://canvas.ucsd.edu/calendar?
event_id=745997&include_contexts=course_35546](https://canvas.ucsd.edu/calendar?event_id=745997&include_contexts=course_35546)
