Game Theory and Applications

Economics 6110: Spring 2026

Game theory is the study of *interdependent* decision-making. Firms in an oligopolistic industry, diplomats at a negotiation table, bidders at an art auction, applicants and employers in a job market — these are some of the environments where people must consider the behavior of other *players* when deciding on their own actions. Unlike single-agent decision problems, these multi-agent *games* represent economic situations where decentralized choices made by several individuals jointly determine outcomes. This course will equip you with the tools of game theory to model and analyze these and other strategic interactions.

Contact Information: Kevin He, hekevin@econ.upenn.edu, office hours Fridays 10:15AM to noon in Perelman Center for Political Science and Economics (PCPSE) 506.

Teaching Assistant: Matthew Murphy, mjhm@sas.upenn.edu, office hours Thursdays 2PM to 4PM in PCPSE 500.

Class Logistics:

- We meet on Tuesdays and Thursdays 10:15AM—11:45AM, in McNeil Building room 309.
- We will use Ed Discussion as an asynchronous Q&A platform. We will check Ed Discussion regularly, and we also encourage you to answer each other's questions.
- Links to all course material, including the Ed Discussion website, can be found on Canvas.

Topics: The course will cover four families of games, including both theory and applications.

(1) Static games with complete information. Applications include Cournot and Bertrand oligopolies.

(2) Dynamic games with complete information. Applications include bargaining, repeated games, and folk theorems.

(3) Static games with incomplete information. Applications include auctions and the revenue-equivalence theorem.

(4) Dynamic games with incomplete information. Applications include job-market signaling.

Assignments and Assessments:

- Almost weekly problem sets (10%), except no problem sets will be due in the same weeks as the midterms. Problem sets will be graded coarsely ($\checkmark^+$, $\checkmark$, $\checkmark^-$, 0). The worst problem set score will be dropped.
- Exams (90% total): There will be three non-cumulative midterm exams during normal class time. Each midterm will count for 30% of the final course grade. **The dates of the three midterms are: February 12 (Thursday), March 26 (Thursday), and April 28 (Tuesday).** Make sure you don't have a conflict with any of these dates!
- Class participation (including Ed Discussion, office hours, etc.) may be taken into account to improve your final grade if you are just below a grade boundary.
- There is no final exam for this class.

AI Policy: Please indicate all collaborators and outside resources used in completing the problem sets (this includes AI). You are free to use AI in any way you want, as long as you learn the course material well (most of the grade comes from closed-book exams).

Textbooks: Both textbooks are optional as the course will be based on the lecture notes. I will point out chapters in the textbooks that relate to each lecture as supplementary reading. The course roughly follows the order of topics in the Gibbons textbook, but with a level of emphasis on theory that is closer to the Jehle and Reny textbook.

- Robert Gibbons, Game Theory for Applied Economists, ISBN: 978-0691003955
- Geoffrey Jehle and Philip Reny, Advanced Microeconomic Theory (3rd Edition), ISBN: 978-0273731917

Prerequisites: Mathematical maturity at the level of the Mathematical Appendix in the Jehle and Reny textbook. You should be comfortable with optimization, probability, and basic real analysis. Prior coursework in economics (e.g., Economics 6100) is helpful but not required.

Course Policies: Courses taught in the Department of Economics are bound by a standardized set of department course policies that govern grading appeals, academic integrity, etc. Please see https://economics.sas.upenn.edu/undergraduate/course-information/course-policies.