Brown University

ECON 1090 – Introduction to Game Theory
Fall 2020

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Teaching Assistants:
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Main Lecture Material:
- Asynchronous teaching (videos, text entries, and other content posted on canvas)
- Weekly synchronous meeting (see below) which is also recorded (to give access to students who are unable to attend)

Sections: See
https://docs.google.com/spreadsheets/d/1HW7zXz0TiVK9kA50zNXHbRQ_M3MHsXY8PN7OEsC571w/edit?usp=sharing

Office Hours: See
https://docs.google.com/spreadsheets/d/1HW7zXz0TiVK9kA50zNXHbRQ_M3MHsXY8PN7OEsC571w/edit?usp=sharing

Piazza: Please use piazza to ask questions pertaining to this course instead of emailing them. You'll get prompt feedback from the TAs or myself. One benefit is that all students learn from each other's questions. Another benefit is the promotion of discussions among students, as classmates can respond as well. Posts can be anonymous if this is a concern. You will find the piazza link on canvas. This video (created for blackboard instead canvas, but otherwise using the same interface) will give you a quick overview on how to use Piazza if you are not familiar yet with it.

Overview: The course offers an introduction to game theory, which studies *strategic interactive decision-making*.

Upon successful completion of the course, students will

- Have experienced thinking like an economist (reasoning through models),
- Recognize key strategic variables in interactive decision-making, and gain the ability to communicate them effectively to others,
- Understand the tension that exists between individual and collective incentives, and ways to mitigate it,
- Appreciate the role of information in strategic thinking,
- Better understand behavior in key applications covering business, economics, political science among others,

- Master central solution concepts in game theory, with a critical understanding of their meaning and limitations

Time permitting, the course will cover a variety of key concepts including preference, utility, beliefs/probability, expected utility, strategic-form games, dominant strategy, iterated elimination of dominated strategies, common knowledge, Nash equilibrium, pure/mixed strategy, zero-sum games, extensive-form games, prefect vs. imperfect information, complete vs. incomplete information, action and strategies, backward induction, subgame-perfect Nash equilibrium, Pareto efficiency, repeated games, auctions, moral hazard, and behavioral game theory. The objective is to give students a broad understanding of strategic thinking. Accordingly, there will be an emphasis on examples to illustrate these different ideas and concepts, while a more in-depth analysis can be pursued in subsequent courses.

Weekly Synchronous Meeting: Taking place on Wednesdays from 10 to 10:50am, they will be devoted to reviewing some material, solving an example about the current week's material, and/or answering student questions. Attendance is recommended, but not compulsory. To access these meetings, please click on the zoom link provided on the canvas website. These meetings will be recorded. Students who could not attend are expected to watch the recording later.

Sections: will be devoted to answering questions about the theory, and discussing exercises similar to those of the upcoming homework assignment. Use zoom office hours or schedule a zoom appointment if you are having issues understanding past homework assignments.

Prerequisites: Math 0090 (or equivalent) is the only prerequisite. Yet this is an advanced class in economics, and indeed counts as a 1000-level class for all econ concentrations. At most one ECON course in the 1000-1100 range can fulfill the 1000-level requirement in econ majors. The absence of pre-requisites simply reflects the fact that this course can be taught at the advanced econ level without previous knowledge of intermediate microeconomics. *It does not mean that the class is easy. Your willingness to work hard is essential for a good understanding of the subject, and succeeding in this course.*

Textbook: There are multiple textbook on game theory, but none that adequately matches the format of this course. Instead, students must refer to the content (videos, text and other) posted on canvas.

Course website: All material is available through canvas.

Grading: Your numerical grade in the course will be determined as a weighted average of your participation/class attendance, weekly assignments, and exams (midterm+final). The weights are:

> Weekly assignments: 20%
> Midterm exam: 25%
> Participation/Class Attendance 10%
> Final exam 45%

I will take into account the absolute value of this numerical grade, as well as its relative position in the overall distribution, to decide on the final letter grade for the course. Following the economics department guidelines for 1000-level courses, I usually don't expect there will be

more than 50% of As. Thus checking your grades against the median is informative to know whether or not you might qualify for an A, but not infallible. Furthermore, I cannot know in advance the cutoff for an A, without seeing the eventual class distribution of numerical grades (for example, if the highest score turns out to be 85, that might be an A; on the other hand, if 90 turns out to be below the median, that might be a B). Given the exceptional circumstances (in particular a different exam format), I will consider the possibility of granting more than 50% of A's if multiple students fall very near but below the median.

Students who wish to audit the class will have to submit weekly assignments and pass the participation/class attendance requirement.

Participation/Class Attendance: There will be a few quizzes throughout the semester to get an idea of how students might make choices in different circumstances. There is no right or wrong answers in those quizzes, and thus they are not graded. However, students' participation will be factored in the participation/class attendance grade (see next paragraph). Similarly, there will be a few discussions scheduled on canvas. Here too, only participation matters, not the post content as long as they are reasonable in view of the question being asked. Posting a reply to a classmate's post also counts as participating, and I'd love to see real discussions with multiple responses around a same post. Remember to always be thoughtful and considerate of other students' opinions.

Keeping up to date with the material is critical for proper learning. Each week, students are expected to review all the canvas content pertaining to that week. Furthermore, students must attend (at least) one TA section each week (there is no need to attend multiple sessions, but it is allowed if you find it helpful). The TAs will check attendance. You'll get an attendance-participation check each week that you fulfill all these obligations, and your final participation/class attendance grade will be the fraction of weeks for which you got a checkmark. If you are sick, or have other circumstances that prevent you from fulfilling some of these requirements, please contact the TAs ahead of time. Please check regularly your weekly attendance record on canvas; you have two weeks to ask for a regrade if you think there is a mistake in the TA's record.

Weekly assignments: Problem sets are due on most Fridays. On canvas, they appear in the assignment section, in the weekly course content, and on the calendar. Solution sets must be uploaded through canvas. Please contact the TA if you have any issue with that. On rare occasions, justified delays of a couple of days can be accommodated. This will be decided by the TA on a case by case basis. Motivated requests must be submitted *before* the assignment's deadline. In all other circumstances, missing a deadline means a zero score. Answer keys will be posted on the canvas website five days after the deadline.

The TA or a grader will grade problem sets. Any question regarding the grading of a problem set **must be submitted to the TA within two weeks of it being returned**. Re-grade requests must be emailed to the TA.

Students are not allowed to submit joint solution sets. Although students are free to discuss problem sets with each other, they are ultimately expected to solve them independently in order to best prepare for the exams, which will be mostly comparable in difficulty to the problem sets.

Midterm Exam: The midterm exam will be an open-book, take-home exam covering the material from the first six weeks of class (until, and including the week ending on October 18). It will take place on October 19. The exam would usually take place in person during the time slot of a regular lecture (and thus last 50 minutes). This year, there is no set time limit, except that the exam will be distributed on Monday October 19 at 9am (ET) and due on that same day by 9pm (ET) at the latest. Your solution set must be uploaded in canvas by the deadline, so don't wait the last minute as technological delays are always possible. (This does not mean that the test will be so long that it requires a full day to complete. It will be a test of standard length, but with the flexibility of doing it at the most convenient time during that day.)

Final exam: The final exam will be an open-book, take-home exam covering the entire material. It will take place during the remote examination period. Aside from this, there is no set time limit: it will be distributed on December 7 at 9am (ET) and due by December 11 at 3pm (ET) at the latest. Your solution set must be uploaded in canvas by the deadline, so don't wait the last minute as technological delays are always possible. (This does not mean that the test will be so long that it requires 5 days to complete. It will be a test of standard length, but with the flexibility of doing it at the most convenient time in a roughly 5-day period.)

Expectations of Time Spent: Weekly zoom meetings (10 hours total), attendance to TA sections (10 hours), solving problem sets, answering quizzes, participation to discussions, watching canvas videos and reading material (expected to take an equivalent of 11 hours per week on average, or 121 hours in total), preparing for the midterm and final exams (expected to take 35 hours), midterm and final exams (4h). The total number of hours is thus: 180 hours.

Please review the Brown University Academic Code, available at
http://www.brown.edu/academics/college/degree/sites/brown.edu.academics.college.degree/file s/uploads/Academic-Code.pdf
Violations of the Academic Code will lead to strict disciplinary action as outlined in the Code. Misunderstanding of the Code will not be accepted as an excuse for dishonest work.

Accessibility and Accommodations: Brown University is committed to full inclusion of all students. Please inform me early in the term if you may require accommodations or modification of any of course procedures. You may speak with me after class, during office hours, or by appointment. If you need accommodations around online learning or in classroom accommodations, please be sure to reach out to Student Accessibility Services (SAS) for their assistance (seas@brown.edu, 401-863-9588). Students in need of short-term academic advice or support can contact one of the academic deans in the College.

Books, Supplies, and Materials: If your Brown undergraduate financial aid package includes the Book/Course Material Support Pilot Program (BCMS), concerns or questions about the cost of books and course materials for this or any other Brown course (including RISD courses via cross-registration) can be addressed to bcms@brown.edu. For all other concerns related to non-tuition course-related expenses, whether or not your Brown undergraduate financial aid package includes BCMS, please visit the Academic Emergency Fund in E-GAP (within the umbrella of "E-Gap Funds" in UFunds) to determine options for financing these costs, while ensuring your privacy.

Class Recording: I would like to record our weekly meetings and (some) TA sections because some students may be in different time zones, have poor internet connections, or have health issues. If you have questions or concerns about such recordings, please contact me so that we can talk through those to also ensure your full participation in this course.

Distribution of Materials: Lectures (slides and recordings), problem sets and all other course materials are copyrighted. Students are prohibited from reproducing, making copies, publicly displaying, selling, or otherwise distributing them in any format. The only exception is that students with disabilities may have the right to record for their private use if that method is determined to be a reasonable accommodation by Student Accessibility Services. Disregard of the University's copyright policy and federal copyright law is a Student Code of Conduct violation.

Use of Technology to Support Student Learning in Your Course: This course will use the various technological platforms through canvas (including gradescope, google forms, panopto and piazza). I am committed to ensuring access to online course resources by students. If you have any concerns or questions about access or the privacy of any of these platforms, please reach out to me. The IT Service Center (https://it.brown.edu/get-help) provides many IT Services including remote assistance, phones, tickets, and chat. Please also see the Online and Hybrid Learning Student Guide.