Introduction

Economics 222 - Introduction to Game Theory

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Welcome to ECON 222!

- Instructor: Shih En Lu
- Next hour:
  1. MobLab survey
  2. Overview of the course material
  3. Functioning of the course

Why Game Theory?

- The world is full of interactions between individuals, groups, firms, *etc.*
- Sometimes, no single agent's behaviour impacts other agents' welfare or what other agents should do.
  - Example: In a competitive market, no single buyer or seller can influence the price or availability of goods.
  - These situations are easy to analyze: can view each agent's choice in isolation.
- But often, an agent's behaviour does influence others' well-being and/or others' desired behaviour.
  - Game theory is an approach to studying and making predictions in such situations.
  - Can you think of any examples?

Outline (I)

- First, we will set up a framework for describing situations where agents choose their behaviour *simultaneously*.
- In the first month, we will study various ways of making predictions in such situations:
  - with "logic," by process of elimination (iterated dominance);
  - by looking for behaviour such that no one would wish to have done something else (Nash equilibrium);
  - by looking for behaviour that resists "mutants" (evolutionarily stable strategy).
- Throughout the process, we will look at many examples.

Outline (II)

- In the following month or two, we will consider situations where agents don't act simultaneously at once.
- First, agents might act *sequentially*, one after another.
  - We will see that Nash equilibrium allows for some "weird" predictions here.
  - Finer method for making predictions: backward induction.
- Then, we study situations that have both simultaneous and sequential elements.

Outline (III)

- Finally, toward the end of the course, we will introduce the possibility of uncertainty:
  - What if agents can randomize what they do?
  - (If time permits) What if agents have private information about how actions impact their well-being?

Game Theory Is (Very) Fallible

- Often, predictions from game theory do NOT match the real world. Then we can ask ourselves: why? For example:
  1. The description of the situation (*e.g.* timing of agents' choices, how their well-being depends on choices, *etc.*) might be wrong.
  2. Agents might be distracted or still learning about the situation or about other agents.
  3. The prediction method might be inadequate (*e.g.* ignores psychological biases, ignores "cost of thinking", *etc.*).
- Figuring out which is/are the case helps us:
  1. Discover important features of certain situations
  2. Learn about the context in which decisions were made
  3. Understand better how people think

This Course

- Office hour information: see syllabus / TBD
  - My main office hours (no appointment necessary) will be in person.
  - I will also have Zoom office hours by appointment only.
- Come and see us during office hours, or by appointment - don't be shy, but be well prepared.
- Textbook: *Game Theory for Applied Economists* by Robert Gibbons
  - We will focus on the first half of the book. We will not follow it exactly: some topics may be added/omitted, and the order of presentation can differ.
  - See syllabus for alternatives.
- Recommended reading: *Game-Changer* by David McAdams (bonus points on the final)

Lectures

- Slides will be posted before lecture. They are **not** sufficient on their own as notes: you should complete them with your own notes during class.
- Questions are highly encouraged. Don't allow yourself to be lost for the rest of the lecture!
- You will be asked to play games and answer surveys using MobLab.
- Participation is worth 3 points per lecture (except today), evenly divided across the instances where you're required to participate on that day.

Lectures (cont'd)

- The two lowest scores are dropped, so the total is out of 27.
- If your answers/decisions show that you do not understand the game(s) or aren't paying attention, you will receive a **warning** and get 0/3 for that lecture.
- 2^{nd} warning = an additional 25% penalty on the semester's participation score
- 3^{rd} warning = 0/27 for the semester
- **Participating from outside of class is therefore risky and strongly discouraged.**

Homework

- 5 problem sets. Discuss problems with each other - most of you will learn a lot from each other - but **write your own solutions**.
- Due **on Canvas 30 minutes before lecture** on dates indicated on the syllabus. **Late assignments will not be accepted.** If you encounter an issue with Canvas and the deadline is imminent, email your problem set to your TA.
- Each problem set is out of 6, and the lowest score is dropped, so the total is out of 24.
- You **will not** be allowed to make up or receive an adjustment for the **first** problem set missed for a valid reason, since you can still get 24 points from the other 4. **If you miss a problem set for a valid reason, keep any relevant documentation, but please DO NOT contact me until you've missed 2 problem sets for valid reasons.**

Homework (cont'd)

- Problem sets are **graded for completeness only, so don't copy from other students, tutors or last semester's solutions**.
  - You will get full credit as long as your solutions show that you made a serious attempt at each question, even if they're completely wrong.
  - Very similar assignments will be deemed evidence of academic dishonesty.
- **You need to check your solutions for accuracy once solutions are posted.**
- **Most tutorials will mainly focus on problem sets. You should attend them unless you find problem sets easy.**

The Purposes of Problem Sets

- Problem sets serve a dual purpose:
  1. Make you learn and practice answering basic questions (like in high school).
  2. **Deepen your understanding** of the material and develop your **problem solving skills** by **making you think** about how to approach and analyze settings that are less familiar by using/combining the basic tools you were taught in different ways.
- **If you get solutions and learn them by heart, you will not achieve goal #2**.
  - Instead, you should attempt the problems yourself and/or with classmates, and, if necessary, asking the teaching staff to help you get started on a problem.

The Purposes of Problem Sets (cont'd)

- Isn't the point of problem sets to help you prepare for exams?
- It's the other way around!
  - Problem sets help you learn.
  - Exams are just there to measure what you learned, much of it by doing problem sets - not just how to answer very similar questions, but also how to use course concepts to answer new questions.
- If there were no cheating concerns, I would make ECON 222 problem sets graded for content and worth much more, and I would make exams mostly take-home.

Exams

- A midterm (39 "regular" points) and a final (60 "regular" points).
- Types of questions: "regular" (99 points) and "challenge" (likely 30-40 points)
  - The weight of basic vs. challenge questions may vary across exams; the above estimates are for the total of all exams.
  - Also bonus questions (5-8 points) on *Game-Changer* on the final.
- **Exam averages may be somewhat low**. In my view, **this is totally normal in a properly evaluated game theory course.** Why?
  - Problem-solving should be an important part of game theory courses.
  - Problem-solving must be tested with less familiar questions, which are inherently harder: otherwise, you may instead be testing rote-learning.
- **"Curved" according to the generous end of department grading guidelines.**

Missing Course Requirements

- **See the document posted online for detailed rules and deadlines.**
  - Since the lowest problem set score and 2 lowest lecture scores are dropped, **do not request an academic concession until the 2nd problem set or 3rd lecture missed for a valid reason**, but save the documentation.
  - Fill out an **Academic Concession Self-Declaration Form** and include it in your **first email** (unless you're asking for a religious accommodation, in which case the form is not required).
- Email me **within a week of the final exam date being announced** if you will miss the final for religious reasons.
  - Otherwise, only medical emergencies may lead to an accommodation for missing the final, and even in that case, your request for an accommodation may be rejected if your course grade before the final exam is an F or if you also missed the midterm for any reason.

What You're Getting Yourself Into

- In high school, the teacher did problems in class. Then you repeated the same problems (with different numbers) on the homework. And then, you repeated the same problems again on the exam.
- **This is a university course, where you will learn to think on your own.**
- The lectures will teach the theory and go over examples that will often be **basic**.
- **You will need to figure out how to solve the problem set questions, some of which are complicated.**

What You're Getting Yourself Into (cont'd)

- Part of the exams will test whether you can apply course concepts to **problems that you haven't encountered before**.
- Think of unfamiliar problem set or exam questions as **puzzles, not work**, since you can get a lot wrong and still get a good grade.
  - Solving them should be much more **rewarding** and **fun** than doing a familiar problem with new numbers. A positive attitude can go a long way!
- This course does not require math beyond the high school level (*e.g.* no calculus), but relies on **problem-solving** skills (and will develop them further).
  - You should have taken at least one university-level course that relies on problem-solving (*e.g.* ECON 103, calculus, *etc.*).

My Personality (and Avoiding Misunderstandings)

- I'm blunt. If you're wrong, I'll say it directly. **I'm not judging you as a person - participation is encouraged, and learning from mistakes is important.**
- If an error is easily avoided, I will point that out and explain why. **This is to show you that the question is do-able, not to scold you for making the mistake.**
- Ultimately, **I want all of you to succeed**. Any frustration or impatience (hopefully rare!) is **not intentional** or directed at you, but rather due to the message not getting through.

My Expectations

- Don't try to leave class before time unless I'm done.
- **Read the course staff's emails.**
- **Never fall behind**. You should understand everything in a week's lecture slides before the following week's lectures.
- There are only 5 problem sets, so they could be long. Budget several hours (not just 2-3) for each of them.
- **Everybody** should aim to get full marks on MobLab participation and problem sets.
- Learn the **definitions**. Because most exam questions are different from problem set questions, you will have trouble understanding them if you do not bother learning what the words mean.

My Expectations (cont'd)

- **Read the syllabus.** You'll probably find it helpful to read "Details about grading," but it's not absolutely necessary.
- **If you need to miss a course requirement, read the relevant document BEFORE contacting me.** If not, skip it.
- If you're considering asking for a regrade, read the regrade policy. If not, skip it.
- **Don't ask for an exception to course policies** (*e.g.*, "Can you shift some weight from this exam to that exam?"): the answer is **no**, and you may be penalized for asking.
  - Don't worry: there is no penalty if you ask for a *clarification* (*e.g.*, your situation is unusual, and you're not sure how the course policies apply).
  - Of course, **any question about the course content is encouraged**.

Why Challenge Questions?

- They **reward understanding rather than learning by heart**. If you just learn the material by heart, you'd forget it a week after the final, and this whole course would be a huge waste of your time.
- I don't want the difference between A+/A/A- students to be mainly based on who makes the fewest careless mistakes.
- Suppose you have a bad day on the midterm. If the final only has easy questions, you can't catch up! So **challenge questions make the course more forgiving**.
- Even A+ students may struggle to get over 50% on challenge questions. That's why I exclude them from the denominator. However, I expect A/A+ students to get *some* challenge points, so although they are almost like bonus questions, those aiming for an A/A+ and wanting a healthy margin for error on regular questions should probably attempt them.