Econ 4020 – Game Theory

Spring 2017 · Goldwin Smith Hall 132-HEC Aud · TR10:10–11:25

http://tiny.cc/gametheory

Communication

- *Instructor*: Bruno Salcedo, 480 Uris Hall, TR15:00–16:30, salcedo@cornell.edu
- *Teaching Assistant*: Zhenda Yin, 455 Uris Hall, F16:00–17:00, zy245@cornell.edu
- Check the course website regularly for important announcements.
- The best way to reach me is via email. Please include the phrase "Econ 4020" in the subject line.

Course overview

- This course is about understanding and predicting strategic behavior. The main objective is to introduce some basic tools from Game Theory, and to get you to think in terms of strategies and incentives.
- The first part of the course covers different ways to model strategic environments, and some classic solution concepts. The second part is geared towards mechanism design and specific applications, mainly but not only to economic problems.
- The course has Econ 3010 and Econ 3030 as prerequisites. The required technical background is the basic elements of probability theory and calculus—random variables, expectations, conditioning and derivatives. If you feel insecure about this prerequisites, please contact the instructor.

Course outline

- *Environments* — extensive form games · strategic form games · rational agents
- *Solution concepts* — rationalizability · Nash equilibrium · subgame perfection
- *Moral hazard* — efficiency · contracts · repeated games · principal-agent problems
- *Private information* — Bayesian games · adverse selection · auctions · signaling

Required and recommended reading materials

- You are expected to read the class slides and lecture notes posted on the course website, as well as the corresponding sections from the textbook:
  - Watson (2011) *Strategy: An Introduction to Game Theory*
- The 3rd and most recent edition of the required textbook costs $103 at the Cornell Store. An electronic version can be rented for $45 on Amazon. Almost all the material covered in class is also included in the 2nd edition. Paperback copies of the 2nd edition are being offered for as low as $14.55 on Amazon Marketplace.
- The following *optional* references might be useful complements:
  - Myerson (2001) *Game Theory: Analysis of Conflict*
  - Osborne and Rubinstein (1994) *A Course on Game Theory* [free]
  - Tadelis (2013) *Game Theory: An Introduction*
  - Gilboa (2009) *Theory of Decision Under Uncertainty*

Coursework and grades

- Your grade for the class will be composed of five parts
  - 30% from the first preliminary exam to be held in class on 2/28
  - 30% from the second preliminary exam to be held in class on 3/30
  - 30% from the *cumulative* final exam to be given during finals period
  - 10% from problem sets that will be assigned during the semester
  - Extra credit from participation in in-class activities
- Final grades for the class will be determined by computing a weighted score based on the weights listed above. The weighted scores are assigned letter grades A-B-C at proportions of 35-35-20 percent. The remaining 10 percent is spread across the letter grade distribution (including D and F) at the discretion of the instructor.
- Interactive in-class activities and surveys are meant to help you put in practice the class concepts, and to help me receive feedback on what you are learning and what you are not so I can tailor the lecture. Your participation in these activities can earn you *extra credit* towards your final grade. We will use the MobLab platform for the in-class activities. This will require you to have a device with internet access, and a MobLab account for the course. The account costs $10.

Additional course policies

- You are expected to abide by the Cornell University Code of Academic Integrity. Any work you submit for academic credit will be your own work. You are encouraged to collaborate with your classmates to solve problem sets, but each student must write and submit an individual report.
- Problem sets can be submitted in person or via email, and are due at the beginning of class. **Late problem sets will not be accepted, including those turned in after class on the due date**.
- With respect to exams, the Faculty Handbook lists four types of situations in which faculty are encouraged to make accommodations for missed work. However, the determination as to whether a particular case warrants accommodation is ultimately the decision of the faculty member. Here is how the four cases are handled in this course:
  - Illness, or family or personal emergency: Any situations that fall under this category must be first brought up with the advising dean in the students college. The advising dean will then contact me directly, and I will make a determination based on the particular case. Do not email me directly about these issues.
  - Employment interviews: You must provide me evidence of the interview and establish that you have no control over the timing of the interview.
  - Religious observances: While I do my best not to schedule exams during religious holidays, please contact me at least two weeks in advance if an exam date/time conflicts with a religious holiday.
  - Athletics and Extracurricular Activities: Students in varsity athletics or recognized extracurricular activities must provide the standard permission slip from the staff responsible for the activity at least two weeks before the exam.

Tentative course schedule

- **Environments** (2 weeks)
  - Extensive form games · Watson, Ch. 2 & 14
  - Strategic form games · Watson, Ch. 3
  - Rationality and dominance · Watson, Ch. 4–6

- **Solution concepts** (3 weeks)
  - Common knowledge · Lecture notes
  - Rationalizability · Watson, Ch. 7 & 8

    First problem set due — 2/23
    First preliminary exam — 2/28

  - Equilibrium in pure strategies · Watson, Ch. 9 & 10
  - Equilibrium in mixed strategies · Watson, Ch. 11
  - Backward induction and perfection · Watson, Ch. 15 & 19
- **Moral hazard** (2 weeks)
  - Pareto efficiency · Lecture notes
  - Moral hazard and contracts · Watson, Ch. 13
  - Repeated interactions · Watson, Ch. 22 & 23
  - Principal-agent problems · Watson, Ch. 24 & 25

    Second problem set due — 3/28
    Second preliminary exam — 3/30

- **Private information** (4 weeks)
  - Bayesian games · Watson, Ch. 24 & 26
  - Mechanism design · Tadelis, Ch. 14
  - Adverse selection · Watson, Ch. 27
  - Auctions · Tadelis, Ch. 13
  - Signaling games · Watson, Ch. 28 & 29
  - Matching · Lecture notes

    Third problem set due — 5/09
    Final exam exam — Date to be assigned