



Brown University

**Economics 187 – Game Theory and Applications to Economics**

Fall 2007

**Professor:** Geoffroy de Clippel ([declippel@brown.edu](mailto:declippel@brown.edu))

Class meets W 3-5:20pm (Smith-Buonanno Hall, room G18)

Office hours: W 2-3pm (Robinson hall, room 102 D)

**Teaching Assistant:** Isabel Solchenbach ([Isabel\\_Solchenbach@brown.edu](mailto:Isabel_Solchenbach@brown.edu))

Students may choose to attend *either* the section that meets Th 12-12:50pm, *or* the section that meets Th 7-7:50pm. Both sections meet in Rhode Island Hall 001.

Isabel is available to arrange individual appointments to further explain the material.

**Overview:** This course introduces the basic tools of game theory, a branch of economic theory that studies interactive decision making. The class will cover contributions from Nobel laureates Robert Aumann, John Harsanyi, John Nash, and Reinhard Selten (and much more!). Some emphasis will be placed on applications in Economics, and the Social Sciences in general.

**Prerequisites:** Econ 111 or 113, and a statistics course (Econ 162 or 163, or Math 161, or Applied Math 165). Your willingness to work hard is essential for a good understanding of the subject.

**Textbook:** *Game theory for applied economists* by Robert Gibbons, Princeton University Press

**Course website:** available through [mycourses.brown.edu](http://mycourses.brown.edu)

**Weekly assignments:** A homework assignment will be posted every Wednesday around noon on the class webpage. There will be 10 assignments, starting on September 12 and ending on December 5 (excluding November 21 for the Thanksgiving recess). Assignments are due within a week – the precise deadline being on Wednesdays at noon. Please place your solution set in the class mailbox (in the basement of Robinson hall). Isabel will then correct the assignments and post answer keys on the website on the following Mondays in the afternoon. Each student has the right to ask for a deadline extension of *five* days (hence the new deadline would be the following Monday at noon), *at most two times* during the semester. The student has to send an e-mail to Isabel to request the extension. No explanation is required. Attention - no extension will be granted to students that have already obtained two extensions in the past (except for very exceptional motives that will need to be documented). Missing a deadline means a zero score. Assignments can be solved either individually or by groups of *at most two* students. You are free to decide how to proceed for each assignment. Any two students that decide to team up to solve a specific assignment have to write their two names on the solution set. The score applies equally to both students. I expect any two such students to solve the *whole* assignment *together*. I trust you for not sharing the workload instead. In addition of being a violation of the honor code, not respecting this principle is most likely to result in difficulties in the midterm and the final exams.

**Midterm exam:** The midterm exam will take place on October 17, in place of the regular class. It will be a two-hour exam covering the theory until October 10 included, and the exercises distributed until October 3 included. Students will not be allowed to consult any material during the exam.

**Final exam:** The final exam will cover the *entire* material, and will last at most three hours. Please be aware that the course falls in the examination section number 14, and hence the final exam will be held on December 13, at 2pm. No alternative date will be arranged. Students will not be allowed to consult any material during the exam.

**Grading:** Your numerical grade in the course will be determined as a weighted average of your scores on the weekly assignments, the midterm, and the final exam. The weights are:

|                    |     |
|--------------------|-----|
| Weekly assignments | 30% |
| Midterm exam       | 30% |
| Final exam         | 40% |

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.

Isabel will grade all the weekly assignments, as well as the final exam. I will grade the midterm exam. The average grade for the class will be indicated in the answer keys that will be posted online after each assignment and each exam.

**Complaints regarding grades:** The corrected assignments and exams will all be available in the class mailbox (in the basement of Robinson hall) at most six days after the deadline or the date of the test. Students then have at most *eight* days to introduce a complaint regarding a grade (that means exactly two weeks after the deadline or the date of the test). Requests must be placed in my mailbox situated in Robinson hall (room 103). I expect them to be specific and motivated. This means that you must include a copy of the question(s) that need(s) to be re-graded, a copy of the answer(s), and an explanation as to why the question(s) need(s) to be re-graded. If I find the request motivated, then I will re-grade these question(s) myself (which may possibly result in a lower grade if I find it justified). My decision is final.

I am happy to meet students that want to receive more information regarding their final letter grade. Please contact me before January 31 to request an appointment on that matter.

**Plan of the course** (may change during the semester)

1) Individual decision making

2) Games with complete information

- a. Static games
  - i. Model, benchmark examples
  - ii. Dominated strategies, best response, Nash equilibrium
  - iii. Applications: Cournot and Bertrand duopoly, tragedy of the commons
  - iv. Mixed strategies, existence of equilibrium
- b. Dynamic games
  - i. Model, perfect vs. imperfect information, benchmark examples
  - ii. Strategies vs. actions, Nash equilibrium, Subgame-perfect Nash equilibrium, backward induction
  - iii. Applications: Stackelberg duopoly, wages and employment in a unionized firm, repeated games
- c. Bargaining theory
  - i. Nash bargaining solution
  - ii. Bargaining as a dynamic game
- d. Coalitional Games
  - i. Model
  - ii. Core
  - iii. Shapley value
  - iv. Applications: ownership and the distribution of wealth, measuring political power, matching

3) Games with incomplete information

- a. Static games
  - i. Model
  - ii. Bayesian Nash equilibrium
  - iii. Applications: Cournot duopoly, auctions, revelation principle
- b. Dynamic games
  - i. Model
  - ii. Perfect Bayesian equilibrium
  - iii. Application: job-market signaling, cheap talk, reputation
  - iv. Refinement of perfect Bayesian equilibrium