

Economics 620  
Game Theory with Applications  
Spring 2017

Attila Ambrus

## **SYLLABUS**

Location of Class: Sociology Psychology 126  
Meeting Time: Tu., Th. 8.30-9.45 am  
Attila's Office hours: Wednesday 1-2.15 pm, Social Sciences 313  
Attila's phone and e-mail: 919-660-1835, aa231@duke.edu  
TA: Jingyi Tian  
TA's Office Hours: Mon. 2.30-4pm, SoSci Graduate Lounge (3<sup>rd</sup> floor)

### **Text Books**

Each of the following books provides a good background reading for the lecture material:

R. Gibbons: Game theory for applied economists, Princeton University Press 1992  
ISBN 0-691-00395-5 (PB)

P.K. Dutta: Strategies and Games: Theory and Practice, MIT 1999  
ISBN 0-262-04169-3

E. Rasmusen: Games and information: an introduction to game theory, Blackwell  
Publishing, 2007  
ISBN 1-4051-3666-9

(Not printable chapters are available online: <http://www.rasmusen.org/GI/index.html>)

### **Grading**

Problem Sets	20%
Midterm	30%
Final	50%

### **Requirements: who should take this course?**

This course is an introduction to game theory. For MA students, no formal prerequisite is required. We will use calculus (mostly, one variable) and some probability theory.

## Course Aims and Methods

Game theory is a way of thinking about strategic situations. On the one hand its content is normative: it provides guidelines for decision makers to predict others' actions and to recognize good and bad strategies. On the other hand its content is positive: it helps the social scientist to understand the nature of social interaction in various applications, in Economics, Political Science, Sociology and Anthropology. We will learn new concepts, methods and terminology. The course will emphasize examples and applications. We will also play some games in class.

## Outline and Reading

The readings are not compulsory, but they will help back up the class material.

G=Gibbons; D=Dutta; R=Rasmusen

**Topic 1** (Jan 12) Normal form games: basic concepts; Dominated strategies

Reading G: 1.1.A, 1.1.B; D: 1.1-1.3, 2.3; R: 1.1, 1.2

**Topic 2** (Jan 17, 19) Iterated dominance; Best responses; Rationalizability; Knowledge, common knowledge

Reading: G: 1.1.B; D: 2.1, 3-4; R: 1.3, 2.2

**Topic 3** (Jan 24, 26, 31) Nash equilibrium; Finding pure strategy Nash equilibria in finite games; Applications: Cournot and Bertrand duopoly, voting games, partnership game

Reading: G: 1.1.C; D: 5; R: 1.4, 3.5, 3.6

**Topic 4** (Feb 2, 7, 9) Mixed and correlated equilibria; Large populations; Tipping points; Evolutionary stability

Reading: G: 1.2.A-1.2.B; D: 6-7; R: 5.6

**Topic 5** (Feb 14, 16) Extensive form games; Backward Induction; Zermelo's algorithm; Incredible threats; Counter-intuitive predictions of backward induction

Reading: G: 1.3.A-B; D: 8-9; R: 2.1

**Topic 6** (Feb 21) Applications: alternative-offer bargaining; Game of duel

Reading: G: 2.1.D; D: 11-12; R: 12.1-12.4

**Midterm: Thursday February 23 (in class)**

**Topic 7** (Feb 28, Mar 2, 7) Imperfect information; Subgame perfect Nash equilibrium: theory and applications; War of attrition

Reading: G: 2.2.A; D: 13; R: 3.2, 4

**Topic 8** (Mar 9, 21) Bayesian games; Cournot duopoly with private information; Perfect Bayesian Nash equilibrium and sequential equilibrium

Reading: G: 3.1, 3.2, 4.1; D: 21, 24.2; R: 6.1, 6.2

**Topic 9** (Mar 23) Reputation

Reading: G: 4.3.C; R: 5.3-5.4, 6.4

**Topic 10** (Mar 28, 30) Finitely repeated games; Renegotiation; One-step deviation property; Infinitely repeated games

Reading: G: 2.3.A; D: 13-14; R: 5

**Topic 11** (Apr 4, 6) Private information; Verifiable information; Costly signaling

Reading: G: 2.3.A, 4.2, 4.3.C; D: 15-18, 24; R: 11

**Topic 13** (Apr 11, 13) Auctions: common values and private values; Winner's curse; Revenue equivalence

Reading: G: 3.2.B; D: 23; R: 13

April 18: Review session.