**Rudolf Kerschbamer**

# Game Theory

Module in the Master Program Applied Economics
4St. WS 08/09

## General Remarks

The course Game Theory will be taught in English. It consists of a weekly 3-hour lecture (LV-Nr.: 432051) as well as a 1-hour proseminar (LV-Nr.: 432203). The 3-hour lecture is given by Rudolf Kerschbamer, the 1-hour proseminar by Wolfgang Höchtl.

## Requirements

Basic knowledge of microeconomics as well as the willingness to deal with formal models are required. No previous knowledge of game theory is assumed (basic knowledge of the main concepts is of great help, of course).

## Target Group

First year Master students.

## Course Credits within the Curriculum

This course is compulsory for the Master Program Applied Economics.

## Time and Place

The lecture will take place weekly on Wednesdays from 11:15-14:00 in SR 9, starting October 1, 2008. The 1-hour proseminar will take place weekly on Wednesdays from 16:00-17:45 in SR 9, there are some exceptions, though (see next page)

**The preliminary meeting for the whole curse is on Wednesday, October 1, 11:15 in SR 9. The first lecture starts at the same day. Please do attend both.**

## Lecture and Exam Dates:

| | | |
|---|---|---|
| **Mi 01.10. 11.15 - 13.45** | **SR 4** | **Lecture 1** |
| **Mi 08.10. 11.15 - 13.45** | **SR 4** | **Lecture 2** |
| **Mi 15.10. 11.15 - 13.45** | **SR 4** | **Lecture 3** |
| **Mi 22.10. 11.15 - 13.45** | **SR 4** | **Lecture 4** |
| **Mi 29.10. 11.15 - 13.45** | **SR 4** | **Lecture 5** |
| **Mi 29.10. 16.00 - 18.00** | **HS 3** | **1st Exam** |
| **Mi 05.11. 11.15 - 13.45** | **SR 4** | **Lecture 6** |
| **Mi 12.11. 11.15 - 13.45** | **SR 4** | **Lecture 7** |
| **Mi 19.11. 11.15 - 13.45** | **SR 4** | **Lecture 8** |
| **Mi 26.11. 11.15 - 13.45** | **SR 4** | **Lecture 9** |
| **Mi 26.11. 18.00 - 20.00** | **HS 2** | **2nd Exam** |
| **Mi 03.12. 11.15 - 13.45** | **SR 4** | **Lecture 10** |
| **Mi 10.12. 11.15 - 13.45** | **SR 4** | **Lecture 11** |
| **Mi 21.01. 15.00 - 17.00** | **HS 1** | **3rd Exam** |

## Proseminar Dates:

| | | |
|---|---|---|
| **Mi 01.10. 16.00 - 17.45** | **SR 9** | **PS 1** |
| **Mi 08.10. 16.00 - 17.45** | **SR 9** | **PS 2** |
| **Mi 15.10. 16.00 - 17.45** | **SR 9** | **PS 3** |
| **Mi 22.10. 16.00 - 17.45** | **SR 9** | **PS 4** |
| **Mi 05.11. 16.00 - 17.45** | **SR 9** | **PS 5** |
| **Mi 12.11. 16.00 - 17.45** | **SR 9** | **PS 6** |
| **Mi 19.11. 16.00 - 17.45** | **SR 9** | **PS 7** |
| **Mi 03.12. 16.00 - 17.45** | **SR 9** | **PS 8** |
| **Mi 10.12. 16.00 - 17.45** | **SR 9** | **PS 9** |
| **Mi 07.01. 11.00 - 13.45** | **SR 4** | **PS 10 u. 11** |
| **Mi 14.01. 11.00 - 13.45** | **SR 4** | **PS 12 u. 13** |

## Outline of Contents

Below is an outline of the course that roughly but not precisely corresponds to each class session:

1. **Representation of Games**

   *Lecture 1 Representation of Games:* normal-form representation, extensive form representation, information sets, histories, pure strategies, mixed strategies

2. **Dominance**

   *Lecture 2 Static Games of Complete Information - Dominance:* (strictly) dominant strategies, (strictly) dominated strategies, iterated deletion of strictly dominated strategies, mixed strategies and dominance

3. **Static Games of Complete Information: Nash Equilibrium**

   *Lecture 3 Static Games of Complete Information - Pure Strategy Nash Equilibrium in Finite Games:* definition of Nash equilibrium (NE), finding NE, best-response correspondences and NE, motivating NE, relation between NE and iterated deletion, existence of NE in pure strategies

   *Lecture 4 Static Games of Complete Information - Mixed Strategy Nash Equilibrium in Finite Games:* definition of mixed strategy NE, finding mixed strategy NE, mixed best-response correspondences and mixed NE, motivating mixed NE, existence of (possibly mixed) NE in finite games

   *Lecture 5 Static Games of Complete Information - Nash Equilibrium in Games with Continuous Strategy Spaces:* finding NE in games with continuous strategy spaces, best-response correspondences and NE with continuous strategy spaces, economic applications, existence of NE in games with continuous strategy spaces

4. **Dynamic Games of Complete Information: Subgame Perfect Equilibrium**

   *Lecture 6 Dynamic Games of Complete Information - Subgame Perfect Equilibrium in Finite Games:* definition of subgame perfect equilibrium (SGPE), finding SGPE in games of perfect information, finding SGPE in games of imperfect information, NE versus SGPE, existence of SGPE, SGPE in twice repeated games

   *Lecture 7 Dynamic Games of Complete Information - Subgame Perfect Equilibrium in Infinite Games:* finding SGPE in infinitely repeated games; applications of infinitely repeated games; folk theorems

5. **Static Games of Incomplete Information: Bayesian Equilibrium**

   *Lecture 8 Static Games of Incomplete Information - Bayesian Equilibrium in Discrete Games:* incomplete information games, definition of Bayesian equilibrium (BE), finding BE, correlated types, applications, existence of BE

   *Lecture 9 Static Games of Incomplete Information - Bayesian Equilibrium in Games with Continuous Action and/or Continuous Type Spaces:* definition of BE

in games with continuous action and/or continuous type spaces , finding BE in games with continuous action and/or continuous type spaces, purification theorems

**6. Dynamic Games of Incomplete Information: Perfect Bayesian Equilibrium**

*Lecture 10 Dynamic Games of Incomplete Information - Perfect Bayesian Equilibrium:* definition of perfect Bayesian equilibrium (PBE), finding PBE, economic applications

*Lecture 11 Dynamic Games of Incomplete Information - Perfect Bayesian Equilibrium in Signalling Games:* definition of a signalling game, definition of PBE in signalling games, economic applications

## References:

The main textbook will be

Gibbons, R., *A Primer in Game Theory*, 1st ed., Harvester/Wheatsheaf, New York 1992

Parts of the course are also based on:

Mas-Colell, A., M. Whinston and J. Green, *Microeconomic Theory*, Oxford University Press, New York and Oxford 1995

and on

Binmore K., *Fun and Games*, D.C. Heath & Co., Lexington 1992.

## Course Requirements

*Regular attendance in class:* I require regular attendance and participation in class. If you cannot attend for any reason, I ask that you inform me per e-mail. Please don't provide any reasons, just inform me that you cannot attend.

*Problem sets:* To help you to gain ease in applying the tools of non-cooperative game theory, there will be weekly problem sets. Please work on the problems in small groups (comprising no more than four students each)

*Participation in three written exams:* The three exams include material from both parts of the course. The exam dates and places are: Wednesday, October 29 16:00-18:00 in HS 3; Wednesday, November 26 18:00-20:00 in HS 2; and Wednesday, January 21 15:00-17:00 in HS 1.

**Please note the above dates now, and keep them free from any other obligations. I can offer alternative exam dates only in exeptional circumstances.**

## Grading Scheme for this Course:

The combination of attendance, participation, and problem sets count for 20% of the course grade. The first two exams count for 25% each, the last exam counts for 30%.

## Registration

Registration by computer (period allotted: 15.09.2008 until 30.09.2008, 16:00). **Attendance in the first meeting** (October 1!) is nevertheless **required!**