Introduction to Game Theory with Applications

Lecture Information

01.10.2022

1 Terms of Use

The lecture notes of this course are exclusively for the personal use of the enrolled students. Any type of distribution, reproduction, disclosure, and non-personal usage is prohibited. Moreover, recording the lectures in any form (including audio and video), even partially and for private use, is strictly forbidden.

2 Format

The module provides a basic introduction to game theory and mechanism design, with an emphasis on applications. The module has two parts:

- Lecture (4 SWS): The lecture is in the frontal teaching format and is dedicated to the theory.
- Exercise (2 SWS): In a few of exercise session, the instructor provides and solves some problem sets. The remaining sessions involve reading and discussing scientific papers concerning the application game theory. The instructor selects different articles which span practical perspectives. The students should become familiar with that paper before the session. They then discuss the paper in small groups (breakout sessions) and report to the class. The target is to discuss one paper every week.

3 Time and Location of Lecture- and Exercise Sessions

All lectures take place in the lecture hall, whereas the exercise sessions are synchronous via Zoom. The Zoom link will be shared with the participants.

- Lecture (4 SWS): Tuesday 14:30-15:45 AND Tuesday 16:00-17:15.
- Exercise (2 SWS): Monday 14:15-15:45 OR Monday 16:15-17:45.

Two exercises sessions are available. Each student can select one of the two offered exercise appointments to attend. The capacity of each exercise session is half of the capacity of the lecture.

4 Registration for the Exercise Sessions

After you register for the lecture, you shall go to ’Registration for Exercise Sessions”. There you can enter your name for your preferred exercise session.

5 Attendance Requirement

Attending lecture sessions is not mandatory. Participation in at least 70% of exercise sessions is mandatory to become eligible for the final exam. Active participation in the discussions (during lecture and exercise sessions) results in bonus points in the final exam.

6 Examination

The type of examination is *written*. The questions are from the lecture notes, exercises, and discussions. The first exam takes place in the first half of February (subject to room availability). There will be a second written final exam only for those students who fail the first exam. This exam takes place in April or May.

7 Registration for the Exam

You need to register for the final exam and send the registration confirmation to the lecturer.

8 Tentative Contents

- Strategic Form Games
- Equilibrium Concepts
- Potential Games
- Learning and Evolution in Games
- Games with Incomplete Information
- Nash Bargaining Solution
- Repeated Games
- Mechanism Design
- Auctions
- Nash Bargaining Solution
- Evolutionary Games

- Cooperative Games
- Mean Field Games

9 Readings

Lecture notes only serve as a brief summary of what we discuss during the lecture. To know more about topics and also to develop self-learning ability, study **at least** one book in addition to pre- and post-processing the lecture notes. There are plenty of books available in the area of game theory and microeconomics; some suggestions:

- D. Fudenberg and J. Tirole, *Game Theory*, MIT Press, 1991
- D. Fudenberg and D. Levine, *The Theory of Learning in Games*, MIT Press, 1998
- A. Mas-Colell and M.D. Whinston, and J.R. Green, *Microeconomics Theory*, Oxford University Press, 1995
- K. Vijay, *Auction Theory*, Harvard University Press, 2008

The lecture notes greatly benefit from

- A. Ozduglar, *Game Theory with Engineering Application*, MIT OpenCourseWare, 2009
- M. Manea, *Game Theory*, MIT OpenCourseWare, 2017
- J. Levine, *Graduate Game Theory*, Standford Univeristy, 2007

10 Contact and Office Hours

Please send your questions and requests for appointment via email. I answer your questions on a first-come-first-served basis.