

Doctoral Program in Economics



Academic Year 2025/26

GAME THEORY

Period:

Third term: March/April 2026

Course hours:

20

Teachers:

Paolo Pin (10 hours) – Course coordinator
Annalisa Luporini (10 hours)

Exam methods:

Written exam.

Grading is comparative and based on a final written exam.

Sets of homework exercises may be assigned during the course.

Prerequisite

Mathematics. In particular:

- Linear algebra and mathematical analysis at the level of the Mathematical Appendices in [T] and [MCWG]
- Basic probability theory at the level of the Mathematical Appendix in [T]

Course Description and Educational Objectives

This course covers the basic content of a first-year graduate-level course in **non-cooperative game theory**, with selected extensions to cooperative games and applied formats.

Students will:

- learn the formal tools of game-theoretic modeling,
- understand solution concepts and equilibrium refinements,
- apply game theory to socio-economic, institutional, and strategic interaction problems.

Programme

The course provides a rigorous introduction to non-cooperative game theory, combining formal analysis with economic applications. It is organized into two parts, corresponding to the contributions of the two instructors.

Topics taught by Paolo Pin

This part introduces the foundational elements of non-cooperative game theory and the main equilibrium concepts. It begins with the analysis of rationality and individual decision-making, clarifying the assumptions underlying strategic behavior

(Chapters 1–2 in [T]; Chapter 3 in [OR-Jr]).

The course then focuses on static games in strategic form, emphasizing best responses, dominance, and Nash equilibrium

(Chapters 3–4 in **[T]**; Chapter 15 in **[OR-Jr]**).

Mixed strategies and Nash equilibrium are introduced to address equilibrium existence and strategic uncertainty, together with the expected utility framework

(Chapters 5–6 in **[T]**).

The final part of this section is devoted to dynamic games, including extensive-form representations, sequential rationality, multistage games, and forward induction

(Chapters 7–9 in **[T]**; Chapter 4 in **[OR]**).

Topics taught by Annalisa Luporini

This part develops advanced topics in game theory that arise when strategic interaction unfolds over time or under incomplete information. Repeated games are used to analyze long-run incentives, cooperation, and punishment strategies, and to introduce strategic bargaining

(Chapters 10–12 in **[T]**).

The course then turns to games with incomplete information, with a focus on Bayesian games and auctions as canonical applications. Particular attention is devoted to sequential rationality in environments with private information

(Chapters 13 and 15 in **[T]**).

The final topic concerns signaling games and reputation, emphasizing belief updating, equilibrium selection, and the role of informational asymmetries

(Chapters 16–17 in **[T]**).

Bibliographical References

- **[T]** S. Tadelis (2013), *Game Theory: An Introduction*, Princeton University Press.
- **[OR]** M. J. Osborne and A. Rubinstein (1994), *A Course in Game Theory*, MIT Press.
- **[OR-Jr]** M. J. Osborne and A. Rubinstein (2023), *Models in Microeconomic Theory* (Expanded Second Edition), MIT Press.
- **[MCWG]** A. Mas-Colell, M. D. Whinston and J. R. Green (1995), *Microeconomic Theory*, Oxford University Press.

Lecture slides and selected journal articles will be made available during the course.