

Advanced Microeconomics: Game Theory

Teachers: Olivier Gossner, Frederic Koessler

Duration: 24 hours

Number of ECTS credits: 4

Education Level	Period	Language of instruction	Max. Staffing	Teaching Mode
Master	S1	English	25	in-person

Deanship Department: Economics and Decision Sciences

Domain: Finance and Economics

Track: Advanced Courses

Keywords: Game theory, Value of information, Strategic communication, Betting, Bayesian persuasion

SYNOPSIS

The course treats strategic aspects of information in games. The following topics will be studied, among others: value of information, modeling knowledge, modeling inattention, optimal bluffing, betting, reputation, global games, speculative attacks, bank runs, repeated games, information design, congestion games, strategic communication and mediation. Applications to conflict analysis, policy and investment advices, congestion and finance will be discussed.

DETAILED DESCRIPTION

Prerequisites:

Basic notions in microeconomic theory, information economics and game theory

Course overview:

Information is a central concept in game theory. It is important when one wants to explore the foundations of equilibrium concepts, when agents face uncertainties about the strategic situation they face, and when decisionmakers must rely on the knowledge they acquire from the others or on their own. This course studies fundamental aspects and advanced topics related to information, equilibrium concepts and robustness in games. The first part shows how to model information and knowledge in games, and presents solution concepts for normal form games such as minmax, correlated equilibrium, and rationalizable strategies. The value of information and rational inattention are studied in single-decision as well as in interactive environments such as betting and repeated games. The second part studies models of information design and strategic communication. We analyze how information provision influences agents' beliefs and behavior in strategic environments and study the incentives of privately informed agents to truthfully and voluntarily disclose information to other agents, with and without a mediator.

Principal Items:

Modeling Information and knowledge, solution concepts for normal form games, value of information, information design and persuasion, correlation and information in large games, strategic information transmission.

Pedagogical Objectives:

At the end of the course, the student will know the foundations of information in game theory. The student will be able to understand, solve and build theoretical models of games with incomplete information. The student will also be able to apply relevant models in economic, business and finance applications in which information plays a crucial role.

Skills:

In an academic or business career, the student will be able to use existing models or build new models of game theory to better understand the strategic aspects of information in abstract strategic and mechanism design problems and in applications such as industrial organization, business and finance.

Course organization:

Modeling Information and Knowledge

- States of nature and knowledge
- Interactive knowledge
- Beliefs and consensus

Solution concepts for normal form games: minmax, correlated equilibrium, rationalizable strategies

- Zero-sum games and the minmax theorem
- Correlated equilibrium
- Correlated rationalizability and common knowledge of rationality

Value of information

- One person decision problems: comparison of statistical experiments, rational inattention, Bayesian persuasion
- Bayesian Games
- Betting and no-trade theorem
- Repeated zero-sum games, optimal information revelation

Information design and persuasion in games

- Bayes correlated equilibrium
- Belief-based approach under public information

Correlation and information in large games

- Non-atomic games and Wardrop equilibrium
- Network routing games and the price of anarchy
- Potential games
- Correlated Wardrop equilibrium and the value of mediation
- Bayes correlated Wardrop equilibrium

Strategic information transmission

- Cheap talk with transparent motives
- Strategic information transmission with a biased expert
- Mediated communication

TEACHING MATERIALS

Reading notes and slides

TEACHING METHODS

Presentation and exercises with slides and on the blackboard

WORK AND EVALUATIONS

Work requested:

Learn the concepts studied during the class and solve some exercises

Assessment of achievement:

Tool/method of evaluation	Duration	Weight in the final grading
Final exam	2 hours individual	100%

BIOGRAPHY

Frederic Koessler is research director at the French National Center for Scientific Research (CNRS). He is CNRS researcher at GREGHEC and professor at the department of Economics and Decision Sciences at HEC Paris since 2022. He obtained his PhD in economics at the university of Strasbourg in 2001. Before joining HEC, he was researcher at the university of Cergy-Pontoise, research fellow at the Hebrew University of Jerusalem, and professor at Paris School of Economics.

He is working on game theory and economics of information, especially on strategic information disclosure, persuasion, information and mechanism design, and behavioral game theory. He has published his research in top journals in economics such as *Econometrica*, *Journal of Political Economy*, *Review of Economic Studies*, *Rand Journal of Economics*, *Journal of Economic Theory*, *Theoretical Economics*, *Mathematics of Operation Research*, *Games and Economic Behavior*. His research in economic theory has been rewarded by a CNRS bronze medal in 2010.

Frederic Koessler is actually associate editor at *Games and Economic Behavior* and *Annals of Economics and Statistics*. He is coordinator of the ANR grant StratCom (2019-2024) and of the CNRS research network on game theory (2015-2025).

Olivier Gossner is a specialist of Game Theory working at the intersection of Economics and Mathematics. His main research interests lie in repeated games, the strategic use of information, and bounded rationality.

In recent work, he develops new models of strategic reasoning, and proposed a reform of Solvency II that would allow to allocate more insurance capital to the productive economy.

He is a fellow and the vice president for communications of the Game Theory society.

WAIVER POLICY

None