

Syllabus

Decision Theory and Game Theory

Number of ECTS: 6

Number of hours: 36

Teacher:

Name: Olivier Bos

Affiliation: ENS Paris-Saclay

Email: olivier.bos@ens-paris-saclay.fr

Brief Course Description

This course aims introducing substantial theoretical concepts and tools to be able to formalize and analyze strategic interactions in macro and microeconomics, and beyond to read theoretical and applied scholar articles on decision theory and game theory. Decision theory studies choices that result in either risky or uncertain outcomes, while game theory is the analysis of strategic interactions between rational agents. Both are dynamic fields, with substantial developments and numerous applications in economics (bargaining, taxation, industrial organization), political sciences (voting, government stability, climate policy), philosophy (social norms), biology (evolution, cooperative/aggressive behavior), computer science...

Students are expected to have a background knowledge in mathematics (analysis, optimization, probability).

Course Outline

The course is organized around 12 main classes of 3 hours, 8 tutorials of 1.5 hours.

Part I: Decision theory

1. Preferences and choice
preference properties — continuity of preferences — existence of utility function — Utility maximization.
2. Demand Theory
Walrasian Demand — Hicksian Demand — compensated law of demand — Slutsky equation — Roy's identity
3. Choice under risk
preferences over lotteries — Von Neumann-Morgersten's theorem — Allais paradox — rank dependent utility model
4. Increasing risk: comparison and measures
risk aversion — measures of risk aversion — stochastic dominance

Part II: Game theory

1. Static games of complete information
strategic form — dominance — Nash equilibrium — mixed strategies — equilibrium existence — correlated equilibrium — equilibrium selection and refinements
2. Dynamic games of complete information
extensive form, subgame-perfection, backwards induction, repeated games
3. Static games of incomplete information
beliefs — Bayesian Nash equilibrium — common knowledge — global games
4. Dynamic games incomplete information
incomplete vs. imperfect information — perfect bayesian Nash equilibrium — signaling games

Core References

Gibbons, R. Game Theory for Applied Economists. Princeton: Princeton University Press, 1992.

Mas Colell, A., Whinston, M.D. & Green, J.R. Microeconomic Theory, Chapters 1 & 6, Oxford University Press, 1995.

Maschler, M., Solan, E. & Zamir, S. Game theory, Cambridge university press, 2013.

Osborne, M.J. & Rubinstein, A. A Course in Game Theory. Cambridge, Massachusetts: MIT Press, 1994.

Evaluation / Assessment

Grade are based on a midterm (1/3) and a final test (2/3).