

## Decision Theory for Economic Analysis and Policy Making

**Teachers:** Itzhak Gilboa, Brian Hill, Stefania Minardi

**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:** Economics

**Track:** Decision Theory

**Keywords:** Rationality, Risk, Uncertainty

### SYNOPSIS

The aim of this course is to present an overview of the main developments in decision theory up to today's research frontier with a focus on models that lie at the foundation of many economic applications.

### DETAILED DESCRIPTION

**Prerequisites:** There are no formal prerequisites. However, notions of microeconomics and calculus are recommended.

**Course overview:**

The course will cover the central notions, results and methods in decision theory, as well as selected relevant consequences for policy making and applications in economic analysis. Topics to be covered in class include classic results in utility theory, the theory of subjective probability, ambiguity-sensitive behavior, and incomplete preferences. As optional readings, additional topics include dynamic choices, learning, unawareness, social preferences, and menu-choice models.

**Pedagogical Objectives:**

This course intends to develop critical thinking about economic analysis. When you complete this course, you should be able to:

- Know about a variety of phenomena that make us doubt the validity of classical models;
- Consider economic phenomena whose analysis changes as a result of these phenomena;
- Develop a critical approach to economic modeling;
- Develop a critical approach to experiments and their relevance to economics.

**Course organization:**

In class, we will cover the following topics:

- Decision under certainty: utility maximization
- Choice Theory: Weak Axiom of Revealed Preferences and utility characterization
- Choice under risk: von Neumann and Morgenstern's Expected Utility

- Choice under uncertainty: Subjective Expected Utility (de Finetti, Savage, and Anscombe-Aumann models)
- Experimental violations of Subjective Expected Utility
- Generalizations: Ambiguity models (Choquet, Maxmin Expected Utility, Smooth Ambiguity, Variational Preferences)
- Generalizations: Incomplete preferences under uncertainty (Bewley model), Confidence
- Case-Based Decision Theory
- Role of Uncertainty: implications for policy making (E.g.: climate policies)
- Role of Uncertainty: implications for economic analysis (E.g.: trading)

Optional topics:

- Dynamic choices and updating/learning
- Aggregation / social preferences
- Models of unawareness
- Menu-choice models: demand for flexibility, role of temptation and desire for self-control
- Stochastic choice

## TEACHING MATERIALS

The following references should help providing a general overview of decision theory:

- I. Gilboa, Theory of Decision under Uncertainty, Cambridge, 2009
- I. Gilboa and M. Marinacci (2013), Ambiguity and the Bayesian Paradigm, Advances in Economics and Econometrics: Theory and Applications, Tenth World Congress of the Econometric Society. D. Acemoglu, M. Arellano, and E. Dekel (Eds.). New York: Cambridge University Press
- E. Dekel and B. Lipman (2010), How (not) to do decision theory, Annual Review of Economics, 2, 257-82
- F. Gul and W. Pesendorfer 2008, The case for mindless economics, in The Foundations of Positive and Normative Economics: A Handbook, A. Caplin and A. Schotter eds., Oxford

An optional reading list of research papers for topics covered in class as well as additional topics will be provided.

## TEACHING METHODS

Mini-experiments will be run and analyzed in class; class discussions on the background of the course presentation.

## WORK AND EVALUATION

### Assessment of achievement:

The final grade is based on class participation and a final exam.

| Tool/method of evaluation | Duration | Weight in the final grading |
|---------------------------|----------|-----------------------------|
| Class participation       |          | 40%                         |
| Final exam                | 2h       | 60%                         |

## BIOGRAPHY

**Brian Hill** is Research Director at the French National Centre for Scientific Research (CNRS) and CNRS Research Professor in the Economics and Decision Sciences at HEC Paris. After completing studies in mathematics, logic and philosophy, his research career has largely been related to economics, particularly in the field of decision theory. He has published in top economics and philosophy journals, including *American Economic Review*, *Econometrica*, *Journal of Economic Theory*, *Games and Economic Behavior*, *Economics and Philosophy*, *Mind*, *Philosophy of Science* and *Synthese*. He received the CNRS Bronze Medal for early-career researchers in 2014.

Much of his recent research has focused on what counts as a rational reaction to severe uncertainty or ambiguity, and attempts to marry theoretical insights and tools from economics and philosophy, with an eye on practical consequences for the handling of uncertainty in concrete decisions, such as those involving environmental policy. In economics, he has also worked on state-dependent utility, social choice in the presence of uncertainty, and the consequences of ambiguity for international asset structure; his research interests in philosophy have included conditionals, the dynamics of belief and preference, awareness and justification.

He is currently working on a project concerning income inequality.

**Itzhak Gilboa** studied Mathematics and Computer Science (BSc, 1982) and Economics (BA, 1982, MA, 1984, Ph.D., 1987) at Tel Aviv University, with the graduate studies under the supervision of David Schmeidler.

He works in decision theory and other fields in economic theory such as game theory and social choice. His main research areas are decision under uncertainty, focusing on the definition of probability, notions of rationality, non-Bayesian decision models, and related issues.

He has been teaching a variety of courses on microeconomics, decision theory, game theory, psychology and economics, and related fields, at the undergraduate, graduate, and MBA levels.

He is the author of several books such as *Analogies and Theories: Formal Models of Reasoning*, Oxford University Press, 2015; *Theory of Decision under Uncertainty*, Cambridge University Press, 2009; *Rational Choice*, MIT Press, 2010 and *Making Better Decisions*, Wiley-Blackwell, 2010.

His recent research papers are published in prestigious scientific journals such as *American Economic Review*, *Games and Economic Behavior*, *Annual Reviews in Economics*, *BE Journals in Theoretical Economics*, *Econometrica*, *Economics and Philosophy*, *Journal of Economic Theory*, *Journal of Economic Perspectives*, *Mathematical Social Sciences*, *Review of Economics and Statistics*, *The Journal of Econometrics*.

Itzhak Gilboa is also the holder of the AXA Chair in Decision Sciences

**Stefania Minardi** received a Ph.D. in Economics from New York University in 2012 and a Laurea degree in Economics from the University of Torino in 2006.

She works in economic theory and, in particular, decision theory. Her research interests include the study of decision making under uncertainty as well as issues related to other-regarding preferences and to temporal preferences.

## WAIVER POLICY

None