DECISION AND GAME THEORY

Syllabus

Lecturer: Annalisa Marini  
Course: LPS PPE 222-910

375 Claudia Cohen Hall Building  
Office Hours: TBA  
Decision and Game Theory  
Location: TBA

Description
The course studies the fundamental principles of decision-making and applies them to a variety of social activities. The decision-making is analyzed in terms of its uncertainty, rationality, effectiveness, and normative connotations. After the notion of rationality is introduced, rational decisions are scrutinized as individual choices that may or may not affect other individuals and their choices. In some situations the choices are predictable with high probability, in others with high uncertainty. The nature of situations influences the mode of rationality applied. In the game theoretical situations, for instance, the effective choice must reach an equilibrium, i.e. a mutual solution acceptable for all rational participants. The course revises the theory and provides applications to cases of cooperation, defection, resoluteness, etc. as well as complex cases in various fields. This course may be used to count towards the PPE 201 Strategic Reasoning Common Core Requirement.

Recommended Readings
The recommended readings for this course are:
Parmigiani, G. and Inoue, L.Y.T. (2009), Decision Theory: Principles and Approaches, Wiley;  
Fundenberg, D. and Tirole, J. (1991), Game Theory, MIT.

These books can be used as recommended readings to integrate the lectures notes. There is no single textbook I assign. During the course I will refer to some of these references depending on the topic.

Course Policies
• Academic integrity: any student found in violation of academic integrity will receive no credit for the assessment in question. It will enter as a ‘0’ in the gradebook.  
• Exam attendance: attendance is mandatory for all exams. A missed exam will enter a ‘0’ in the gradebook. Exceptions apply in accordance with PPE policies.
Attendance
Attendance will enter your mark through participation. Being physically present but totally disengaged will earn you no more credit than being physically absent.

Assessment and Marks
The mark for this course will be allocated as follows:
Final grade= 10% Participation, 30% Problem Sets, 30% Midterm exam, 30% Final exam.
- Participation: attendance, and contributions in class
- Problem Sets: problem sets will be posted on the course site and will be due at the start of the class on the posted date
- Midterm: there will be a 1.5 hours exam on June, 7
- Final: there will be a two hours exam on the last day of class on June, 28

Additional Notes
The syllabus is subject to changes and I may update it during the course.

Course Topics
The first part of the course is dedicated to decision theory and its applications.

Lecture 1: Introduction to Decision Theory and Motivation
In the first lecture of the course we will see how decision theory can be used and its philosophical concept. We will also provide motivating examples and explain the difference existing between decision theory and game theory.

Lecture 2: Decision under Certain Prospects
After the introduction, we will analyze how to take decisions under certain prospects. Examples and applications will be provided.

Lecture 3: Decision Rules and Uncertainty
We will see how to make decisions under uncertainty. Decisions rules and accompanying examples will be presented.

Lecture 4: Expected Utility Theories and Problems with Decision Theory for Uncertain Prospects
Explanation of expected utility theories and problems with decision theory are presented.

Lecture 5: Mid Term Exam
The second part of the course will be dedicated to game theory.
Lecture 6: Introduction to Game Theory

Definition of game theory, normal form, payoff, strategies, pure strategy Nash equilibrium.

Lecture 7: Mixed Strategy Nash Equilibria

Definitions and examples of mixed strategy and existence of equilibrium.

Lecture 8: Dynamic Games with Complete Information

Definitions, theory and examples of dynamic games of complete and perfect information and complete but imperfect information.

Lecture 9: Static Games with Incomplete Information

Definitions, theory and examples of static Bayesian games and Bayesian Nash equilibrium.

Lecture 10: Dynamic Games of Incomplete Information

Definitions, theory and examples of dynamic games with incomplete information.

Lecture 11: Final Exam