lpols1114

2024

Formalization for the social sciences

4.00 credits	30.0 h + 15.0 h	Q2

Teacher(s)	Masquelier Bruno ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	As a matter of illustration, here are possible topics: - conflict and cooperation - voting - measurement of power - social choice - fair division
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 This course is an introduction to mathematical modelization in social sciences at large (economics, political science, sociology, law). It is not a course in mathematics and the prerequisite do not go beyond the basic college mathematics. Its aim is to help students to develop an analytical capacity through a systematic and rigorous use of simple concepts of game and decision theory.
Evaluation methods	A written exam organized in the regular session, combining practical exercises and multiple-choice questions.
Teaching methods	The course is structured around lectures and practical work. Participation in sessions of practical work is required.
Content	At the end of this course, students will be able to • to understand the value of formalization for the social sciences and to recognize the main tools used in this field, • to build models of strategic situations and analyze them using cooperative and non-cooperative game theory, • to use computer simulation of social phenomena using a programming environment (NetLogo). Topics covered: • The notion of "model" in social sciences • Basic mathematical concepts useful for social sciences: sets, truth tables, relations, matrices, functions, permutations and combinations, etc. • Rational choice model in non-cooperative game theory: how to predict the outcome of a strategic situation involving several players? • Models of games with coalitional structure (Shapley value): how to distribute fairly the gains from a joint effort? • Matching models (Gale-Shapley algorithm): how to match requesters and givers? • Models of voting games and power indices: how to measure power? • Models of collective choice and voting procedures: how to decide collectively? • Social science simulations: why and how to simulate our social universe? • Models of transition between states (SIR model): how to predict the evolution of an epidemic? • Growth models: what are linear and exponential growths? • Statistical models: how to make simple predictions in statistics? The course consists of a series of lectures completed by exercises.
Bibliography	• Bonacich, P. and Lu, P., *Introduction to Mathematical Sociology*, 2012, Princeton University Press • Dehez, P. Théorie des jeux, 2017, Economica • Gura E. and M. Maschler. *Insights into Game Theory: An Alternative Mathematical Experience*. Cambridge University Press, 2008. • Lave L. and J.G. March. *An introduction to models in the social sciences*. University Press of America, 1993.
Other infos	Prerequisite: None Rating: written examination. Support: lecture notes
Faculty or entity in charge	ESPO

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Minor in Human and Social Sciences	MINHUSO	4		🔍
Bachelor in Human and Social Sciences	HUSO1BA	4		🔍
Bachelor in Philosophy, Politics and Economics	PPE1BA	5		🔍
Bachelor in Sociology and Anthropology	SOCA1BA	4		🔍
Bachelor in Political Sciences: General	SPOL1BA	4		🔍