





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	<p>At the end of this learning unit, the student is able to :</p> <p>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.</p>
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	<p>At the end of this course, students will be able to</p> <ul style="list-style-type: none"> • 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). <p>Topics covered:</p> <ul style="list-style-type: none"> • 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? <p>The course consists of a series of lectures completed by exercises.</p>
Bibliography	<ul style="list-style-type: none"> • Bonacich, P. and Lu, P., <i>Introduction to Mathematical Sociology</i>, 2012, Princeton University Press • Dehez, P. <i>Théorie des jeux</i>, 2017, Economica • Gura E. and M. Maschler. <i>Insights into Game Theory: An Alternative Mathematical Experience</i>. Cambridge University Press, 2008. • Lave L. and J.G. March. <i>An introduction to models in the social sciences</i>. 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		