

updated September 2015

Doctoral Program in Complexity Sciences 2015-1016

Advanced Topics in Complexity Sciences II

Goal

Students will develop competencies regarding the study of complex systems and the modelling techniques proposed by human and social sciences, namely economics, sociology, anthropology, and psychology. This discipline proposes discussing the state of the art in these domains, regarding the study of complexity observed in social and human systems.

Program

1. Economics: John Reed; Brian Arthur; Hayek; methodological individualism, reductionism; economics based on computational artificial agents.
2. Sociology: Norbert Elias. Social structures vs. levels of analysis. Raimond Boudon.
3. Anthropology: cultural diversity, ethnocentrism; primitive societies, evolution; actual societies, functionalism.
4. Psychology: Bibb Latané, Social Impact Theory. James Davies. Social decision schemas. Piaget: genetic psychology. Keith Sawyer: individualism vs. holism. Max Weber. Holism: Durkheim, social facts. Vigotsky. Functionalism. Socio-culturalism. Fodor and Davidson.

5. Social Networks: six degrees of separation (Erdos); random graphs; small world effect; Watts and Strogatz; scale-free; hub effect; Matheus effect.
6. Agent-Based Modeling (ABM): ABM (sometimes ABMS), a way to simulate a large number of choices by individual actors, to anticipate the likely effects of their decisions (the future) and to understand data and generate information. The theory and practice of ABM is reviewed, and the toolkits are discussed.
7. Data Processing.

Assessment

Continuous Assessment:

- Exercises (90%) - Exercises regarding the subjects presented in class.
- Participation in class (10%).