



Department/Area of Study:	Economics
Discipline:	Introduction to Agent Based Modeling (EA028)
Number of credits:	2
Academic hours:	30 h/a
Prerequisites:	Microeconomics I.

1 Overview

This course introduces to the student the methods of modeling and estimation of models based on agents. The material is closely related to computational sciences and it is developed through software applications in NetLogo.

2 Objectives

By the end of the course students will be able to:

1. Describe and share ABMs.
2. Model real situations by using ABMs.
3. Implement models in NetLogo.
4. Apply these methods in economics and other sciences.

3 Contents

1. Agent Based Models Basics (**ABMs 1**): Basics of NetLogo; ODD protocol; Implementing ABMs; Science and ABMs.
2. The Design of ABMs (**ABMs 2**): Emergence; Observation; Sensing; Adaptive Behavior; Prediction; Interaction; Scheduling; Stochasticity; Collectives.
3. Pattern Oriented Modeling (**POM**): Patterns; Theory Development; Parametrization; Calibration.
4. Model Analysis(**MA**): Sensitivity; Uncertainty; Robustness Analysis.
5. ABMs in Economics and Computer Science (**AppABMs**): MAS; Game Theory; Learning; Mechanism Design; Selected Applications to Economics.

4 Texts

The course follows [5] as textbook. However some topics could be clearly extended by reading the complementary material (see below).



Chap.	Principal	Complementary
ABM 1	[5, chap. 1-6]	[8]
ABM 2	[5, chap. 7-16]	[1]
POM	[5, chap. 17-20]	
MA	[5, chap. 21-24]	[3]
AppABMs	[7], [2]	[6], [4]

Table 1: List of readings

5 Contact Information

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References

- [1] Steven Orla Kimbrough. *Agents, Games, and Evolution: Strategies at Work and Play*. Chapman and Hall/CRC, 2011.
- [2] Nigel Gilbert Lynne Hamill. *Agent-Based Modelling in Economics*. John Wiley & Sons Inc, 2016.
- [3] Melanie Mitchell. *Complexity*. Oxford University Press Inc, 2011.
- [4] Noam Nisan, Tim Roughgarden, Eva Tardos, and Vijay V. Vazirani, editors. *Algorithmic Game Theory*. Cambridge University Pr., 2007.
- [5] Steven Railsback and Volker Grimm. *Agent-Based and Individual-Based Modeling*. Wiley, 2011.
- [6] Yoav Shoham and Kevin Leyton-Brown. *Multiagent Systems*. Cambridge University Press, 2008.
- [7] José M Vidal. *Fundamentals of multiagent systems*, 2006.
- [8] Uri Wilensky. *Introduction to Agent-Based Modeling*. MIT University Press Group Ltd, 2015.