Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	**Network Thinking and Agent-based modeling**
Course code	25556
Scientific sector	ND
Degree	Master in Entrepreneurship and Innovation
Semester and academic year	1st semester, a.y. 2025-26
Year	1st study year
Credits	2
Modular	No

Total lecturing hours	15
Total lab hours	Not foreseen
Total exercise hours	Not foreseen
Attendance	Mandatory 75%
Prerequisites	Not foreseen
Course page	Course offering - Enrolled from 2025

Specific educational objectives	Network thinking and agent-based modeling (ABM) are conceptually related to the Growth mindset course, where students have been introduced to algorithmic thinking and design thinking as ways to conceptualize complexity in the phenomena they observe. The main objective is to approach different phenomena with a complexity lens and understand how current behaviors and patterns emerge. In this regard, network thinking and agent-based modeling provide a third logic to tackle the complexity of adaptive systems, in the context of business (e.g. innovation and entrepreneurship). The lecturer will introduce the students to ABM thinking and to the NetLogo as a simulation environment to describe and analyze open innovation phenomena.

Lecturer	Roberto Gabriele
Scientific sector of the lecturer	Applied Economics ECON-04/A (former SECS-P/06)
Teaching language	English
Office hours	please refer to the lecturer's web page
Lecturing assistant	Not foreseen
Teaching assistant	Not foreseen
Office hours	6
List of topics covered	• Introduction to systems and complexity • Introduction to agent-based modeling • Introduction to Netlogo • Proposal of some models dealing with complexity

Teaching format	hybrid lectures: frontal teaching combined with lab sessions.

Learning outcomes	This course will provide knowledge and understanding of complex adaptive systems and their properties, and how patterns are emerging in systems. In the context of innovation and entrepreneurship, emerging patterns are related to innovation. During this course, students will be given a framework with which they can assess innovation phenomena as well as how to apply a complex adaptive system perspective. Students will be introduced to agent-based modeling via the NetLogo program, which is a widely used, arguably, easy software with which they can further simulate and explore complex adaptive systems.

Assessment	Written exam with three "open answers questions" about the topics covered during the course
Assessment language	English
Evaluation criteria and criteria for awarding marks	Written final Exam **Assessment criteria**: The written exam will consist of three open answer questions and aims at checking the knowledge of the topic and of the models covered in the course. Clarity of the exposition is also evaluated.

Required readings	• *Wilensky, U., Rand W. (2015). An Introduction to Agent-Based Modeling: Modeling Natural, Social, and Engineered Complex Systems with Netlogo. The MIT Press.* • *Holland, J.H., 2014. Complexity: A very short introduction. Oxford.* • *Mitchell, M., 2009. Complexity: A guided tour. Oxford university press.*
Supplementary readings	• *Arthur, W.B., 2021. Foundations of complexity economics. Nature Reviews Physics, 3(2), pp.136-145.* • *Newman, M., 2018. Networks. Oxford university press.* • *Garcia, R., 2005. Uses of agent-based modeling in innovation/new product development research. Journal of Product Innovation Management, 22(5), pp.380-398.*

	• *Arthur, W.B., 1999. Complexity and the economy. science, 284(5411), pp.107-109.* • *Rogers, E.M., 2010. Diffusion of innovations. Simon and Schuster.* • *Schelling, T.C., 1969. Models of segregation. The American Economic Review, 59(2), pp.488-493.* • *Schelling, T. C. "Dynamic models of segregation." Journal of mathematical sociology 1, no. 2 (1971): 143-186.*