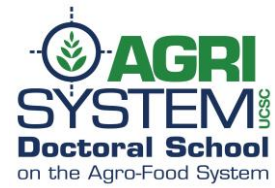




UNIVERSITÀ
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THEORY, FORMULATION, AND PRATICAL EXAMPLES OF SYSTEM THINKING APPLIED IN MODELING OF COMPLEX BIOLOGICAL AND ENVIRONMENTAL SYSTEMS

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Course Aims

The object of the course will be to introduce the students to system dynamics modelling for the analysis of policy and strategy, with a focus on biological science and policy applications.

Methodology

The basic concepts of modelling and System Dynamic will be presented for the students, both theoretically and practically, by using the Vensim simulation software for improving the performance of real systems.

Course Description

Skills in formal and computer (numerical) bases of system dynamics (SD) modeling will be provided in order to construct SD models, representing simple but also powerful tools for the interpretation of complex dynamical systems and its application regards all fields of biological and environmental sciences. In a first part of the course, the general theory of SD approach and essential components of the SD structure (stocks, flows, auxiliary variables, feed-back loops and time delays) will be presented and used to build and simulate simple SD models. Then, other skills of SD modeling techniques will be presented and applied by using Vensim software. They are: special functions (eg: step, ramp, what if else, ...), superscripts, optimization and calibration tools.

Recommended Texts

Business Dynamics: Systems Thinking and Modeling for a Complex World by John D. Sterman (Irwin McGraw Hill, Boston: 2000).
System Dynamics Modeling with R (Jim Duggan, Springer, 2016)