RUHR UNIVERSITÄT BOCHUM RUB

ECOLOGICAL ECONOMICS

COURSE OUTLINE WINTER SEMESTER 2025/26

Prof. Dr. Michael Roos / Dr. David Piorunek

CONTENT

Ecological economics is concerned with socio-ecological systems. In other words, it analyzes the relationship of the economy to other social and natural systems from a systems perspective. Economic activity is always embedded in a larger context. Production requires resources and energy that are taken from nature and produces waste that ends up in the natural environment. In addition, the economy is influenced by values, opinions and beliefs that shape economic policies and institutions.

From the perspective of ecological economics, sustainability can only be discussed with a systemic view. Therefore, systems thinking is a critical skill that will be trained in this module. Students learn what system thinking means and how system dynamics can be used to analyze systems with the help of computer simulations. They receive a systematic introduction into system dynamics and the software Vensim.

LEARNING OUTCOMES

After successful completion of this module, students can

- distinguish ecological economics from environmental economics;
- explain basic concepts of sustainability and ecological economics;
- explain what a system is;
- apply systems thinking to sustainability policy;
- work with system dynamics models in the software Vensim (creating causal loop diagrams and stock-flow diagrams, use and analyze existing models).

PREREQUISITES

"Principles of Macroeconomics (Grundlagen der Makroökonomik)" in the Bsc program must have been passed with grade 3,3 or better.

Students will need English skills to read the materials. We expect the willingness to deal with computational models and to work with models in a hands-on fashion.

ORGANIZATION

This module consists of lectures and tutorials. The accompanying Moodle **course** is called "Ecological Economics (073101-WS2025/26). The Moodle password is SD_Macro_25.

Participants: 30 participants

If there are more than 30 participants in the first lecture, you must write short motivation letter of about one page to explain why you want to take this module. The selection of participants will be based on the quality of this motivation letter.

Lectures/tutorials: The lectures introduce students to the topics of the module and provide important basic knowledge.

In the tutorial sessions, students apply the knowledge acquired in the lectures. You are expected to **bring your own laptops** and pre-install the software VENSIM PLE to make this feasible. By hands-on work in the tutorials, you learn how to work with system dynamics models and how to build them.

For educational purposes, Vensim is free and can be downloaded here:
https://vensim.com/free-downloads/

Both the lectures and the tutorials are relevant for passing the exam!

Assessment: The **final exam** will take place on 9th February 2026, 14 – 16h. More information about the exam will be provided in the Moodle course.

In order to qualify for the final exam, you will need to submit and pass three **ungraded homework assignments** (Studienleistungen). The topics of the final exam will mirror those of the homework assignments very closely.

Time and place: Lecture: Friday, 12:15 to 13:45 (GD 03/230)
Lecture: Friday, 12:15 to 13:45 (GD 04/620) 14.11, 28.11., 16.1.26

Tutorial: Thursday 8:30 to 10:00 (GD 03/230)

Start: First session: **October, 17th 2025, 12:15 – 13:45**

Resit exam: date and further details will be announced in due time.

Exam Registration: 8th December 2025 – 2nd January 2026
Exam De-Registration: 8th December 2025 – 2nd February 2026

The only binding registration for the exam can be made via **FlexNow in the registration period.**
If you miss registering, you will not be allowed to take the exam!

SELF-STUDY

This module contains 120 hours of self-study and applied homework. Without this amount of time spent on self-study, it is unlikely that you will pass the exam.

COURSE TEXTBOOK

Relevant material will be provided on Moodle.

SCHEDULE

The following course schedule is preliminary. Any change will be announced on Moodle in due course.

Week	Date	Type	Lecturer	Topic
1	16.10.25			No Meeting
	17.10.25	Lecture (L)	MR	Ecological Economics
2	23.10.25			No Meeting
	24.10.25	L	MR	Anthropocene and Planetary Boundaries
3	30.10.25	Tutorial (T)	DP	Vensim & Causal Loop Diagrams
	31.10.25	L	MR	Systems
4	06.11.25	T	DP	Stock-Flow Diagrams
	07.11.25	L	MR	Earth-World systems
5	13.11.25	T	DP	Solow model in Vensim
	14.11.25	L	MR	Environmental Solow model
6	20.11.25	T	DP	Environmental Solow model (Vensim)
	21.11.25	L	MR	Climate model
7	27.11.25	T	DP	Climate model (Vensim)
	28.11.25	L	MR	Biosphere
8	04.12.25	T	DP	Biosphere (Vensim)
	05.12.25	L	MR	Interaction Climate-Biosphere
9	11.12.25	T	DP	Interaction Climate-Biosphere (Vensim)
	12.12.25	L	MR	Social peace and cohesion
10	18.12.25	T	DP	Social peace and cohesion (Vensim)
	19.12.25	L	MR	North-South model
11	08.01.26			No Meeting

	09.01.26			No Meeting
12	15.01.26	T	DP	North-South model and migration
	16.01.26	L	MR	North-South model
13	22.01.26	T	DP	North-South model and conflict
	23.01.26	L	MR	Governance, institutions and values
14	29.01.26	T	DP	Governance, institutions and values
	30.01.26	L	MR	Leverage points of change
15	5.02.26	T	DP	Buffer
	6.02.26	L	DP	Buffer