RUHR UNIVERSITÄT BOCHUM

ECOLOGICAL ECONOMICS

COURSE OUTLINE WINTER SEMESTER 2023/24

Prof. Dr. Michael Roos / Ndjiba Antonio / Elias Schmitt

Please note: all materials (readings, lecture slides etc.) will be in English, but the language of instruction in the lecture and the tutorial is **German**. It is possible to take the module and to pass the exam both in English and in German.

CONTENT

In this module, you learn how the economy interacts with natural and other social systems. The economy needs energy and materials from outside and produces wastes and pollution that damage natural systems. The economy is also embedded in society, because economic behavior is influenced by culture, institutions, and politics. Ecological economics argues that we cannot understand the economy without looking at its connection with other systems.

The module has four parts. First, basic concepts of ecological economics (e.g. anthropocene, planetary boundaries, urban metabolism …) are explained. Second, you learn about systems thinking and system dynamics modeling. This will be the main content of the tutorial sessions. You will learn to use the system dynamics software Vensim. Third, a number of example models that show how socio-ecological systems can be analyzed are explained. These models deal with forests, water management, climate change and other topics. Finally, systems thinking is applied to issues of environmental and climate policy.

LEARNING OUTCOMES

After successful completion of this module, students can

- explain the difference between ecological economics and environmental economics;
- explain the concepts of planetary boundaries and anthropocene;
- explain what socio-ecological systems are and provide examples;
- explain why it is important to think in systems and apply systems thinking to socio-ecological issues;
- analyze sustainability problems with system dynamics models;
- implement system dynamics models in Vensim and analyze them
- evaluate economic and environmental policy using systems thinking;
- identify and evaluate normative assumptions behind policy proposals and model analyses.

PREREQUISITES

Familiarity with the models taught in “Principles of Macroeconomics (Grundlagen der Makroökonomik)” in the Bsc program is necessary.

Students will need English skills to read the materials. The language of instruction in the lectures and tutorials will be **German**. 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-WS2023/24). The Moodle password is EcolEcon_23.

Participants: 30 participants

If there are more than 30 participants in the first lecture, you must write a 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 5th February 2024. 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 five **ungraded homework assignments** (Studienleistungen). The topics of the final exam will mirror those of the homework assignments very closely.

Time and place: Lecture: Monday, 14:15 to 15:45 (HGB 50)
Tutorial: Tuesday 12:15 to 13:45 (IA 02/480)

Start: First session: **October, 16th 2023, 14:15 – 15:45**
Second session: **October, 17st 2023, 12:15 – 13:45**

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

Exam Registration: 11th December 2023 - 5th January 2024
Exam De-Registration: 11th December 2023 - 29th January 2024

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	16.10.23	Lecture (L)	MR	Ecology and Ecological Economics
	17.10.23	L	MR	Systems and system thinking
2	23.10.23	L	MR	Earth-World models
	24.10.23	L	MR	Systems thinking
3	30.10.23	L	MR	Growth and metabolism
	31.10.23	Tutorial (T)	Elias Schmitt & Ndjiba Antonio	Vensim and CLD
4	06.11.23	L	MR	Planetary boundaries and anthropocene
	07.11.23	T	Elias Schmitt	System Archetypes
5	13.11.23	L	MR	Modeling and Daisyworld

	14.11.23	T	Elias Schmitt	System archetypes
6	20.11.23	V	MR	Forest models
	21.11.23	T	Ndjiba Antonio	Stock-Flow models
7	27.11.23	L	MR	Common pool resources
	28.11.23	T	Ndjiba Antonio	Stock-Flow models of archetypes
8	04.12.23	L	MR	Water management
	05.12.23	T	Elias Schmitt	Simple Vensim models of archetypes
9	11.12.23	L	MR	Climate and carbon cycle
	12.12.23	T	Ndjiba Antonio	Application of common pool model
10	18.12.23	L	MR	World3 model
	19.12.23	T	Ndjiba Antonio	Extension of CPM
11	08.01.24	L	MR	Policy fails and climate policy
	09.01.24	T	Elias Schmitt	Implementation of an ecosystem model
12	15.01.24	L	MR	Applying system thinking to policy
	16.01.24	T	Elias Schmitt	Application of the model
13	22.01.24	L	MR	Socio-ecological transformation
	23.01.24	T	Elias Schmitt	Extension of the model
14	29.01.24	L	MR	Ethics and normative considersations
	30.01.24	T	Elias Schmitt / Ndjiba Antonio	Buffer and questions