

Biophysical Resources and Socio-economic Systems

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Course Description: This upper-level undergraduate course deals with the relationships between human society and natural ecosystems as they relate to the sustainability of both. Relevant scientific, socio-economic, and ethical issues will be addressed in connection to current events such as global climate change, energy, conservation, agriculture, and cities. Format is a combination of lectures, discussions, and in class exercises, culminating in student presentations.

Course Goals:

1. To provide students with a basic understanding of the environment as a system including the biological, physical, chemical, social, and economic foundations of environmental science.
2. To provide pertinent information about ecosystem functioning and services and how they interact with human society.
3. To explore the concept of sustainability and how it relates to the students' everyday life.

Learning Outcomes: Students will be able to:

1. Gather and analyze evidence from a variety of sources pertinent to the issue under study, including materials that might support opposing points of view.
2. Articulate an understanding of the ethical dimensions of significant issues or dilemmas under study.
3. Construct and assess possible solutions to problems or dilemmas within an informed ethical and societal context.
4. Communicate arguments and conclusions effectively and clearly.

Specifically, those will be attained by having students:

1. Define the concept of sustainability and how it relates to their everyday life
2. Identify ecosystem services and the contributions they make to and human society
3. Gather and analyze evidence from a variety of sources pertinent to sustainability
4. Articulate an understanding of the global dimensions of sustainability
5. Compose an argument in defense of an environmental position
6. Write a scientific essay on a current issue regarding Human Ecology and Sustainability
7. Create and present a PowerPoint seminar on a current issue regarding Sustainability
8. Demonstrate critical thinking and scientific literacy through effective oral and written communication

Grading Policy: Course grade will be based on the combined total from paper, exercises, presentation, attendance, discussion, and exam. The final exam will be comprehensive, covering all class activities, discussions, lectures, and readings.

Grade evaluation (points available):

Presentation (50), Participation (50), Reflections (50), Paper (100), Final Exam (150) = Total (400)

Course Outline: Arranged in 10- 90 minutes blocks; specific readings (in bold) from *Encyclopedia of Ecology*, 2nd Edition, 2019, Fath (eds), Elsevier. Students are expected to work on a case study of an environmental topic of interest to them that applies the socio-ecological systems approaches.

Thursday 26. 9., 10:00–11:40, room nr. P31

Lecture 1: Systems thinking, system diagrams, systems analysis

Ecological Systems Thinking: Orr, Niccolucci, Bastianoni

Thursday 10. 10. 10:00–11:40, room nr. P31

Lecture 2: Ecosystems, Succession, Dynamics, Complex systems cycle (Holling)

Ecosystems: Fath

Succession: Pandolfi

Thursday 17. 10. 12:00–13:40, room nr. P52

Lecture 3: Human population

Human Population Growth: Goujon

Thursday 24. 10. 12:00–13:40, room nr. P52

Lecture 4: Agriculture

Agriculture Systems: Andr n

Organic Farming: Nielsen

Thursday 31. 10. 10:00–11:40, room nr. P31

Lecture 5: Energy basis for socio-ecological development: from solar to fossil fuels back to solar

Water-Energy-Food-Ecosystems Nexus: Bidoglio, Vanham, Bouraoui, Barchiesi

Thursday 7. 11. 10:00–11:40, room nr. P31

Lecture 6: Global Climate Change

Greenhouse Gases Formation and Emission: Barbera, Vymazal, Maucieri

Thursday 14. 11. 10:00–11:40, room nr. P31

Lecture 7: Ecological Economics and Ecosystem Services

Ecological Economics 1: Costanza

Ecological Economics 2: Costanza

Thursday 21. 11. 10:00–11:40, room nr. P31

Lecture 8: Urban systems

Urban Systems: Elmqvist, Alfsen, Colding

Tuesday 26.11., 10.00 - 11.40, room nr. U35

Lecture 9: Sustainability and Sustainable Development Goals

System Sustainability: Pulselli

The Sustainable Development Goals: Gigliotti, Schmidt-Traub, Bastianoni

Thursday 28. 11. 10:00–11:40, room nr. P31,

Lecture 10: Student presentations, summary and future research directions

Each student shall prepare a 5 minute presentation that explains the main findings of her/his research paper. You should make a point to relate the findings to the main concepts we have discussed in the course and how this (hopefully) new understanding of environmental systems gives you greater insight into the topic. No more than 5 PowerPoint slides should be used.

Thursday 5. 12

No Class

Thursday 12. 12. 10:00–11:40, room nr. P31.
Final Exam