DETAILED SYLLABUS

1. Information about the study program

1.1 University	Babeș-Bolyai University
1.2 Faculty	Faculty of Environmental Science and Engineering
1.3 Department	Environmental analysis and engineering
1.4 Field of study	Environmental engineering
1.5 Program level (bachelor or master)	Master (2 years)
1.6 Study program / Qualification	Sustainable development and environmental management

2. Information about the subject

2.1 Subject title				Assessment of Ecosystem Services			
2.2 Course activities professor				HARTEL Rudolf Tiberiu			
2.3 Seminar activities professor				HARTEL Rudolf Tiberiu			
2.4 Year of study	2	2.5 Semester	4	2.6 Type of assessment	E	2.7 Subject regime	Compulsory

3. Total estimated time (teaching hours per semester)

3.1 Number of hours per week	4	out of which: 3.2 course	2	3.3 seminar/laboratory	2
3.4 Total number of hours in the curriculum	56	out of which: 3.5 course	28	3.6 seminar/laboratory	28
Time distribution					Hours
Study based on textbook, course support, references and notes					60
Additional documentation in the library, through specialized databases and field activities					10
Preparing seminars/laboratories, essays, portfolios and reports					25
Tutoring					15
Assessment (examinations)					10
Others activities field trips					20
3.7 Total hours for individual study	140				
3.8 Total hours per semester	196				
3.9 Number of credits	7				

4. Preconditions (if necessary)

4.1 Curriculum	Not applicable

4.2 Skills	Not applicable

5. Conditions (if necessary)

5.1. For course development	Logistic support (digital video-projector)
5.2. For seminar / laboratory development	Logistic support: multimedia projector Compulsory attendance of students at minim 80% of the seminars

6. Acquired specific competences

Professional competences	• Knowledge and understanding of general principles of functioning of social-ecological systems; • Knowledge on recent conceptual developments on the role of values in human-nature interactions and their possibilities for sustainable development; • Knowledge on the main economic directions (neoclassical-, environmental-, ecological economics) and the role and place of ecosystem services within these; • The ability to develop strategic and research projects to address the ecosystem service supply and management in human modified landscapes; • Ecosystem services and policy.
Transversal competences	• Developing capacities to integrate information received from other areas such as: Ethnography, Sociology, Anthropology, History, Economics, Biogeography, Ecology, Biodiversity Conservation, with ecological data; • Using theoretical notions in solving practical problems of biodiversity conservation and governance of social-ecological systems.

7. Subject objectives (arising from the acquired specific competences)

7.1 Subject's general objective	Knowledge and understanding of social-ecological systems, their ecosystem service supply and the role of ecosystem services in sustainable development.
7.2 Specific objectives	• Conceptualization of social-ecological systems; • Conceptualisation of the human modified landscape as social-ecological system interface. • Understanding ecosystem services and different value domains and their importance in the dynamics of social-ecological systems; • Understanding the role of ecosystem services in the resilience and transformability of human modified landscapes; • Understanding the types of governance and their relevance for the biodiversity, ecosystem service supply and the access to ecosystem services; • Understanding the importance of scenarios for the governance of human modifie landscapes; • The concept of biocultural refugia and its applicability in the understanding of cultural landscapes in Romania, Europe and other parts of the world; • Understanding archetypes and typologies of human dominated landscapes in Europe; • Conflicts around ecosystem services in human dominated landscapes.

8. Contents

8.1 Course	Teaching methods	Observations

1. Social-ecological systems – introduction to systemic thinking, the importance of mental models on the way in which complex systems are conceptualized, the comparison between the social system and the ecosystems and the challenges that arise from differences for the sustainable harmonization of these systems.	Lecture, dialogue, interrogation	
2. Human modified landscapes - evolution, definitions, history, conceptualizations.	Lecture, dialogue, interrogation	
3. Resilience and transformation of social-ecological systems - the concept of resilience, panarchy, ecological, biological and cultural memory, social-ecological traps, the de-coupling and re-integration of social-ecological systems, the challenges induced by globalization.	Lecture, dialogue, interrogation	
4. Value domains that link human society to ecosystems (human-nature ties): cognitive values, experience values, spiritual values, material values, emotional values. Three domains of values: instrumental values (ecosystem services), intrinsic values, relational values.	Lecture, dialogue, interrogation	
5. Capital forms used for co-producing ecosystem services and disservices: human, social, financial, manufactured and natural capitals. How they interact for ecosystem service coproduction, what kind of development path dependencies they imply and what vulnerabilities they impose for the resilience of the social-ecological systems.		
6. Integration of ecosystem service co-production and biodiversity conservation in human modified landscapes. The concepts of „land-sparing", „land-sharing", „high natural and cultural value landscapes", sustainable intensification. Applying these concepts in agricultural, urban and wild landscapes.	Lecture, dialogue, interrogation	
7. Strategies and policies for governing ecosystem service coproduction - the importance of pluralistic leadership, the holistic vision, the importance of contextualization, resource management based on community involvement, social capital	Lecture, dialogue, interrogation	
8. Scenarios for ecosystem service supply in human modified landscapes - the importance of scenarios, scenarios based on statistical models, participatory scenarios, the importance of pro-active attitudes	Lecture, dialogue, interrogation	
9. The concept of bio-cultural refugia and the applicability of this concept to the sustainability of human modified landscapes - comparisons between glacial refuges and bio-cultural refugia, the contribution of bio-cultural refugia to the social-ecological resilience of human dominated landscapes in Europe and the world.	Lecture, dialogue, interrogation	
10. Social-ecological archetypes of human modified landscapes with examples from Europe and around the world - introduction into archetypes, their importance, characterization of archetypes according to their ecosystem service delivery, governance, capitals etc.	Lecture, dialogue, interrogation	
11. International conventions and legislation relevant to ecosystem services - Critical approach.	Lecture, dialogue, interrogation	
12. The importance of disciplinary, inter-disciplinary and trans-disciplinary research for the holistic understanding of human dominates landscapes. The importance of cross-sector perspectives for the sustainable governance of ecosystem services.	Lecture, dialogue, interrogation	
13. The role of universities and the academic sphere in determining and guiding the transformation of values at social level, for sustainability.	Lecture, dialogue, interrogation	
14. Species and habitats of European interest requiring extensive, multifunctional management.	Lecture, dialogue, interrogation	

References:

1. **Berkes, F., Colding, J., Folke, C.** 2008. Navigating Social-Ecological Systems: Building Resilience for Complexity and Change. Cambridge University Press.
2. **Chan, K. M. A., Balvanera, P., Benessaiah, K., Chapman, M., Díaz, S. 2016.** Why protect nature ? Rethinking values and the environment. *Proceedings of the National Academy of Sciences* 113: 1462–1465.
3. **Hartel, T., Plieninger, T. 2014.** European wood-pastures in transition: a social-ecological approach. Earthscan/Routledge.
4. **Ives, C.D., Giusti, M., Fischer, J., et al. 2017.** Human–nature connection: a multidisciplinary review. *Current Opinion in Environmental Sustainability* 26–27: 106–113.
5. **Piccolo, J. J. 2017.** Intrinsic values in nature: Objective good or simply half of an unhelpful dichotomy? *Journal for Nature Conservation* 37: 8–11.
6. **Plieninger, T., Bieling, C. 2012.** Resilience and the cultural landscape. Cambridge University press.
7. **Plieninger, T., Bieling, C. 2017.** The Science and Practice of Landscape Stewardship. Cambridge University press.
8. **Loos, J., Abson, D., Dorresteijn, I., Hanspach, J., Hartel, T., Horcea-Milcu, A.I., Mikulcak, F., Fischer, J.** 2017. Sustainable Landscapes in Central Romania: A social-ecological study on the future of Southern Transylvania. Pensoft.

8.2 Seminar/laboratory	Teaching methods	Observations
1. Building complex virtual systems based on a large number of elements.	Group exercises. Debating the results.	
2. Presentation of the history of a selected landscape by each student, depending on the student's origin / experience.	Individual and group exercises	
3. Carrying out social trap experiments and finding solutions to escape from the trap.	Individual and group exercises	
4. Estimate ecosystem services and disservices for a virtual landscape and develop a strategy to maximize diversity in the supply of ecosystem services. Synergies and compromises.	Individual and group exercises	
5. Exercises for food production strategies and biodiversity conservation along an urban-rural gradient. The importance of the social context.	Individual and group exercises	
6. Case study: Developing a coexistence strategy between humans and large carnivores at landscape level, in human modified landscapes. Students are divided into „interest groups" and play specifically indicated roles. What kind of ecosystem services and disservices can be associated to large carnivores?	Individual and group exercises	
7-8-9. Developing a scenario for the ecosystem delivery of three distinct human dominated landscapes. These landscapes are chosen by the groups that are formed. It encourages the selection of landscapes from distinct regions of Europe and the world.	Individual and group exercises	
10. Developing social-ecological archetypes and ecosystem service supply for human modified landscapes addressed in the exercises 7-8-9.	Individual and group exercises	
11. Developing institutional governance networks for the landscapes addressed in exercises 7-8-9-10.	Individual and group exercises	
12. Development of virtual trans-disciplinary research projects for the landscapes addressed in points 7-10.	Individual and group exercises	
13. Developing sustainable model development strategies for universities where students come from - how can the university become the avant-garde of social value change?	Individual and group exercises	
13. Field trip to Fănațele Clujului	Field trip	

References

Hartel, T., Reti, K.O., Craioveanu, C. (2017): Valuing scattered trees from wood-pastures by farmers in a traditional rural region of Eastern Europe. *Agriculture, Ecosystems & Environment* 236: 304-311.

Plieninger, T., C. Bieling, N. Fagerholm, A. Byg, Hartel, T., P. Hurley, C. A. López-Santiago, N. Nagabhatla, E. Oteros-Rozas, Ch. M Raymond, D. van der Horst, Lynn Huntsinger. (2015): The role of cultural ecosystem services in landscape management and planning. *Current Opinion in Environmental Sustainability* 14: 28-33.

Sutcliffe, L., Batary, P., et al (2015): Harnessing the biodiversity value of Central and Eastern European farmland. *Diversity and Distributions* 21: 722-730.

Hartel, T., Fischer, J., Câmpeanu, C., Milcu, A., Hanspach, J., Fazey, I. (2014): Importance of ecosystem services for rural inhabitants in a changing social-ecological system. *Ecology and Society*. http://dx.doi.org/10.5751/ES-06333-190242.

9. Corroboration / validation of the subject's content in relation to the expectations coming from representatives of the epistemic community, of the professional associations and of the representative employers in the program's field.

- The course has an updated, similar content to those given in other Romanian and European universities and is adapted to the different skill levels of the students
- The content of the course takes into account the training needs of students as future pre-university teachers as well as those involved in nature conservation and the development of strategies for cultural landscapes.

10. Assessment (examination)

Type of activity	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Knowledge of the information content	Writing exam	80%
	Ability to use the acquired knowledge in a new context		
10.5 Seminar/laboratory	Skills to identify vertebrate animal species	Attendance and feed-back provided at seminars	20%
10.6 Minimum performance standard			
• Knowledge of at least 50% of the information that pertains to the course • Acquiring the skills (in proportion of at least 50%) practised during seminars			

Date of filling

23.04.2018

Signature of the course professor

Signature of the seminar professor

Date of approval by the department

Head of department's signature