COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
ACADEMIC UNIT	BIOLOGY		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BIO_XAO**	**SEMESTER**	**7**
COURSE TITLE	MAPPING AND ASSESSMENT OF ECOSYSTEMS AND THEIR SERVICES		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, seminars, and Multimedia displays	3	6
Laboratory work & exercises	2	

COURSE TYPE	Field of Science Skills development
PREREQUISITE COURSES	Typically, there are not prerequisite course. A good knowledge on the field of ecology is recommended.
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek. Teaching may however be performed in English in case foreign Erasmus students attend the course.
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.upatras.gr/courses/BIO373/

2. LEARNING OUTCOMES

Learning outcomes

By the end of this course the students will be able to:

1. Understand the patterns of and identify the spatial distribution of the various ecosystem types
2. Apply methods of qualitative, quantitative, temporal and spatial assessment of ecosystems' condition
3. Identify and assess ecosystems' main services
4. Discuss major theories and concepts of modern perspectives of the contribution of ecosystem services in sustainable management and human well-being
5. Select and implement methods on mapping ecosystem types and their services at different spatial scales

At the end of this course the students will have further developed the following skills/ competences:

1. Ability to identify the various ecosystem types and their main services
2. Ability to assess ecosystems' condition and services
3. Ability to create thematic maps, conduct spatial analyses on ecosystems and their services using Geographic Information Systems (GIS) and compile relevant cartographic studies
4. Ability to formalize scientific and management questions in the field of conservation biology and sustainable management
5. Ability to conduct environmental impact assessments, on ecosystems' condition and services, of the various construction projects and activities

Ability to communicate scientific data and outcomes to decision makers, via their interpretation from the perspective of the ecosystem service concept.

General Competences

Generally, by the end of this course the student will, furthermore, have develop the following general abilities (from the list above):

- Search, analyze and synthesize data and information, using the necessary technologies
- Adaptation to new situations

- Autonomous (Independent) work
- Group work
- Working in an interdisciplinary environment
- Decision making
- Respect to natural environment
- Design and project management
- Respect for diversity and multiculturalism

3. SYLLABUS

1. Introduction to Mapping and Assessment of Ecosystem and their Services – subject of study, terms, historical review of the establishment and integration of the ecosystem services' concept in integrated management and decision making
2. Classification of ecosystem types and of their services: identification, classification methods and categories, main problems and challenges
3. Basic principles and methods of mapping ecosystems types and biophysical parameters.
4. Mapping of ecosystems, vegetation units and habitat types: sampling methods, satellite imagery and remote sensing, photo-interpretation, thematic representations, spatial analyses.
5. Mapping ecosystem services; main mapping methods; What do we choose to map, where, when, and why?
6. Geographic Information Systems (GIS): digital maps compilation, geographic and spatial data types, spatial analyses, geo-databases
7. The value of mapping as a research and decision-making tool.
8. Qualitative and quantitative assessment of ecosystems condition and of their services: ecosystems conservation status assessment methods, identification of the provided services and the demand for services, creation and evaluation of management scenarios.
9. The value of ecosystem services in decision-making: practical applications of mapping and assessing ecosystems and their services.
10. Ecosystem services and protected areas: challenges, opportunities and prospects.
11. Case-study exercise using Geographic Information Systems (GIS).

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Lectures, seminars and laboratory work (face to face).	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Use of Information and Communication Technologies (ICTs) (e.g. PowerPoint, videos) in teaching. The lectures content of the course for each chapter are uploaded on the internet, in the form of a series of ppt files, where from the students can freely download them.	
TEACHING METHODS	***Activity***	***Semester workload***
	Lectures (3 conduct hours per week x 13 weeks)	39
	Laboratory exercises/ work (2 conduct hours per week x 13 weeks)	20
	Optionally, preparation of home-works from groups of two or three students each.	26
	Hours for private study of the student and	65

	preparation of home-works and reports, for the Laboratory, and preparation for the Laboratory (study of techniques and theory)	
	Course total	**150**
STUDENT PERFORMANCE EVALUATION	Written examination at the end of semester (70%) Laboratory practicum (30%) Passing grade: 5	

5. ATTACHED BIBLIOGRAPHY

Suggested bibliography:

- Dimopoulos P, Kokkoris IP (2017). Mapping and assessment of ecosystem and their services. Katagramma publishing, Kiato, pp. 272 (in Greek). ISBN 978-960-9407-39-7
- Burkhard B, Maes J (Eds.) (2017). Mapping Ecosystem Services. Pensoft Publishers, Sofia, 347pp.
- Jacobs S, Burkhard B, Van Daele T, Staes J, Schneiders A (2015). "The Matrix Reloaded": A review of expert knowledge use for mapping ecosystem services. Ecol Modell. 295:21–30.
- Haines-Young R, Potschin M (2013). 'Common Classification of Ecosystem Services (CICES): Consultation on version 4, August-December 2012', Report to the European Environment Agency [Internet]. [cited 2017 Jan 21]. Available from:
- https://www.nottingham.ac.uk/CEM/pdf/CICES%20V43_Revised%20Final_Report_29012013.pdf
- Kokkoris IP, Drakou EG, Maes J, Dimopoulos P (2018). Ecosystem services supply in protected mountains of Greece: setting the baseline for conservation management, International Journal of Biodiversity Science, Ecosystem Services & Management, 14:1, 45-59, DOI: 10.1080/21513732.2017.1415974
- Dimopoulos P, Drakou E, Kokkoris I, Katsanevakis S, Kallimanis A, Tsiafouli M, Bormpoudakis D, Kormas K, Arends J (2017). The need for the implementation of an Ecosystem Services assessment in Greece: drafting the national agenda. One Ecosystem 2: e13714. https://doi.org/10.3897/oneeco.2.e13714
- Kokkoris IP, Dimopoulos P, Xystrakis F, Tsiripidis I (2018). National scale ecosystem condition assessment with emphasis on forest types in Greece. One Ecosystem 3: e25434. https://doi.org/10.3897/oneeco.3.e25434
- Kokkoris IP, Bekri ES, Skuras D, Vlami V, Zogaris S, Maroulis G, Dimopoulos D, Dimopoulos P (2019). Integrating MAES implementation into protected area management under climate change: A finescale application in Greece. Science of the Total Environment, 695, 133530
- QGIS training manual https://docs.qgis.org/2.2/en/docs/training_manual/
- Notes of lecturers (in Greek): https://eclass.upatras.gr/courses/BIO373/

Related academic journals: