COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	BIOLOGY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**BIO_OEY**	**SEMESTER OF STUDIES**	**7**
COURSE TITLE	**FRESHWATER ECOLOGY**		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	2	6
Laboratory Exercises	3	
Educational fieldwork	1 day	

COURSE TYPE	Field of Science
PREREQUISITE COURSES:	There are no prerequisite courses. However, a good understanding of ecology, botany, zoology, and basic knowledge of statistics is recommended.
TEACHING AND ASSESSMENT LANGUAGE:	Greek.
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes, in English
COURSE WEBPAGE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course aims to enable students to:

1. Understand the ecological characteristics of freshwater ecosystems (lakes, flowing waters, lagoons).
2. Acquire fundamental knowledge of ecosystem functions and processes in freshwater ecosystems (food webs, productivity, ecosystem metabolism).
3. Understand the relationships between biotic communities and the abiotic environment.
4. Identify the main problems encountered in freshwater ecosystems (eutrophication, climate change, habitat fragmentation).
5. Apply methods for measuring and monitoring hydrobiological and ecological parameters.
6. Analyze hydrobiological and ecological data using statistical tools and models.
7. Gain knowledge of methods for assessing the ecological status of inland water ecosystems.

General Abilities

General Skills Developed by the End of the Course:

1. Ability to recognize key environmental problems in inland waters and their impacts on aquatic communities.
2. Ability to design and implement interdisciplinary approaches for studying inland water ecosystems.
3. Practical application of ecological monitoring tools and field sampling methodologies.
4. Ability to work independently.
5. Ability to collaborate and promote teamwork.
6. Respect for the natural environment.
7. Creative and inductive thinking.

3. COURSE CONTENT

1. **Introduction to Freshwater Ecology**: Definitions and importance of inland waters. Historical evolution of limnology and aquatic ecology.
2. **Types of Freshwater Ecosystems**: Lakes, rivers, wetlands – typology, characteristics and functions.
3. **Natural variations/ changes and Anthropogenic alterations of the inland waters of Greece**.
4. **Legislative Framework for the protection of inland waters:** European Policy, International Conventions, National Strategy
5. **Hydrological Cycle and Water Resources**: Hydrological regime, water level fluctuations, and nutrient inflow.
6. **Abiotic Environment**: Temperature, light availability, stratification, turbidity. The role of nitrogen and phosphorus in primary production.
7. **Primary Production**: Phytoplankton and phytobenthos. The ecological role of aquatic plants.
8. **Freshwater Biotic Communities**: The role of aquatic vegation in ecosystem functioning. The role of benthos in nutrient recycling.
9. **Riparian vegetation**: The importance of riparian vegetation for maintaining ecosystem health. Protection from erosion, organic matter provision, temperature regulation, habitat formation.
10. **Food Web Structure and Function**: Energy flow, interactions among communities, and multiple equilibrium states in shallow lakes.
11. **Multiple Stressors in Freshwater Ecosystems**: Pollution, eutrophication, habitat fragmentation, and synergistic effects of multiple pressures.
12. **Climate Change and Freshwater Ecosystems**: Ecosystem responses to warming, hydrological regime changes, and impacts on ecosystem functions and biodiversity.
13. **Ecosystem metabolism:** The role of freshwater ecosystems in the production, storage, and release of carbon. Implications for climate change. Modelling of ecosystem metabolism using dissolved oxygen measurements.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

<table>
<tr><td>TEACHING METHOD.</td><td>Face to Face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</td><td>• Use of the e-class online platform
• Data analysis applications using the open-source programming language R</td></tr>
<tr><td>TEACHING ORGANIZATION</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures (13 weeks x 2 hours per week)</td><td>26</td></tr>
<tr><td>Laboratory Exercises (6 weeks x 3 hours per week)</td><td>18</td></tr>
<tr><td>Field excursion</td><td>8</td></tr>
<tr><td>Semester project</td><td>50</td></tr>
<tr><td>Home study</td><td>48</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Total number of hours for the Course (25 hours of workload per ECTS credit)</td><td>150</td></tr>
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<tr><td>STUDENT ASSESSEMNT</td><td>1. Written final examination on the course theory, including Multiple Choice Questions, Short Answer Questions, and Problem Solving (50%).
2. Presentation of the semester project (20%).
3. Written examination in the course laboratory, including Multiple Choice Questions, Short Answer Questions, and Problem Solving (30%).</td></tr>
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5. RECOMMENDED LITERATURE

Suggested bibliography:

1) Wetzel R.G. 2023. Limnology: Lake and River Ecosystems. Fourth Edition. Elsevier. ISBN: 978-0-12-822701-5
2) The Lakes Handbook: Limnology and Limnetic Ecology (electronic resource). O' Sullivan, P.E., Reynolds, C.S. 2004. HEAL-Link Wiley UBCM ebooks. ISBN: 9780470999271

Related academic journals:

1) Hydrobiologia
2) Freshwater Biology
3) Limnology and Oceanography
4) Aquatic ecology