

**Course name: Functioning of Natural and Seminatural Ecosystems**

ECTS	6.0
Course status	facultative
Course final assessment /evaluation of outcomes	graded credit
Prerequisite	General background in biology

**Main field of study: Environmental Engineering; Landscape Architecture**

Educational profile	General academic
Code of studies and education level	master of thesis
Semester of studies	summer
Language of instruction	English

**Course offered by:**

Name of faculty offering the course	Faculty of Environment Engineering and Land Surveying
Name of department offering the course	Ecology, Climatology and Air Protection
Course coordinator	Jan Zarzycki, Ph.D.; Renata Kędzior Ph.D.

**Learning outcomes:**

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands:			
FEC_K1	the complexity of structure composition and functioning of various types of ecosystems with interdependence between biotic and abiotic elements including human impact.	IGW2_W11	T
SKILLS – student is able to:			
FEC_S1	use basic methods of ecosystems evaluation in ecological research.	IGW2_U12	T
SOCIAL COMPETENCIES – student is ready to:			
FEC_C1	correctly identify and resolve dilemmas related to engineering activities in environment and is aware of the importance of social and ethical aspects in this activity	IGW2_K03	T

**Teaching contents**

Lectures:	15 hours
Topics	<ol style="list-style-type: none"> <li>1. General principles of functioning of ecosystem (basic definition and conception of biocenosis and population; energy and matter flow in ecosystems; development and evolution of ecosystem).</li> <li>2. Still water ecosystems (abiotic factors, classification; space structure; trophic structure; productivity).</li> <li>3. Running water ecosystems (abiotic factors, classification; space structure; trophic structure; productivity).</li> <li>4. Forest ecosystems (abiotic factors, classification; space structure; trophic structure; productivity).</li> <li>5. Grassland (factors influencing creation and persistence; classification; space structure; trophic structure; productivity).</li> <li>6. Agro ecosystem (history of agriculture; systems of agriculture in the world; trophic structure; productivity and restrictive factors; influence of agriculture on environment).</li> <li>7. Natural and semi-natural ecosystems in urbanized areas. Types, methods of creation and protection. The Fourth Nature Concept.</li> </ol>

Accomplished learning outcomes	<i>FEC_K1; FEC_C1</i>	
Means of verification, rules and criteria of assessment	Written test, positive assessment should be given at least 50% of correct answers to given questions. The share of the lecture grade in the final grade is 50%.	
Classes:	15 hours	
Topics	<ol style="list-style-type: none"> <li>1. <i>Methodology of ecological studies in: grassland, forest and aquatic ecosystems.</i></li> <li>2. <i>Analysis of the collected field data (grassland, forest, aquatic ecosystems).</i></li> </ol>	
Accomplished learning outcomes		
Means of verification, rules and criteria of assessment	Passing reports on exercises – a grade from exercises is an arithmetic average of formative grades. The share of the grade for the project exercises in the final grade of the subject is 50%.	
Field practicals:	15 hours	
Topics	<ol style="list-style-type: none"> <li>1. <i>Forest ecosystems</i> <ul style="list-style-type: none"> <li>• <i>selecting the sampling plots</i></li> <li>• <i>estimating the tree stand volume</i></li> <li>• <i>tree species identification</i></li> <li>• <i>identification of herbaceous plant species with the key</i></li> <li>• <i>estimating the ecological state of forest ecosystem using soil-litter macroinvertebrates fauna</i></li> </ul> </li> <li>2. <i>Aquatic ecosystems</i> <ul style="list-style-type: none"> <li>• <i>Hydromorphological assessment based on the British method RHS</i></li> <li>• <i>Benthic macroinvertebrates as bioindicators of ecological state of rivers and reservoirs</i></li> <li>• <i>Identification of water macrophytes</i></li> </ul> </li> <li>3. <i>Grassland ecosystems</i> <ul style="list-style-type: none"> <li>• <i>vegetation survey of different grasslands communities (plant species composition using Braun-Blanquettes scale)</i></li> <li>• <i>Rapid Biodiversity Assessment (RBA) of terrestrial invertebrates in different type of grasslands</i></li> </ul> </li> </ol>	
Accomplished learning outcomes	<i>FEC_S1</i>	
Means of verification, rules and criteria of assessment	<i>Attendance list</i>	

#### References:

Basic	1. Krebs C. J. 2014. Ecology: The Experimental Analysis of Distribution and Abundance. Pearson Education Limited. <a href="https://archive.org/details/KrebsCharlesJ.EcologyTheExperimentalAnalysisOfDistributionAndAbundance201440mb/page/n407/mode/2up">https://archive.org/details/KrebsCharlesJ.EcologyTheExperimentalAnalysisOfDistributionAndAbundance201440mb/page/n407/mode/2up</a>
Supplementary	<ol style="list-style-type: none"> <li>1. van der Maarel E. 2005. Vegetation Ecology. Blackwell Publishing</li> <li>2. Schilthuizen M. 2018. Darwin Comes to Town: How the Urban Jungle Drives Evolution. Quercus Publishing Plc</li> </ol>

#### Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences	0.0	ECTS**
Area of academic study: T – technical sciences	6.0	ECTS**

#### Structure of student activity

Contact hours	57	hrs.	2.3	ECTS**
Including: lectures	15	hrs.		
classes and seminars	15	hrs.		
consultations	10	hrs.		
participation in research	0	hrs.		
obligatory field trips	15	hrs.		
participation in examination	2	hrs.		
e-learning	0	hrs.	0.0	ECTS**

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student own work	93	hrs.	3.7 ECTS**
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\*Areas of academic study in the fields of: A – the arts; H – humanities; M – medical, sport and health sciences; N – natural sciences; P – biological sciences; R – agricultural, forestry and veterinary sciences; S – social studies; T – engineering and technology

\*\* stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25–30 hours of classes