Course name: ***Functioning of Ecosystems***

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

Main field of study: ***Engineering and Water Management***

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	*Environmental Engineering and Land Surveying*
Name of department offering the course	*Ecology, Climatology and Air Protection*
Course coordinator	*Jan Zarzycki, 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	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).* 2. *Still water ecosystems (abiotic factors, classification; space structure; trophic structure; productivity).* 3. *Running water ecosystems (abiotic factors, classification; space structure; trophic structure; productivity).* 4. *Forest ecosystems (abiotic factors, classification; space structure; trophic structure; productivity).* 5. *Grassland (factors influencing creation and persistence; classification; space*

	structure; trophic structure; productivity). 6. *Agro ecosystem (history of agriculture; systems of agriculture in the world; trophic structure; productivity and restrictive factors; influence of agriculture on environment).*
Accomplished learning outcomes	*FEC_K1; FEC_C1*
Means of verification, rules and criteria of assessment	*Single-choice test, positive assessment should be given at least 50% of correct answers to given questions: <50% – insufficient (2.0); 50–60% – sufficient (3.0); 61–70% – satisfactory plus (3,5); 71–80% – good (4.0); 81–90% – good plus (4,5); 91–100% – very good (5.0). The share of the lecture grade in the final grade is 50%.*
Classes:	15 hours
Topics	1. *Methodology of ecological studies in: grassland, forest and aquatic ecosystems.* 2. *Analysis of the collected field data (grassland, forest, aquatic ecosystems).*
Accomplished learning outcomes	*FEC_S1*
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:	*1. Forest ecosystems* • *selecting the sampling plots* • *estimating the tree stand volume* • *tree species identification* • *identification of herbaceous plat species with the key* • *estimating the ecological state of forest ecosystem using soil-litter macroinvertebrates fauna* *2. Aquatic ecosystems* • *Hydromorphological assessment based on the British method RHS* • *Benthic macroinvertebrates as bioindicators of ecological state of rivers and reservoirs* • *Identification of water macrophytes* *3. Grassland ecosystems* • *vegetation survey of different grasslands communities (plant species composition using Braun-Blanquettes scale)* • *Rapid Biodiversity Assessment (RBA) of terrestrial invertebrates in different type of grasslands*
Accomplished learning outcomes	*FEC_S1*
Means of verification, rules and criteria of assessment	Attendance list

References:

Basic	1. *Allan, J. D. 1995. Stream ecology : structure and function of running waters. London: Chapman & Hall.* 2. *Krebs J. 1978. Ecology: the experimental analysis of distribution and abundance. New York : Harper & Row Publishers.* 3. *Odum E.P. 1983. Basic Ecology. Saunders, Philadelphia.*
Supplementary	1. *van der Maarel E. 2004. Vegetation Ecology. Blackwell Publishing.*

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.		
field practicals	15	hrs.		
participation in examination	2	hrs.		
e-learning	0	hrs.	0.0	ECTS**
student own work	93	hrs.	3.7	ECTS**

*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