Course name:
Restoration ecology of post-industrial sites

ECTS	2
Course status	*optional, facultativ*
Course final assessment /evaluation of outcomes	*graded credit*
Prerequisite	

Main field of study:
Forestry

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

Course offered by:

Name of faculty offering the course	Faculty of Forestry
Name of department offering the course	Department of Forest Ecology and Silviculture
Course coordinator	prof. dr hab. inż. Marcin Pietrzykowski

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands			
EPB_W1	the concepts and treatments of reclamation of post-industrial sites: the course of biological reclamation, the development of new ecosystems and their dynamics, criteria for assessing the success of reclamation, some issues of ecological engineering and ecology of restoring post-industrial sites	EPB2_W01 EPB2_W02	RL
EPB_W2	the dynamic concepts and management of the post-mining ecosystem through the development of the forest ecosystem in post-mining areas, the process of soil formation and plant succession, classification of mine soils, criteria for assessing the reclamation of ecosystem productivity, nutrient circulation; post-industrial landscape management	EPB2_W03 EPB2_W05	RL
SKILLS – student is able to			
EPB_U1	assess the risk of successful reclamation in post-mining areas, plan basic technical and biological methods for stabilizing extremely contaminated and eroded post-industrial areas, and assess the correctness of basic components	EPB2_U05 EPB2_U06	RL
SOCIAL COMPETENCIES – student is ready to:			
EPB_K1	working independently and in a group, further improving his/her professional knowledge and skills, managing a small team and preparing presentations and discussing research results	EPB2_K02 EPB2_K06	RL

Teaching contents

Lectures		10 hours
Topics	Ecology of restored ecosystems, fundamentals and concepts; Forest reclamation - introduction, definition, legal basis, reclamation treatments, balance of post-mining areas; Ecology of newly formed ecosystems in post-mining areas - concepts and management: Process of soil formation and plant succession; Comparative analysis of reclamation and succession rates - case study of	

	forest ecosystem development, criteria for assessing reclamation; Classification of soils and habitats in post-mining reclaimed areas for forestry; Tree response under reclaimed post-mining conditions and selection of species for afforestation, dynamics and stand development in reclaimed areas; Case study of forest ecosystem development on different post-mining sites and soil reconstruction technologies; Examples of reclamation strategies in various mining industries with different geology and climatic zones - a transcontinental review; Selected issues of ecological engineering and hazard assessment in post-mining areas: Technical and biological methods for the stabilisation of post-mining waste dumps.
Accomplished learning outcomes	EPB_W1, EPB_W2
Means of verification, rules and criteria of assessment	A time-limited test of knowledge in the form of a written test on a given problem topic - final course credit (a minimum of 50% of correct solutions to the problems in order to obtain a grade of 3.0); the proportion of the grade in the final evaluation is 50%.

Classes:		14 hours
Topics	Workshops: discussion on reclamation of post-industrial sites, strategies for reclamation on the example of selected post-mining areas One-day field visit in post-mining areas: landscape management of post-mining areas, reclamation measures, forest management in post-mining areas, sustainable development of post-mining areas; practical morphology of mine soils and description of vegetation Final evaluation of experience and conclusions - presentation of a case study	
Accomplished learning outcomes	EPB_U1,EPB_K1	
Means of verification, rules and criteria of assessment	Data computing - report, oral presentation, demonstration of practical skills. The contribution of the final evaluation is 30%.	

Field exercises		6 hours
Topics	Visit to a forest restoration site and verify and comprehensively assess the effectiveness of the ecosystem repair measures undertaken.	
Accomplished learning outcomes	EPB_U1,EPB_K1	
Means of verification, rules and criteria of assessment	Data computing - report, oral presentation. The contribution to the final evaluation is 20%	

References:

Basic	1. Courtney, R., Pietrzykowski, M. 2017. Soil quality indices for evaluation of acid mine spoil. Chapter 2 (in:) Bio-Geotechnologies for mine site rehabilitation, Eds: Majeti NV Prasad, Paulo Favas, and Subodh K Maiti. Elsevier, Amsterdam-Oxford-Cambridge,p. 33 - 48.
	2. Pietrzykowski M. 2015. Reclamation and reconstruction of terrestrial ecosystems on mine sites - ecological effectiveness assessment. (Chapter 5), in: J.N. Govil et al. (ed.), Series: Energy Science and Technology, Coal Energy (Volume 2), Studium Press LLC, New Delhi, Houston, USA, p. 121-151. (available on-line at: http://wl.ur.krakow.pl/zasoby/3/chapter_Pietrzykowski2014.pdf)
	3. Pietrzykowski M., Krzaklewski W. 2017. Reclamation of mine lands in Poland. Chapter 27 (in:) Bio-Geotechnologies for mine site rehabilitation, Eds: Majeti NV Prasad, Paulo Favas, and Subodh K Maiti. Elsevier, Amsterdam-Oxford-Cambridge, p. 493-513.
Supplementary	1. Barnhisel R. I., Darmody R. G., Daniels W. L., (ed.). 2000. Reclamation of drastically disturbed lands. Number 41 in the series Agronomy, Madison, Wisconsin USA Publishers
	2. Pietrzykowski M., Krzaklewski W., 2007. An assessment of energy efficiency in reclamation to forest. Ecological Engineering, 30, 341-348.

Structure of learning outcomes

Area of academic study: R – Agricultural sciences, L - Forestry		2 ECTS **

Structure of student activity

Contact hours		34	hrs.	1,4	ECTS**
Including:	lectures	10	hrs.		
	classes and seminars	20	hrs.		
	consultations	2	hrs.		
	participation in research	0	hrs.		
	obligatory traineeships	0	hrs.		
	participation in examination	2	hrs.		
e-learning		0	hrs.	….	ECTS**
student own work		16	hrs.	0,6.	ECTS**

*Areas of academic study in the fields of: H- humanities; S - social studies; P – biological sciences; T – technological sciences; M- medical, sport and health sciences; R – Agricultural, forestry and veterinary sciences; A – the arts
** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25 - 30 hours of classes