



MODULE SPECIFICATION

Module code	
Module title in Polish	Remediacja środowiska gruntowo-wodnego
Module title in English	Water and Soil Remediation (WSR)
Module running from the academic year	2017/2018

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	Environmental Engineering First-cycle full-time programme
Level of qualification	1st degree (first cycle, second cycle)
Programme type	academic (academic/practical)
Mode of study	Full-time (full-time/part-time)
Specialism	Water Supply, Treatment of Wastewater and Solid Waste
Organisational unit responsible for module delivery	Department of Water and Wastewater Technology
Module co-ordinator	Jarosław Gawdzik, PhD hab.
Approved by:	Lidia Dąbek, PhD hab., Professor of the University

B. MODULE OVERVIEW

Module type	core module (core/programme-specific/elective HES*)
Module status	optional module (compulsory/optional)
Language of module delivery	
Semester in the programme of study in which the module is taught	semester 5
Semester in the academic year in which the module is taught	winter semester (winter semester/summer semester)
Pre-requisites	None (module code/module title, where appropriate)
Examination required	(Yes/No)
ECTS credits	1

* elective HES – elective modules in the Humanities and Economic and Social Sciences

Mode of instruction	lectures	classes	laboratories	project	others
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Total hours per semester	15				
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C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The subject matter of the module covers essential problems connected with the remediation of contaminated soil by e.g. liquid fuel spill at reloading stations as well as the issue of land reclamation in the premises of former industrial plants and stockpiles. The classes cover discussing the techniques and devices for land remediation, technological diagrams as well as mathematical models of waste transport.
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Module outcome code	Module learning outcomes	Mode of instruction (l/c/lab/p/ others)	Corresponding programme outcome code	Corresponding discipline-specific outcome code
W_01	A student has fundamental knowledge as regards sanitation processes in the soil-water environment.	I	IŚ_W07 IŚ_W09 IŚ_W15	T1A_W01 T1A_W03 T1A_W04 T1A_W05 T1A_W06 T1A_W07 T1A_W08
W_02	A student is knowledgeable about development trends of soil remediation and sanitation.	I	IŚ_W07 IŚ_W09 IŚ_W15	T1A_W01 T1A_W03 T1A_W04 T1A_W05 T1A_W06 T1A_W07 T1A_W08
W_03	A student has elementary knowledge on the life cycle of devices, objects, and systems applied in terms of sanitation processes in the soil-water environment.	I	IŚ_W15	T1A_W06
U_01	A student can obtain information from the literature on the subject, databases, and other sources; a student can also evaluate them.	I	IŚ_U02	T1A_U01 T1A_U05 T1A_U07
U_02	A student is capable of modelling basic unitary processes in order to obtain the required remediation effect.	I	IŚ_U11	T1A_U08 T1A_U09
U_03	A student can assess the usefulness of operations and unitary processes in order to solve determined engineering assignments.	I	IŚ_U12	T1A_U08 T1A_U09 T1A_U15
K_01	A student is aware of raising his/her professional competences; a student also individually improves and broadens his/her knowledge as regards modern processes in environmental engineering.	I	IŚ_K03	T1A_K01 T1A_K02
K_02	A student understands the necessity of passing information as regards engineering and environmental protection to the society.	I	IŚ_K06	T1A_K06 T1A_K07
K_03	A student is aware of technological progress and the necessity to implement modern remediation systems.	I	IŚ_K09	T1A_K02



Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1.	The sources of contamination in the soil-water environment. Legal and formal aspects of contaminating soil with organic substances. The division into the areas in terms of potential environmental hazards with respect to zoology and urban planning.	W_01 W_03 U_01 K_01
2.	The sanitation of the soil-water environment with physico-chemical methods. In situ and ex situ methods. SRM methods. Underground water and soil air treatment plants. Utilising surfactants and biosurfactants.	W_01 W_03 U_01 K_02
3.	Thermal method. The extractive method. Electroreclamation. The processes of biodegradation as regards organical substances in the soil-water environment.	W_02 W_03 U_01 K_01 K_02
4.	The methods of bioventilation of contaminated soil of the SWE technique. Bioventing processes. In situ and ex situ methods.	W_01 W_02 W_03 U_02 K_03
5.	The migration of contaminations in soils. The mechanism of the process of spreading effluents from landfills and waste stockpiles.	W_02 U_02 K_01 K_02
6.	The methods and processes applied in clearing oily effluents. Sedimentation. Spinning. Coalescence. Flotation and electroflotation.	W_01 U_01 U_03 K_03
7.	Devices for removing contaminations from surface water. The barriers of protective screens. The principle of treating surface water with the PRB technology.	W_01 W_03 U_01 K_01 K_03

Assessment methods

Module outcome code	Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i>
W_01	A test
W_02	A test
W_03	A test
U_01	A test



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U_02	A test
U_03	A test
K_01	A test
K_02	A test
K_03	A test



D. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	Study time/ credits
1	Contact hours: participation in lectures	15
2	Contact hours: participation in classes	
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	2
5	Contact hours: participation in project-based classes	
6	Contact hours: meetings with a project module leader	
7	Contact hours: attendance at an examination	
8		
9	Number of contact hours	17 (total)
10	Number of ECTS credits for contact hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	0.68
11	Private study hours: background reading for lectures	4
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	4
14	Private study hours: preparation for laboratories	
15	Private study hours: writing reports	
16	Private study hours: preparation for a final test in laboratories	
17	Private study hours: preparation of a project/a design specification	
18	Private study hours: preparation for an examination	
19		
20	Number of private study hours	8 (total)
21	Number of ECTS credits for private study hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	0.32
22	Total study time	25
23	Total ECTS credits for the module <i>(1 ECTS credit = 25-30 hours of study time)</i>	1.0
24	Number of practice-based hours <i>Total practice-based hours</i>	0
25	Number of ECTS credits for practice-based hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	0

E. READING LIST



References	<ol style="list-style-type: none">1. Jose T. V. S. de Albergaria, Hendrikus P. A. Nouws.: „Soil Remediation: Applications and New Technologies”, Tylor & Francis CRC Press 2016.2. Gary W vanLoon, Stephen J.Duffy: „Environmental Chemistry”, Oxford Univesity Press 2010.3. Tom G. Spiro, Kathleen L. Purvis-Roberts, and William M. Stigliani: "Chemistry of the Environment", 3rd Edition, August 2011 by University Science Books4. Gray N.F.: „Water Technology: An Introduction for Environmental Scientists and Engineers, 3rd Edition”, Butterworth-Heinemann, 2010.5. Shun Dar Lin, C. Lee: “Water and Wastewater Calculations Manual “ McGraw Hill Professional, 2007.
Module website	