



### MODULE SPECIFICATION

Module code	
Module title in Polish	<b>Gospodarka osadami ściekowymi</b>
Module title in English	<b>Sewage Sludge Management</b>
Module running from the academic year	<b>2016/2017</b>

### A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	Environmental Engineering
Level of qualification	first cycle (first cycle, second cycle)
Programme type	academic (academic/practical)
Mode of study	full-time (full-time/part-time)
Specialism	Sanitary Pipelines and Systems
Organisational unit responsible for module delivery	Department of Water and Wastewater Engineering
Module co-ordinator	Jolanta Latosińska , PhD, Eng. Magdalena Dańczuk, PhD, Eng
Approved by:	Lidia Dąbek, PhD hab., Professor of the Kielce University of Technology

### B. MODULE OVERVIEW

Module type	Core module (core/programme-specific/elective HES*)
Module status	optional module (compulsory/optional)
Language of module delivery	<b>Polish/ English</b>
Semester in the programme of study in which the module is taught	semester 7
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	No (Yes/No)
ECTS credits	3

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



# Politechnika Świętokrzyska

## WYDZIAŁ INŻYNIERII ŚRODOWISKA, GEOMATYKI I ENERGETYKI

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	15			15	



### C. LEARNING OUTCOMES AND ASSESSMENT METHODS

<b>Module aims</b>	The aim of the module is to familiarise students with basic issues concerning deposit management, drawing attention to technological as well as legal and formal aspects together with environmental protection. The syllabus of the module covers the characteristics of sewage deposits, theoretical fundamentals of the applied processes of processing and neutralising, the methods of management and utilisation of deposits. Furthermore, a student takes the principles of dimensioning and selecting devices for deposit processing into consideration.
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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 general knowledge on managing sewage deposits in terms of their physico-chemical properties as well as legal and formal aspects.	l/p	IŚ_W09 IŚ_W15	T1A_W03 T1A_W04 T1A_W05 T1A_W06 T1A_W07
W_02	A student knows basic processes of treating municipal sewage deposits.	l/p	IŚ_W09	T1A_W03 T1A_W04 T1A_W05 T1A_W06 T1A_W07
W_03	A student knows the methods of neutralising municipal sewage deposits as well as the methods of their agricultural and environmental utilisation.	l/p	IŚ_W07 IŚ_W09	T1A_W01 T1A_W03 T1A_W04 T1A_W05 T1A_W06 T1A_W07 T1A_W08
U_01	A student can balance the amount of sewage deposits which are formed on any mechanical and biological sewage treatment plant.	l/p	IŚ_U02	T1A_U01 T1A_U05 T1A_U07
U_02	A student can provide dimensions and select device of a process line treat to process sewage deposits.	l/p	IŚ_U15 IŚ_U25	T1A_U07 T1A_U09 T1A_U10 T1A_U14 T1A_U15
U_03	A student has general knowledge of solving exploitation problems concerning sewage treatment plants as regards processing sewage deposits.	l/p	IŚ_U05 IŚ_U15 IŚ_U25	T1A_U03 T1A_U04 T1A_U07 T1A_U09 T1A_U10 T1A_U14 T1A_U15
K_01	A student is aware of the necessity of raising his/her professional and personal competences; a student also improves and broadens his/her knowledge in terms of environmental engineering.	p	IŚ_K03 IŚ_K05	T1A_K01 T1A_K02 T1A_K03 T1A_K04
K_02	A student is aware of technological progress and the necessity of implementing new solutions to raise his/her professional competences.	l/p	IŚ_K09	T1A_K02
K_03	A student can draw conclusions in a substantive manner.	p	IŚ_K07	T1A_K07



### Module content:

#### 1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	Legal fundamentals of waste deposit management (their generation, types and amounts).	W_01 U_01
2	The characteristics of waste deposits (physic-chemical properties of deposits and sanitary properties of deposits). The change of mass, hydration, and volume of deposits in unitary processes at a sewage treatment plant. Technological parameters of sewage deposits. The methodology of testing sewage deposits.	W_01 U_01
3	The selected processes of processing sewage deposits: condensing sewage deposits; devices for condensing; conditioning sewage deposits (chemical and physical methods).	W_02 U_02 U_03 K_02
4	The stabilisation of sewage deposits in aerobic and anaerobic conditions. Theoretical fundamentals of the stabilisation processes. Factors influencing on the course of stabilisation processes. Devices for aerobic and anaerobic stabilisation of sewage deposits.	W_02 U_02 U_03 K_02
6	Dehydration of sewage deposits. Theoretical fundamentals of the process. Devices for dehydrating the deposit. The hygienisation of sewage deposits.	W_02 U_02 U_03 K_02
7 - 8	Drying sewage deposits. Composting sewage deposits; agricultural and environmental use of sewage deposits. Thermal methods of neutralising sewage deposits. Disposing sewage deposits at landfills.	W_03 U_03 K_02

#### 2. Topics to be covered in the classes

#### 3. Topics to be covered in the laboratories

#### 4. Topics to be covered in the project

No.	Topics	Module outcome code
1	Discussing the requirements and conditions for obtaining a credit. Project range. The balance of sewage deposits generated in mechanical and biological sewage treatment plants.	W_01 U_01 K_01 K_03
2	Devices for condensing sewage deposits (a flow gravitational condenser and a mechanical condenser); dimensioning and selecting devices.	W_02 U_02 K_01 K_03
3	Aerobic stabilisation of sewage deposits (dimensioning the aerobic chamber of stabilising sewage deposits).	W_02 U_02 K_01 K_03
4	Devices of aerobic stabilisation of a sewage deposit (a project).	W_02 U_02 K_01 K_03
5	Devices for dehydrating municipal sewage deposits (the principles of selecting devices).	W_02 U_02



		K_01 K_03
6-8	Assessing the possibilities of neutralising municipal sewage deposits.	W_03 U_03 K_02 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 and a project
W_02	A test and a project
W_03	A test and a project
U_01	A test and a project
U_02	A test and a project
U_03	A test and a project
K_01	A project
K_02	A test and a project
K_03	A project

### 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)	4
5	Contact hours: participation in project-based classes	15
6	Contact hours: meetings with a project module leader	6
7	Contact hours: attendance at an examination	-
8		
9	<b>Number of contact hours</b>	<b>40</b> <i>(total)</i>
10	<b>Number of ECTS credits for contact hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>1,60</b>
11	Private study hours: background reading for lectures	15
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	5
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	15
18	Private study hours: preparation for an examination	
19		
20	<b>Number of private study hours</b>	<b>35</b> <i>(total)</i>
21	<b>Number of ECTS credits for private study hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>1,40</b>
22	<b>Total study time</b>	<b>75</b>
23	<b>Total ECTS credits for the module</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>3</b>
24	<b>Number of practice-based hours</b> <i>Total practice-based hours</i>	<b>36</b>
25	<b>Number of ECTS credits for practice-based hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>1,44</b>

### E. READING LIST

References	<ol style="list-style-type: none"><li>1. Cecil Lue-Hing, <i>Municipal Sewage Sludge Management: A Reference Text on Processing, Utilization and Disposal, Second Edition, Tom 4</i>, CRC Press, 1998</li><li>2. David H.F. Liu, Béla G. Lipták, Paul A. Bouis, <i>Environmental Engineers' Handbook, Second Editions</i>, CRS Press Company, 1997</li><li>3. Eliot Epstein, <i>Land Application of Sewage Sludge and Biosolid</i>, CRC Press Taylor &amp; Francis Group, 2003</li><li>4. <i>Articles from the science journals: Environmental Protection Engineering, Archives of Environmental Protection, <a href="#">Polish Journal of Environmental Studies</a></i></li></ol>
Module website	