

**Course name: Wastewater Treatment Plant in Non-urban Areas**

ECTS	6.0
Course status	facultative
Course final assessment /evaluation of outcomes	graded credit
Prerequisite	knowledge of wastewater treatment processes

**Main field of study: Environmental Engineering**

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	Sanitary Engineering and Water Management
Course coordinator	Piotr Bugajski, Ph.D., Karolina Kurek, 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:			
WWT_K1	problems raised by wastewater, environmental and public health impact, national and UE legislation on wastewater, operations and processes used to treat wastewater. Knows different types of technology and principles of operation and control of wastewater treatment plants.	IS2_W09	T
SKILLS – student is able to:			
WWT_S1	use the principles of designing and / or selecting the series of household sewage treatment plants. Recognize different technologies of household sewage treatment plants and different ways of process control and monitoring.	IS2_U07	T
SOCIAL COMPETENCIES – student is ready to:			
WWT_C1	responsibly fulfill social obligations in the area of application and dissemination of strict principles based on empirical data, interpretation of phenomena and processes in research work and practical activities	IS2_K04	T

**Teaching contents**

Lectures:	15 hours
Topics	<ol style="list-style-type: none"> <li>1. Definitions of sewage treatment plants in the aspect of current legal acts.</li> <li>2. The requirements of effectiveness work for wastewater treatment plant.</li> <li>3. The individual wastewater treatment system – economic aspects.</li> <li>4. Types of technologies used for this type of objects.</li> <li>5. Ecological effect of wastewater treatment plants for environmental.</li> </ol>

	6. <i>The indicators of effectiveness work for sewage treatment plants.</i> 7. <i>The reasons and possible disturbance in the operation in sewage treatment plant.</i>
Accomplished learning outcomes	WWT_K1, WWT_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. <i>Selection of the concept of a household sewage treatment plant (situation and height plan).</i> 2. <i>Calculation of the: amount of sewage flowing into the treatment plant, concentration of pollution loads, PE (pollution equivalent).</i> 3. <i>Individual calculations for the technological systems in wastewater treatment plant.</i> 4. <i>Economical aspect – calculations.</i> 5. <i>Design of a sewage treatment plant (drawing).</i>
Accomplished learning outcomes	WWT_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. <i>Household wastewater treatment plant type 1 – (flow bioreactors).</i> 2. <i>Household wastewater treatment plant type 2 – (SBR bioreactors).</i> 3. <i>Constructed wetland.</i>
Accomplished learning outcomes	WWT_K1, WWT_C1
Means of verification, rules and criteria of assessment	Attendance list

### References:

Basic	1. Vesilind P.A. 2003. <i>Wastewater Treatment, Plant Design.</i> Water Environmental Federation. IWA Publishing. 2. <i>Wastewater Treatment Plant Design Handbook.</i> 2012. Water Environmental Federation. 3. Henze M., Harrenmoës P., Jansen J., Arvin E. 1995. <i>Wastewater Treatment – Biological and Chemical Processes.</i> Springer Berlin Heidelberg New York.
Supplementary	1. Von Sperling M. 2007. <i>Basic Principles of Wastewater Treatment.</i> IWA, London. 2. Pawełek J., Bugajski P. 2017. <i>The development of household wastewater treatment plants in Poland-advantages and disadvantages.</i> Acta Scientiarum Polonorum – Formatio Circumiectus, p. 3–14. 3. Gajewska M., Obarska-Pemkowiak H. 2009. <i>20 Years of experience of hybrid constructed wetlands exploitation in Poland.</i> Rocznik Ochrony Środowiska, 111, p. 875–888.

### 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 traineeships	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