

# WASTEWATER TREATMENT

Course Code/Course ID : Oczysz.01\_pNadGenZTLSP

Type of course: compulsory

Teaching language: English

Director of studies: dr hab. inż. Sylwia Myszograj, prof. UZ

Name of lecturer: IEE teachers

Form of instruction	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Points ECTS
<b>Full-time studies</b>					7
Lecture	30	2		Exam	
Laboratory	30	2		Grade with notes	
Project	30	2		Grade with notes	

## THE AIM OF THE LECTURE:

Acquaint students with the basic concepts, objectives and unit processes and typical unit process lines used in municipal wastewater treatment.

## ENTRY REQUIREMENTS:

Formal: no requirements

## SCOPE OF COURSE TOPICS:

The program of Lectures:

Types, quantity and composition of municipal sewage. Receiving waters and quality norms of treated wastewater. Mechanical treatment: straining processes on grates and sieves. Sedimentation in grit chambers and in sedimentation tanks, flotation and filtration. Efficiency of mechanical part. Biochemical treatment – aerobic and anaerobic processes. Mathematical modeling of the processes of biological degradation of pollution. Removal of biogenic compounds. Activated sludge. Biological filters. Sewage ponds. Constructed wetland systems. Secondary settlement tanks. Theoretical basis of anaerobic processes. Characteristics of sewage treatment facilities. Treatment of rivers and rainwaters.

The Program of Laboratory:

Characteristics of the composition of raw and treated municipal wastewater, sedimentation in Imhoff funnels, indication of Mohlmann Index, removal of phosphorus from wastewater in the coagulation process, sludge thickening, dewatering and conditioning of sludge.

The Program of projects:

Technological project of municipal wastewater treatment plant.

## TEACHING METHODS:

Giving methods: information and problem lecture with the use of multimedia techniques.

Searching methods: classrooms and practical, laboratory method, project method.

## LEARNING OUTCOMES:

Symbol	Learning outcomes after completion of the course. Student:	The reference to the effects of education in the field of technical sciences
<b>Knowledge</b>		
<b>K_W09</b>	knows the basic concepts and methods of waste water treatment plants, defines the unit processes used in wastewater treatment	<b>T1A_W03</b>
<b>K_W15</b>	has a general knowledge about the types of plants and their properties, the primary processes used in wastewater treatment, methods of purification and wastewater development directions	<b>T1A_W05; T1A_W06</b>
<b>K_W26</b>	knows the rules of the establishment and development of forms of individual entrepreneurship and heating contractor in the design, execution and operational facilities and environmental engineering systems	<b>T1A_W11</b>
<b>Skill</b>		
<b>K_U17</b>	is able to design a series of technological wastewater treatment plant	<b>T1A_U16</b>
<b>K_U16</b>	is able to plan and carry out in the laboratory unit of wastewater treatment processes, interpret test results and draw conclusions, apply safety rules in laboratory work required	<b>T1A_U08; T1A_U09; T1A_U14</b>
<b>Social competences</b>		
<b>K_K04</b>	operates in a group, prepares job, determines the validity and order of the tasks necessary to complete the exercises	<b>T1A_K03; T1A_K04</b>

## ASSESSMENT CRITERIA:

Project: Pass is based putting in the time correctly made design documentation of the technological design of wastewater treatment plant, demonstrating a knowledge of the processes and design rules technology.

Laboratory: Pass is based on the implementation of the all laboratory exercises, positive credit the theoretical knowledge in the field of exercise and putting in the time correctly made reports. Final evaluation of the laboratory is the arithmetic mean of the marks obtained by tests of theoretical knowledge in the field of exercise.

Exam: condition of the exam is to get a positive assessment of the project and laboratory, the test takes the form of a written and /or oral. The basis for determining the cumulative rating is the weighted average obtained by adding: 0.44 lecture grade, 0.28 laboratory assessment grade, and 0.28 assessment from project classes. The weighted average is rounded to two decimal places. The total rating is based on the weighted average according to the rule: below 3.24 - sufficient, from 3.25 to 3.74 - satisfactory plus, from 3.75 to 4.24 - good, from 4.25 to 4.74 - a good plus, from 4.75 – very good.

## SELF STUDENT'S WORK:

Independent student work: full-time studies - 25 hours,

Contact hours: full-time studies 150 hours,

## RECOMMENDED READING:

1. Arceivala S.J., Asolekar S.R., Wastewater Treatment For Pollution Control And Reuse, Mc Graw Hill Education , 2012
2. College T., Biology of Wastewater Treatment , Imperial College Press, 2004
3. Forster Ch.F., Wastewater treatment and technology, Thomas Telford, 2003

## OPTIONAL READING:

1. Spellman F., R., *Handbook of Water and Wastewater Treatment Plant Operations*. CRC Press, 2003
2. Tchobanoglous G., Burton F.L., Stensel H.D., *Wastewater Engineering: Treatment and Reuse*, McGraw-Hill Science/Engineering/Math, 2002

## REMARKS:

As part of the course, students participate in a field trip to the sewage treatment plant.