

subject code: 71C2500

Course title:

## Wastewater technology

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**30L, 30 Lab, 7 ECTS**

| Available in semester:                        | Language taught | ISCED2013-F code | ISCED2013-F field of study          | Level:<br>1 – BSc (EQF-6)<br>2-MSc (EQF 7)<br>3 – PhD (EQF 8) | ECTS | Lecture (hours) | Exercises (hours) | Laboratory | Seminar (hours) | e-learning (hours) | Project (hours) | Examination:<br>EO – exam oral<br>EW – exam written, A-assignment |
|---|-----------------|------------------|-------------------------------------|---|------|-----------------|-------------------|------------|-----------------|--------------------|-----------------|---|
| S –spring only<br>A – autumn only<br>Y - both |                 |                  |                                     |   |      |                 |                   |            |                 |                    |                 |   |
| S   | EN              | 0712             | Environmental protection technology | 1   | 7    | 30              | -                 | 30         | -               | -                  | -               | A   |

# SYLLABUS

## COURSE OBJECTIVES

- C.1.** To acquire knowledge on wastewater and wastewater treatment processes
- C.2.** To learn the basics of chemistry and microbiology of wastewater treatment
- C.3.** Presentation of the way of conducting chemical experiments, data collecting, calculation of final results and formulating conclusions from experimental work in English

## PRELIMINARY COURSE REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

- 1.** Student knows principal rules and laws in mathematics, chemistry and biology
- 2.** Student is able to logical thinking and estimation of the quality of results obtained during calculation

## LEARNING OUTCOMES

- EU 1 -** student understands the wastewater treatment process
- EU 2 -** students recognize how their actions influence the performance of wastewater treatment plant
- EU 3 -** student has the ability to safely conduct laboratory experiments on wastewater treatment based on the instructions, description of the experiment carried out, perform appropriate calculations of technological parameters

## COURSE CONTENT

| Form of classes - lectures  | Hours |
|---|-------|
| Historical background of wastewater treatment. Municipal and industrial | 2     |
| Sewage collection systems.  | 2     |
| Legislation.  | 2     |

|  |              |
|--|--------------|
| Overview of wastewater treatment methods.  | 2            |
| Mechanical wastewater treatment.   | 2            |
| Microbiological processes of wastewater treatment. Aerobic vs. anaerobic           | 2            |
| Biological wastewater treatment - attached growth processes. Technical parameters. | 2            |
| Biological wastewater treatment - activated sludge. Technical parameters.          | 2            |
| Biological nutrient removal.   | 4            |
| How to control wastewater treatment plants - introduction.                         | 3            |
| Waste management in wastewater treatment plants. Sewage sludge                     | 2            |
| Small wastewater treatment plants.   | 2            |
| Advanced methods of wastewater treatment.  | 2            |
| Final test   | 1            |
| <b>Form of classes - laboratory</b>  | <b>Hours</b> |
| Lab safety training.   | 1            |
| Analysis of selected parameters of wastewater.                                     | 3            |
| Treatment of wastewater with trickling filters. Technical parameters.              | 5            |
| Precipitation of phosphorus.   | 5            |
| Treatment of wastewater with activated sludge. Technical parameters.               | 5            |
| Biological nutrient removal with activated sludge method.                          | 5            |
| Visit to a municipal wastewater treatment plant.                                   | 6            |

### COURSE STUDY METHODS

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| 1. blackboard, interactive whiteboard                                     |
| 2. multimedia presentation  |
| 3. laboratory manuals   |
| 3. Laboratory installations of selected wastewater treatment technologies |

### METHODS OF ASSESMENT ( F - formative; S - summative)

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| <b>F1.</b> – activity in classes                                   |
| <b>F2.</b> – evaluation of the team work in the laboratory classes |
| <b>F3,</b> - initial tests before laboratory                       |
| <b>F4.</b> – evaluation of the laboratory reports                  |
| <b>S1.</b> – final test lecture                                    |

### PRIMARY AND SUPPLEMENTARY TEXTBOOKS

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|---|
| Grady L., et al., Biological Wastewater treatment, CRC Press, 2011 or later edition |
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## **I. OTHER USEFUL INFORMATION**

1. All the information on the class schedule is posted on the student information board and online at: [www.is.pcz.pl](http://www.is.pcz.pl)
2. The information about the consultation hours is provided to students on the first class meeting and posted online at the Faculty of Infrastructure and Environment Website

3. The information on course completion and grade is provided to students on the first class meeting.