

Code	V.10
Course Title (English)	Technology of water and wastewater treatment I
Course Title (Polish)	Wybrane zagadnienia z technologii wody i ścieków
Credits	3 ECTS

Language of instruction **English**

Programme Intelligent Energy, Biotechnology for Environmental Protection

Type of studies BSc studies

Unit running the programme Department of Chemistry, Water and Wastewater Technology

Course coordinator and academic teachers **Ewa Wiśniowska, PhD.**, Ewa Wiśniowska, PhD; Elżbieta Sparczyńska, PhD (Lec.), Ewa Wiśniowska, PhD; Elżbieta Sparczyńska, PhD (Lab.)

Form of classes and number of hours

Semester	Lec.	Tut.	Lab.	Proj.	Sem.	Credit points
V	15	-	30	-	-	3

Learning outcomes

The objectives of the course are: to acquaint the students with basic knowledge in water and wastewater treatment processes; to develop the ability to execute and assess laboratory work required for water and wastewater quality analysis as well as to calculate technological parameters of water and wastewater treatment processes; to develop the ability to apply the knowledge in water and wastewater treatment for selecting the best treatment strategies based on influent characteristics and effluent quality requirements. After completing the course student: has a knowledge in water and wastewater treatment methods; is able to calculate technological parameters of water and wastewater treatment processes and recognize appropriate ranges for the parameters; is able to select the technology of water and wastewater treatment taking into consideration physicochemical characteristics of the influent as well as effluent quality requirements.

The students are expected to have background knowledge in chemistry, biology and unit processes in environmental engineering from previous semesters. In particular they are expected to have basic competences in engineering calculations

LECTURE

Technology of water treatment: Water contaminants. Treatment of water at the source. Preliminary treatment of water. Coagulation and flocculation. Filtration, adsorption, aeration. Iron and manganese control. Disinfection. Ion exchange, membrane processes.

Technology of wastewater treatment: Quality, quantities and variability of raw wastewater. Effluent quality criteria. Mechanical treatment of wastewater including processing of waste materials. Basics of biological wastewater treatment. Organisms. Conversion processes of organic and inorganic matter. Biofilters. Activated sludge (including excess sewage sludge processing). Biological nutrient removal systems. Methane digestion of wastewater.

TUTORIALS

Not applicable

LABORATORY

Technology of water treatment: Water and wastewater laboratory safety training. Coagulation. Adsorption. Iron control. Ion exchange.

Technology of wastewater treatment: Wastewater treatment on trickling filters under aerobic conditions. Wastewater treatment with activated sludge (including BNR removal). Chemical removal of biogen compounds. Technical field trip to Wastewater Treatment Plant. Methane digestion of wastewater.

PROJECT

Not applicable

SEMINAR

Not applicable

Form of assessment

Lectures: Summary test of water treatment, summary test of wastewater treatment.

Laboratory: regular tests (during each laboratory), evaluation of laboratory work reports

Basic reference materials

1. Pizzi N.: Water Treatment, principles and Practices of Water Supply Operations, AWWA, Denver 2010
2. Hendrics D.: Water Treatment Unit processes. Physical and Chemical, CRC Press, Boca Raton 2006
3. Burton F.L., Stensel H., D., Tchobanoglous G., Wastewater Engineering: Treatment and reuse, McGraw-Hill, New York 2004

Other reference materials

For Polish-speaking students:

1. Janosz-Rajczyk M. (red.): Badania wybranych procesów oczyszczania ścieków, Wydawnictwo Politechniki Częstochowskiej, Częstochowa 2008
2. Miksch K., Sikora J. (red.), Biotechnologia ścieków, Wydawnictwo naukowe PWN, Warszawa 2010.
3. Henze M., Harremoes P., Jansen J., Arvin E.: Oczyszczanie ścieków, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2002
4. Praca zbiorowa, Poradnik eksploatatora oczyszczalni ścieków: Wyd. PZiTS, Poznań 1997

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Average student workload (teaching hours + individ.)	3 hours of teaching hours + 2 hours of individual work per week
Remarks:	
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