SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Biotechnological methods at environmental protection

Educational subject description sheet

Basic information

Field of study Biotechnology	**Didactic cycle** 2024/25
Speciality -	**Subject code** BBTBTjS_D.310.01605.24
Organizational unit Faculty of Biology and Biotechnology	**Lecture languages** english
Study level first cycle (engineering degree)	**Mandatory** Obligatory subjects
Study form full-time studies	**Block** Major subjects
Education profile General academic	**Disciplines** Biological sciences

Coordinator	Aleksandra Chojnacka
Teacher	Aleksandra Chojnacka

Period	**Examination**	**Number of ECTS points**
Semester 5	Exam **Activities and hours** Lecture: 15 Auditorium exercises: 7 Laboratory exercises: 6 Field exercises: 2	2

Goals

Code	Goal
C1	The aim is to provide knowledge about the processes and equipment used for wastewater treatment and sludge treatment, as well as advanced and modern wastewater treatment technologies. Acquisition of the ability to perform laboratory tests of wastewater and sewage sludge, calculation of the necessary efficiency of wastewater treatment and calculation of mass balances of selected devices of the treatment plant.

Entry requirements

no required

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the processes and devices used in wastewater treatment	BTj_K3_W01_inz, BTj_K3_W03, BTj_K3_W13_inz, BTj_K3_W15_inz	Written exam
W2	the processes and devices used in sewage sludge treatment	BTj_K3_W01_inz, BTj_K3_W03, BTj_K3_W13_inz, BTj_K3_W15_inz	Written exam
Skills – Student can:			
U1	calculate the required efficiency of wastewater treatment plants and mass balances of equipment	BTj_K3_U10_inz, BTj_K3_U13_inz	Test (written or computer based)
U2	perform measurements of basic parameters characterizing wastewater and activated sludge	BTj_K3_U05_inz, BTj_K3_U06_inz, BTj_K3_U13_inz	Test (written or computer based)
Social competences – Student is ready to:			
K1	presenting opinions on technologies used in wastewater treatment plants and providing the public with reliable knowledge about the impact of wastewater on the environment	BTj_K3_K06	Written exam, Test (written or computer based)

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Qualitative and quantitative characteristics of various types of wastewater. Pollutant loads and population equivalent. Legal conditions of wastewater disposal to the environment and sewage system. Processes and technologies of physicochemical wastewater treatment. Processes and technologies of aerobic and anaerobic wastewater treatment. Activated sludge and biofilm technologies. Processes and technologies of integrated removal of carbon and nutrients. Technological systems and equipment of municipal and industrial wastewater treatment plants. Characteristics of sewage sludge and sludge management in a wastewater treatment plant.	W1, W2, K1	Lecture

No.	Course content	Subject's learning outcomes	Activities
2.	Calculation of the reliable amount of wastewater, pollutant loads and the necessary efficiency of the wastewater treatment plant. Balancing pollutants in a wastewater treatment plant. Physical and chemical analysis of the basic parameters characterizing the quality of wastewater (suspensions, BOD5, COD, pH). Characteristics of activated sludge (sludge volume index, microbiological analysis). Analysis of the technological system of the technical object of the wastewater treatment plant along with the identification of physical, chemical and biological technological processes and devices.	U1, U2, K1	Auditorium exercises, Laboratory exercises, Field exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture, Case study, Discussion, Presentation
Auditorium exercises	Design method
Laboratory exercises	Laboratory (experiment), learning by experiment, Measurement
Field exercises	Observation

Activities	Examination method	Percentage
Lecture	Written exam	50%
Auditorium exercises	Test (written or computer based)	20%
Laboratory exercises	Test (written or computer based)	20%
Field exercises	Test (written or computer based)	10%

Activities	Credit conditions
Lecture	obtaining at least 51% of the total points
Auditorium exercises	obtaining at least 51% of the the points
Laboratory exercises	obtaining at least 51% of the total points
Field exercises	obtaining at least 51% of the total points

Literature

Obligatory

1. Environmental Biotechnology; Apple Academic Press Inc.2022; ISBN: 9781774638309
2. Jeguirim, Mejdi, i Salah Jellali. 2021. Wastewater Treatment, Valorization and Reuse. Basel, Switzerland: MDPI - Multidisciplinary Digital Publishing Institute.
3. Cheremisinoff, Nicholas P. 2002. Handbook of water and wastewater treatment technologies. Boston: Butterworth-Heinemann.

Optional

1. research and review articles in English
2. legal acts

Calculation of ECTS points

Activity form	**Activity hours***
Lecture	15
Auditorium exercises	7
Laboratory exercises	6
Field exercises	2
Preparation for the exam	15
Preparation for the test	10
Student workload	**Hours** 55
Number of ECTS points	**ECTS** 2

* hour means 45 minutes

Effects

Code	Content
BTj_K3_K06	The graduate is ready to presenting justified arguments supporting one’s standpoint regarding scientific, ethical and social topics influencing the progress in biological sciences;
BTj_K3_U05_inz	The graduate can understand and explain chemical processes forming a basis for explaining biochemical reactions, and able to apply proper techniques for their investigation;
BTj_K3_U06_inz	The graduate can use laboratory equipment in order to gather observations and data
BTj_K3_U10_inz	The graduate can critically assess the functionality and validity of technical and technological solutions used in a biotechnological process;
BTj_K3_U13_inz	The graduate can propose analytical methods and plan an experiment for solving engineering tasks related to various stages of creating a biotechnological product;
BTj_K3_W01_inz	The graduate knows and understands technologies of performing biotechnological processes
BTj_K3_W03	The graduate knows and understands key aspects of biotechnology
BTj_K3_W13_inz	The graduate knows and understands the importance of processes necessary to asses and initiate research in the field of biotechnology;
BTj_K3_W15_inz	The graduate knows and understands the systems currently recommended for managing quality and safety in the biotechnological industry; the principles of creating and developing the forms of individual entrepreneurship;