

Course title: ENVIRONMENTAL ENGINEERING DESIGN

ECTS credit allocation (and other scores): 2.0

Semester: spring

Level of study: ISCED-7 - second-cycle programmes (EQF-7)

Branch of science: Engineering and technology

Language: English

Number of hours per semester: 30

Course coordinator/ Department and e-mail: dr habil. eng. Katarzyna Bułkowska, prof. UWM / Environmental Biotechnology; katarzyna.bulkowska@uwm.edu.pl

Type of classes: classes

Substantive content

CLASSES: Composting of sewage sludge with structure-forming materials. Production of polyhydroxy acids by mixed cultures of microorganisms using waste materials as substrates. The technological concept of producing methyl esters in a batch reactor. Technological requirements for bioremediation of oil-contaminated soils in a pile system.

Learning purpose: Design of processes in environmental biotechnology.

On completion of the study programme the graduate will gain:

Knowledge: technological processes in environmental engineering such as composting technologies, production of polyhydroxy acids, biodiesel production and soil bioremediation.

Skills: Students will be able to calculate the operational parameters of the processes in environmental biotechnology.

Social Competencies: Students will gain experience in understanding the relationships between the design of processes and the quality of the environment.

Basic literature:

- 1) Rodionova, M. V., Poudyal, R. S., Tiwari, I., Voloshin, R. A., Zharmukhamedov, S. K., Nam, H. G., & Allakhverdiev, S. I. (2017). Biofuel production: challenges and opportunities. *International Journal of Hydrogen Energy*, 42(12), 8450-8461.
 - 2) Mathew, G. M., Raina, D., Narisetty, V., Kumar, V., Saran, S., Pugazhendi, A., & Binod, P. (2021). Recent advances in biodiesel production: Challenges and solutions. *Science of the Total Environment*, 794, 148751.
 - 3) Dhaliwal, S. S., Singh, J., Taneja, P. K., & Mandal, A. (2020). Remediation techniques for removal of heavy metals from the soil contaminated through different sources: a review. *Environmental Science and Pollution Research*, 27, 1319-1333.
 - 4) Kumar, D., & Khan, E. A. (2021). Remediation and detection techniques for heavy metals in the environment. In *Heavy metals in the environment* (pp. 205-222). Elsevier.
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The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 30 h (1.28)

Student's independent work: 25 h (0.72)