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Course title: INFORMATION TECHNOLOGIES IN ENVIRONMENTAL ENGINEERING

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

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Substantive content

CLASSES: Introduction to the mathematical modelling environment of selected processes in environmental engineering. Discussion of modelling goals. Presentation of the methodology (stages) of creating a mathematical model. Modelling the growth kinetics of the population of microorganisms. Monod model. Modelling of biochemical changes. Mass and energy balances of aerobic and anaerobic farming. Mathematical modelling of selected processes in environmental engineering. Optimization of process parameters and bioreactor design.

Learning purpose: Getting acquainted with the methods used to create mathematical models of processes in environmental engineering.

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On completion of the study programme, the graduate will gain:

Knowledge: Principles of creating mathematical models of processes and their optimization. Principles of applying mathematical modelling methods in the research of selected production processes.

Skills: Calculations of the growth kinetics of microorganisms and gas release during selected biomass processing processes. Use the computing environment.

Social Competencies: Promoting the importance of mathematical modelling and computer simulation in the design of bioreactor installations.

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Basic literature:

- 1) Gupta, S., Aga, D., Pruden, A., Zhang, L., & Vikesland, P. (2021). Data analytics for environmental science and engineering research. *Environmental Science & Technology*, 55(16), 10895-10907.
- 2) Batstone, D. J., Keller, J., Angelidaki, I., Kalyuzhnyi, S. V., Pavlostathis, S. G., Rozzi, A., Vavi, The IWA anaerobic digestion model no 1 (ADM1), *Wyd. Water Science and Technology*, R. 2002.
- 3) Prochaska, C., Theodore, L., *Introduction to mathematical methods for environmental engineers and scientists*, Wyd. John Wiley Sons, R. 2018.
- 4) Tang, K. T., *Mathematical methods for engineers and scientists*, Wyd. Springer, R. 2022.

Supplementary literature: ---

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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)