

Process Engineering - course description

General information	
Course name	Process Engineering
Course ID	13.9-WB-OS2P-In_proc-S17
Faculty	Faculty of Biological Sciences
Field of study	Environmental Protection
Education profile	academic
Level of studies	First-cycle studies leading to Bachelor's degree
Beginning semester	winter term 2021/2022

Course information	
Semester	4
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	<ul style="list-style-type: none">dr inż. Julia Nowak-Jary

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam
Class	15	1	-	-	Credit with grade

Aim of the course

The aim of the course is to acquire by a student a basic knowledge regarding process engineering rules and the most important unitary operations and processes, especially these which have applications in the field of environmental protection. Furthermore, the goal is to acquire by a student skills of mathematical analysis of the unitary operations and processes which enable predicting the technological and economical properties of the designed processes.

Prerequisites

Passing the courses: Physical Chemistry, Physics, Mathematics.

Scope

Lectures: Unitary operations and processes. Selected issues regarding rheology and media flow; properties of liquids in environmental protection. The flow continuity equation and the Bernoulli's law. Real fluids: pressure losses caused by the internal friction of the fluids (Darcy-Weisbach equation) and by the local resistance. Pumps. The liquid outflow from a vat. Mono- and polyphase flux through deposits. Gravitational separation of suspensions: sedimentation and filtration. Fluidization. Barbotage. Filtration. Dust removal from gases. Heat transport. Extraction. Absorption and adsorption in purifying liquids. Division and general characteristics of membrane processes used in environmental protection.

Exercises: solving issues and computational tasks regarding: physicochemical parameters of fluids, fluids' flow: the flow continuity equation, the Bernoulli's law and the Darcy-Weisbach equation. Sedimentation, filtration, heat transport, adsorption, extraction.

Teaching methods

Lecture - multimedia presentation

Exercises: practical - solving problems and tasks

Learning outcomes and methods of their verification

Outcome description	Outcome symbols	Methods of verification	The class form
A student understands basic phenomena and chemical processes, especially applicable in process engineering.	<ul style="list-style-type: none">K1A_W12	<ul style="list-style-type: none">activity during the classesan exam - oral, descriptive, test and otheran observation and evaluation of activities during the classes	<ul style="list-style-type: none">Lecture

Outcome description	Outcome symbols	Methods of verification	The class form
A student differentiates and classifies selected processes, indicates their application in the field of the environment's protection; he is able to carry out simple calculations in the area of process engineering; he can prepare and show a presentation regarding the issues contained in the curriculum.	<ul style="list-style-type: none"> • K1A_U68 	<ul style="list-style-type: none"> • activity during the classes • an evaluation test • an observation and evaluation of activities during the classes 	<ul style="list-style-type: none"> • Lecture • Class
The student has knowledge in the area of the basic conceptual categories and processing engineering terminology as well as awareness of development of science and science disciplines, which are appropriate for the studied degree course involving applied research methods.	<ul style="list-style-type: none"> • K1A_W90 	<ul style="list-style-type: none"> • activity during the classes • an exam - oral, descriptive, test and other • an observation and evaluation of activities during the classes 	<ul style="list-style-type: none"> • Lecture
The student understands the basic natural processes; has knowledge in the area of mathematics, physics and chemistry which is necessary for understanding the basic unit processes and operations in process engineering; is knowledgeable about the basic term categories and natural terminology.	<ul style="list-style-type: none"> • K1A_W81 	<ul style="list-style-type: none"> • activity during the classes • an evaluation test • an observation and evaluation of activities during the classes 	<ul style="list-style-type: none"> • Class
A student is able to carry out calculations in the area of mathematical and natural sciences.	<ul style="list-style-type: none"> • K1A_U59 	<ul style="list-style-type: none"> • activity during the classes • an evaluation test • an observation and evaluation of activities during the classes 	<ul style="list-style-type: none"> • Class
The student understands the need of constant learning and constantly updates his knowledge.	<ul style="list-style-type: none"> • K1A_K22 	<ul style="list-style-type: none"> • a discussion • an observation and evaluation of activities during the classes • an observation and evaluation of the student's practical skills 	<ul style="list-style-type: none"> • Lecture • Class

Assignment conditions

Lecture - final exam in written. The exam takes 90 minutes and involves 5 problems requiring discussion. In order to get credit for sufficient assessment, obtaining 60 points (60%) for 100 points is required.

Exercises - tests in written. Final assessment is an arithmetic mean of partial assessments.

Recommended reading

- 1) Environmental Processes - An International Journal, Editor-in-Chief: Vassilios A. Tsihrintzis, ISSN: 2198-7491 (print version), ISSN: 2198-7505 (electronic version)
- 2) Introduction to Process Engineering and Design, Shuchen B. Tharoke, Bharat I. Bhat, Tata McGraw-Hill Publishing Company Limited, 2007
- 3) Handbook of Chemical Engineering Calculations, Nicholas Chokey, McGraw-Hill Professional, 2003

Further reading

- 1) Principle of Chemical Engineering Practice, George DeLancey, John Wiley&Sons, 2013

Notes

Lack

Modified by dr inż. Julia Nowak-Jary (last modification: 20-05-2021 09:46)

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