Cracow University of Technology

Course syllabus

binding for the doctoral students of the CUT Doctoral School commencing their studies in the academic year 2022/2023

Information on the course

Name of the course in Polish	Jednostkowe procesy w inżynierii środowiska
Name of the course in English	Unit processes in environmental engineering
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Elective
Field of education	Engineering and Technology
Discipline of education	Environmental engineering, ,mining and power engineering
Person responsible for the course Contact	Andrzej Bielski, *doctor hab.*, MSc in Eng. , professor of CUT andrzej.bielski@pk.edu.pl

Type of course, number of hours in the study programme curriculum

Semester	Credit type (G / NG)*	Lecture	Practical class	Laboratory	Computer Laboratory	Project class	Seminar
3	G	15	0	0	0	0	0

*G – graded credit, NG – non-graded credit

Course objectives

Code	Objective description
Objective 1	Gaining knowledge in the field of basic unit processes used in environmental technologies
Objective 2	Acquiring computational skills related to the design of selected devices and reactors used in environmental technologies.

Learning Outcomes

Code	Description of the learning outcome adjusted to the specific characteristics of the discipline	Learning outcome symbol in the CUT SD	Methods of verification
OUTCOMES RELATED TO KNOWLEDGE			
EUW1	The doctoral student has the knowledge of methods for describing the kinetics of selected chemical and biochemical processes	E_W01	Involvement in class activities
EUW2	The doctoral student has the knowledge of the calculations of devices and reactors used in environmental technologies	E_W02	Involvement in class activities
OUTCOMES RELATED TO SKILLS			
EUU1	Acquiring computational skills in the field of speed of selected processes. Acquiring computational skills related to the design of selected devices and reactors	E_U01	Graded paper

OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	Acquiring the ability to present independent opinions on individual processes and creativity in presenting views	E_K01 E_K03	Discussion

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Kinetics of chemical and biochemical processes	EUW1, EUW2, EUU1, EUK1	6
W2	Basic types of reactors, mass balance	EUW1, EUW2, EUU2	2
W3	Reactors models	EUW1, EUW2, EUU2, EUK2,	3
W4	Mass exchangers	EUW1, EUW2, EUU2, EUK2	4

The ECTS points statement

WORKING HOURS SETTLEMENT	
Type of activity	Average number of hours (45 min.) dedicated to the completion of an activity type
SCHEDULED CONTACT HOURS WITH THE ACADEMIC TEACHER	
Hours allotted in the syllabus	15
Consultations	1
Examination / course credit assignment	2
HOURS WITHOUT THE PARTICIPATION OF THE ACADEMIC TEACHER	
Independent study of the course contents	8
Preparation of a paper, report, project, presentation, discussion	4
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	Knowledge of differential calculus, the ability to use a spreadsheet and a text editing program
2	Knowledge of the English language

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	75% attendance in class.
2	Delivery/ submission of a paper presentation.
	METHOD OF THE FINAL GRADE CALCULATION
	Credit assigned on the grounds of weighted average of the result of the discussion and the delivery of the paper presentation.

Additional information

None

The course reading list

1	F. Strek - Mixing and mixers, Warsaw, 1979, Polish Scientific Publishers PWN
2	J. Szarawara, J. Skrzypek - Fundamentals of chemical reactor engineering, Warsaw, 1980, Scientific and Technical Publishers
3	Z. Kembijowski, St. Michałowski, Cz. Strumiłło, R. Zarzycki - Theoretical foundations of chemical and process engineering, Warsaw, 1985, Scientific and Technical Publishers
4	K.F. Pawłow, P.G. Romankow, A.A. Noskow - Examples and tasks in the field of chemical apparatus and engineering, Warsaw, 1981, Scientific and Technical Publishers
5	J. Pikon - Chemical apparatus, Warsaw, 1978, Polish Scientific Publishers PWN
6	W.W. Kafarov, A. Ju. Vinarov, L.S. Gordiejew - Modeling of biochemical reactors, Warsaw, 1983, Scientific and Technical Publishing House
7	R.Zarzycki, M.Imbierowicz, M.Stelmachowski - Introduction to engineering and environmental protection, part: 1, 2, Warsaw, 2007, Scientific and Technical Publishers
8	Metcalf & Eddy, Wastewater Engineering Treatment and Reuse, Mc Graw Hill, 2004
9	Crittenden J. C. , Trussell R. R. , Hand D. W. , Howe K. J. , Tchoobanoglous G. , Borchardt J. H. MWH's Water Treatment pronciples and design, John Wiley & Sons, 2012