Nazwa w jęz. angielskim: Process Smulation, Optimistaion and Design

Dane dotyczące zajęć:
Information on course:

Jednostka oferująca: Wydział Chemiczny // dr hab. inż. Robert Kubica, prof. PŚ
Course offered by: Faculty of Chemistry // dr hab. inż. Robert Kubica, prof. PŚ

Język wykładowy:
angielski
Language:
English
Strona WWW: **Course homepage:**
Skrócony opis:
Short description:
The main objective is to provide the students with: a skils, including practical in using specialized software for mathematical problems solution, clear understanding of what is a process simulation, a process optimization and process design, using commonly available software to solve simulation problems, using specialized software for process simulation.
Opis:
Description:
Lectures in the form of multimedia presentations, laboratories conducted in the computer laboratory. Based on th course The student knows what is the chemical process simulation as well as has orientation in commercial simulating software, understand conception of degrees of freedom for streams, apparatus and systems; knows the principles of design and modeling of Heat exchanger, rectifying column, chemical reactor etc. The student knows principles of using ChemCAD process simulator, can use it to describe thermodynamic parameters of streams, phase equilibrium, design and make simulations of system consist of heat exchangers, reactors, rectifying columns and other equipment; understand idea of steady state calculations as well as unsteady state and regulation systems. The student knows how to use MathCAD software to solve equations, systems of linear and non-linear algebraic equations, differential equations and its systems, approximation and interpolations problems. The student can make calculations in MathCAD environment; solves algebraic equations and systems of algebraic equations using few 2 / 4 methods, makes calculations on matrices, can import files, approximate data by functions; can show results in graphic form. The student can design and simulate heat exchanger, chemical reactor, rectifying column using the ChemCAD software; can make simulation of system consist of few apparatus; knows how to use correctly measuring equipment and regulating systems.The student can solely deliver a process design of the drying system Lectures include description of mathematical package (MathCAD), overall rules of process simulations shown on the basis of a simple process flowsheeting simulator as well as principles of physico-chemical and thermodynamic properties systems calculations, mass and heat balances indispensable to fully take advantage of process simulation software (including ChemCAD). Lectures include also introduction to using ChemCAD and MathCAD software. Laboratory classes: Classes are held in a computer laboratory. During the laboratories students exercise skills of using the mathematical package making basic calculations and plots, solving systems of linear and non-linear equations, ordinary derivative equations and makes approximation of the experimental date by given functions. Then they use MathCAD to create simulator of system consists of heat exchanger and pipes. Next the students will practically exercise skills of using ChemCAD including mass and heat balances of different unit operations; analyse steady states of the systems.

Project:
A process design of a complete system for drying bulk materials (from the furnace producing the hot flue gases through a fluidized bed dryer), inlcuding all the necessary euipment, selection and design. Within the confines of project the students will be familiarized with procedures of process design and process control by elaboration of a project book. Project elaborated in a sole way based on idividual sets of input data. Introduction to the project provided by tutor. Optional consultation possible in a set 3 / 4 hours aside of the course. Obligatory attendance to laboratories and project introductory classes.

Number of hours of classes with direct participation of academic teachers or other persons teaching courses and students (105h).
Contact hours (105h):
lecture 30h,
laboratory 45h,
project 30h
Number of ECTS credits: 7

Literatura:

Bibliography:

1. G. Towler, R. Sinnott: Chemical engineering designm, Elsevier, 2013
2. W.D.Seider, J.D. Seader i D.R. Lewin: Process Design Principles. Synthesis, Analysis and Evaluation, Willy, N.Y.1999

Efekty uczenia się:

Learning outcomes:

K2A-W01 Student has broadened and deep knowledge in the field of mathematics and computer science necessary for modeling, planning, optimization and characterization of industrial chemical processes as well as planning experiments and elaborating the results of experimental research.
K2A-W02 Student has an extended knowledge in the field of physics allowing to understand physical processes related to technology and chemical engineering

K2A-U07 Student can use professional software, using them to design chemical processes.
K2A-U09 Student has the ability to analyze and solve problems related to chemical technology and process engineering, using theoretical, analytical, simulation and experimental methods for this purpose

Metody i kryteria oceniania:

Assessment methods and assessment criteria:

Lecture:
Final grade is derived based on the written test that covers scope of the lectures, as well as the laboraotry and project grades. The requirement for admission to the exam is passing the laboratories.

Laboratory: Final grade is derived based on the separate grades of individual projects. Each individual topics rated under the presence of student. The work is assessed for compliance with relevant standards and requirements . Theoretical background of the student can be also checked and rated if applicable.

Project: The project is carried out independently on the basis of individual sets of input data. Introduction to the project carried out by the teacher. Optional consultations of the results of your own work at set times. Obligatory participation in laboratory classes and during a series of introductory classes to the project.
The final grade is a weighted average of the writen test (scope of the lectures), laboratory and project grades with weights of 40%, 30%, 30% respectively.

Przynależność do grup przedmiotów w cyklach:
Element of course groups in various terms:

Opis grupy przedmiotów Course group description	Cykl pocz. First term	Cykl kon. Last term
przedmioty obieralne	2023/2024	

studia stacjonarne i niestacjonarne stopień studiów – dowolny kierunek studiów – dowolny, semestr dowolny elective courses full-time and part-time studies degree - any field of study - any semester - any		