FACULTY OF CHEMISTRY

SUBJECT CARD

Name of subject in Polish: Podstawy inżynierii chemicznej
Name of subject in English: Foundations of chemical engineering
Main field of study (if applicable):
Specialization (if applicable):
Profile: academic
Level and form of studies: 1st level, 2nd level – supplementary semester, full-time
Kind of subject: obligatory
Subject code
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				
Number of hours of total student workload (CNPS)	90				
Form of crediting	Crediting with grade				
For group of courses mark (X) final course					
Number of ECTS points	2				
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BU) classes	1,3				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of physics and mathematics on the secondary school level.

SUBJECT OBJECTIVES

C1 Cognition of quantitative description of fluid flow processes in apparatus including drops pressure.
C2 Using of Bernoulli law for quantitative description of metering equipments and heat and mass transfer apparatus.
C3 Specify of heat transfer methods.
C4 Specify of interphase mass transfer.
C5 Cognition of construction rules and operation of selected industrial equipment and apparatus.

SUBJECT LEARNING OUTCOMES

relating to knowledge:
PEK_W01 – know different types of flows in industrial flowing equipment and apparatus used for heat and mass transfer.
PEK_W02 – know Bernoulli law and its application for description of different types of flows in the equipment and apparatus.
PEK_W03 – know methods of heat transfer in the heat-exchangers.
PEK_W04 – distinguish mass transfer and overall mass transfer and is able to describe mass transfer rate of components.
PEK_W05 – know cognition of construction rules and influence of operating parameters on the processes in selected apparatus: pumps, sedimentators, filters, separators of dusts, mixers, chemical reactors, and distillation, absorption, extraction, adsorption, drying apparatus.

PROGRAMME CONTENT

	Lectures	**Number of hours**
Lec1	Interest area of chemical engineering and basic values used for processes description.	2
Lec2	Balancing rules streams and apparatus.	2

Lec3	Fluid flow in apparatus, Bernoulli equation, pressure drops in pipeline and in selected apparatus.	2
Lec4	Pumps – characteristics of pump and pipeline. Calculation of work point in selected configurations pump – pipeline.	2
Lec5	Motion of particles in the fluids. Calculation of particle diameter, calculation of motion velocity, fall of particles set, fluidization, pneumatic transport, sedimentation.	2
Lec6	Filtration. Filter construction, classification of filtration processes, used filters in selected technologies.	2
Lec7	Mixers, construction of stirrers and mixers, consumption of energy.	2
Lec8	Heat transfer processes and heat exchangers.	2
Lec9	Methods of description mass transfer process, methods of realization absorption process.	2
Lec10	Absorption processes. Absorption apparatus.	2
Lec11	Distillation processes. Equilibrium distillation, batch distillation, distillation with the steam, thin layer distillation, molecular distillation. Rules of balancing.	2
Lec12	Rectification of two-component systems. Construction of rectification column, heat and mass balances of process.	2
Lec13	Extraction apparatus. Periodic apparatus and continuous apparatus. Calculation methods with using Gibbs triangle. Calculation of the extraction column diameter and column high by means of selected methods.	2
Lec14	Drying processes. Drying medium – Molier diagram. Construction of dryers, time of drying.	2
Lec15	Credits colloquium.	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Lecture with multimedia presentation.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
C1	PEK_W01 – PEK_W05	Crediting with grade.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Koch, A. Noworyta: *Procesy mechaniczne w inżynierii chemicznej*, WNT, Warszawa, 1992.
[2] R. Koch, A. Kozioł: *Dyfuzyjno–cieplny rozdział substancji*, WNT, Warszawa, 1994.
[3] J. Ciborowski: *Podstawy inżynierii chemicznej*, WNT, Warszawa, 1982
[4] M. Serwiński: *Zasady inżynierii chemicznej i procesowej*, WNT, Warszawa, 1982
[5] A. Selecki, L. Gradoń: *Podstawowe procesy przemysłu chemicznego*, WNT, Warszawa, 1985.

SECONDARY LITERATURE:

[1] Z. Kembłowski: *Podstawy teoretyczne inżynierii chemicznej i procesowej*, WNT, Warszawa 1985.
[2] T. Hobler: *Ruch ciepła i wymienniki*, WNT, Warszawa, 1986.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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