FACULTY OF CHEMISTRY

SUBJECT CARD

Name in Polish	Nowe trendy w inżynierii chemicznej
Name in English	New concepts and solutions in chemical engineering
Main field of study (if applicable):	Inżynieria chemiczna i procesowa
Specialization (if applicable):	Advanced Chemical Engineering and Nanotechnology
Level and form of studies:	2nd level, full-time
Kind of subject:	selectable
Subject code	ICC020011
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)	60				
Form of crediting	credit				
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 (BK) classes	1				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Fundamentals of physics, chemistry and chemical engineering.

SUBJECT OBJECTIVES

C1	To understand role of chemical engineering in modern global economy.
C2	To understand direction of development of chemical engineering.
C3	To understand role of nanotechnology in chemical industry.
C4	To understand role of advanced analytical methods in chemical industry.
C5	To understand role of advanced computer modeling methods in chemical industry.

SUBJECT LEARNING OUTCOMES

Related to knowledge:

The person who completed the course:

P2P_W01 – knows the fundamental challenges in chemical industry,

P2P_W03 – knows advanced computational and analytical methods used in chemical engineering,

P2P_W07 – understands the role of new technologies in the design of technological processes,

P2A_W05 – knows directions of development of new technologies in chemical engineering.

Related to skills:

The person who completed the course:

P2K_U01 - is able to find in the literature information concerning advances in chemical engineering,

P2K_U02 – is able to propose application of new technologies in chemical industry,

P2K_U07 – is able to identify directions of development of chemical engineering.

With a range of social skills:
The person who completed the course:
P2K_K01 - is able to work in a group consisting of several people interchanging and formulating opinions

PROGRAMME CONTENT

	Form of classes - project	**Number of hours**
Lec1	Challenges of the XXI century.	2
Lec2	Advanced analytical methods process I: spectrometric methods in the analysis of the crystallization process.	2
Lec3	Advanced analytical methods for process II: observations in the near-infrared spectroscopy and image analysis in search of pollution during the production of drugs.	2
Lec4	The intensification of the process: nanofluids.	2
Lec5	Nano-biocomposites in chemical engineering.	2
Lec6	Design and development of targeted drug carriers.	2
Lec7	Energy industry based on hydrogen I: methods of energy generation.	2
Lec8	Energy industry based on hydrogen II: storage.	2
Lec9	Nanotechnology in water treatment technologies.	2
Lec10	Radioactive waste treatment.	2
Lec11	Non-invasive measurement methods: tomographic methods, laser methods, advanced image analysis.	2
Lec12	Novel methods of sequestration, distribution and processing of carbon dioxide.	2
Lec13	Microreactors I.	2
Lec14	Microreactors II.	2
Lec15	The future of chemical engineering.	2
	Total hours	**30**

TEACHING TOOLS USED

N1	Lecture
N2	Consultation

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
P (lecture)	PEK_W01-W15	exam

grade
2,0 if P < 14,5 pnt.
3,0 if P= 14,5– 18,0 pnt.
3,5 if P = 18,5 – 21,5 pnt.
4,0 if P = 20 – 22 pnt.
4,5 if P = 22,5- 24,5 pnt.
5,0 if P = 25 - 27 pnt.
5,5 if P = 27,5-30 pnt.

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] Wirth Thomas, Microreactors in Organic Chemistry and Catalysis, Wiley-Vch, Singapore, 2013 [2] Jighai Li, Advances in Chemical Engineering: Characterization of Flow, Particles and Interfaces, Academic Press, 2009. **SECONDARY LITERATURE:** [1] Internet sources
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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