

DESCRIPTION OF THE COURSE OF STUDY

Course code	0531-2CHM-C04-TS	
Name of the course in	Polish	Techniki separacyjne
	English	The technics of separation

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	Chemistry
1.2. Mode of study	Full-time studies
1.3. Level of study	Second-cycle studies
1.4. Profile of study*	General academic
1.5. Person/s preparing the course description	prof. dr hab. Piotr Słomkiewicz, dr. hab. Beata Szczepanik, prof. UJK
1.6. Contact	piotr.slomkiewicz@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	English
2.2. Prerequisites*	mathematics, physics, basics of chemistry

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes	Lectures, laboratory	
3.2. Place of classes	Classes in the teaching room of the UJK	
3.3. Form of assessment	Lecture - exam, laboratory – pas w/ grade	
3.4. Teaching methods	Lecture, discussion, demonstration, experiments, project	
3.5. Bibliography	Required reading	An Introduction to Separation Science, BL Karger, John Wiley & Sons 1973
	Further reading	Separation Process Principles: With Applications Using Process Simulators John Wiley & Sons 2019

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

<p>4.1. Course objectives (including form of classes) lecture C1 – Getting to know various separation techniques and their use in chemical research. C2 – Getting to know the theory of separation phenomena C3 – Introduction of extraction, chromatographic and adsorption methods and their practical application lab C4 – Acquiring skills in using extraction and chromatographic equipment</p>
<p>4.2. Detailed syllabus (including form of classes) LECTURE General characteristics of separation techniques and their application. Isolation of analytes from matrices, chromatography and electromigration. Theory of separation phenomena, adsorption and partition, intermolecular interactions. Extraction techniques. Extraction gas – liquid, gas – solid, liquid – liquid, liquid – gas, liquid – solid, to the headspace phase. Microextraction to the stationary phase, to a single drop of solvent, to the packed phase. Solid-liquid extraction, assisted by microwaves, ultrasounds, accelerated extraction with solvents under pressure. Chromatographic techniques. Theory of chromatography, gas, column and thin-layer liquid chromatography, supercritical. Electromigration techniques, plane gel electrophoresis and capillary electrophoresis. LAB Exercises in the field of extraction, thin layer chromatography, liquid HPLC and adsorption.</p>

4.3 Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of KNOWLEDGE:		
W01	Defines concepts related to extraction, adsorption, chromatography and electromigration techniques Explains the phenomena accompanying separation processes Knows the basics of the construction and operation of equipment used during extraction and chromatography	CHEM2A_W04 CHEM2A_W04
within the scope of ABILITIES:		
U01	Performs simple chromatographic separations and adsorption processes	CHEM2A_U01
U02	Interprets the obtained experimental results	CHEM2A_U09
within the scope of SOCIAL COMPETENCE:		
K01	is ready to recognize the importance of knowledge in solving cognitive and practical problems	CHEM2A_K01

4.4. Methods to verify the achievement of the learning outcomes

Teaching outcomes (code)	Method of verification (+/-)											
	Exam oral/written*			Test*			Project*			Group work*		
	Form of classes			Form of classes			Form of classes			Form of classes		
	W	C	...	W	K	L	W	K	L	W	K	L
W01	+				+	+						
W02	+				+	+						
W03	+				+	+						
U01												+
U02					+							+
U03					+	+			+			+
U04					+	+			+			+
U05					+				+			
K01	+											

*delete as appropriate

4.5. Criteria of assessment of the intended learning outcomes

Form of classes	Grade	Criterion of assessment
Lecture (L) (including e-learning)	3	Exam - test, 51-60% correct answers
	3,5	Exam - test, 61-70% correct answers
	4	Exam - test, 71-80% correct answers
	4,5	Exam - test, 81-90% correct answers
	5	Exam - test, 91-100% correct answers
Seminar including e-learning	3	Pass w/grade - test, 51-60% correct answers
	3,5	Pass w/grade - test, 61-70% correct answers
	4	Pass w/grade - test, 71-80% correct answers
	4,5	Pass w/grade - test, 81-90% correct answers
	5	Pass w/grade - test, 91-100% correct answers
Laboratory exercises (including e-learning)	3	Pass w/grade - test, 51-60% correct answers
	3,5	Pass w/grade - test, 61-70% correct answers
	4	Pass w/grade - test, 71-80% correct answers
	4,5	Pass w/grade - test, 81-90% correct answers
	5	Pass w/grade - test, 91-100% correct answers

5. BALANCE OF ECTS CREDITS – STUDENT’S WORK INPUT

Category	Student's workload	
	Full-time studies	Extramural studies
<i>NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/</i>	55	55
<i>Participation in lectures*</i>	15	15
<i>Participation in seminars, laboratories*</i>	35	35
<i>INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/</i>	25	25
<i>Preparation for the classes, seminars, laboratories*</i>	10	10
<i>Preparation for the exam/test*</i>	15	15
<i>TOTAL NUMBER OF HOURS</i>	75	75
ECTS credits for the course of study	3	3

**delete as appropriate*

Accepted for execution (date and legible signatures of the teachers running the course in the given academic year)

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