

DESCRIPTION OF THE COURSE OF STUDY

Course code	0531-2CHEM-C12-CM/0531-2CHEM-C12-CM	
Name of the course in	Polish	<i>Chemia materiałów</i>
	English	<i>Chemistry of Materials</i>

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/extramural studies
1.3. Level of study	graduate studies
1.4. Profile of study*	general
1.5. Person/s preparing the course description	Walentyna Zubkowa, Andrzej Strójwjas
1.6. Contact	walentyna.zubkowa@ujk.edu.pl andrzej.strojwas@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	English
2.2. Prerequisites*	Basics of Chemistry, Organic Chemistry

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes	Lecture: 30 hrs, Laboratory: 30 hrs	
3.2. Place of classes	Classes at the UJK facilities	
3.3. Form of assessment	Lecture: exam (test) Laboratory: credit with a grade	
3.4. Teaching methods	Lecture, laboratory (self-conducted experiments), discussion (problem solving)	
3.5. Bibliography	Required reading	Pielichowski J., Puszyński A. <i>Chemia polimerów</i> . Wyd. AGH. Kraków 2004; Gersten J.I. <i>The Physics and Chemistry of Materials</i> . New York, John Wiley & Sons, 2001 Bala H. <i>Wstęp do chemii materiałów</i> . WNT. Warszawa 2003; Porejko S., Fejgin J., Zakrzewski L. <i>Chemia Związków Wielkocząsteczkowych</i> . WNT. Warszawa 1974.
	Further reading	Przybyłowicz K., Przybyłowicz J. <i>Materiałoznawstwo w pytaniach i odpowiedziach</i> . WNT. Warszawa 2004. Florjańczyk Z., Penczek S. <i>Chemia polimerów t. 1-3</i> . Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 1995-1997

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

4.1. Course objectives (including form of classes)

C1. The main objective of the lectures is to master the skills of using chemical methodology by the students in order to describe the structure of polymers and other materials.

C2. The objective of laboratories is to improve the skills of obtaining materials with specific utility purposes.

4.2. Detailed syllabus (including form of classes)

Lecture

The notion of polymer. Average molecular weights. The influence of monomer structure on the type of polyreaction. Branched and star polymers, dendrimers. Synthesis methods – polymerization, polycondensation, polyaddition. The stages of polymerization – initiation, propagation, termination, transfer. Radical and ionic polymerization. Coordination polymerization. Condensation polymerization. Enzymatic polymerization. Migratory polyaddition, polymerization of aldehydes and ketones. Materials for special purposes: liquid crystal and carbon polymers. The elements of supramolecular chemistry: the definition of notion of supramolecular chemistry, the notion and basic functions of supramolecule; molecular recognition; the principles of construction of molecular receptor. Metallic materials, steels and special alloys. Heat treatment – the definition and types of treatment, phase transformations. Ceramic materials – the definition and basic types: porcelain, porcelite, faience; their properties. Glass: definition, the classification of glasses, structure and properties. Sintered materials and composites – definition, preparation, properties.

Laboratory

The identification of macromolecular compounds containing acetate groups. The determination of molecular weight using the viscometric method. The polymerization of styrene and determination of its conversion degree. Polycondensation reaction, reaction rate constant computation. Ceramic materials. The determination of the sintering temperature of clay. The determination of the composition and properties of selected binders.

4.3 Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of KNOWLEDGE:		
W01	knows the nomenclature and definitions used in the chemistry of materials.	CHEM1A_W11
W02	describes the relationship between the chemical structure of monomers and the type of synthesis reaction leading to the formation of macromolecular compounds.	CHEM1A_W04
W03	has knowledge about the composition, chemical structure, and properties of metallic and ceramic materials	CHEM1A_W11
within the scope of ABILITIES:		
U01	describes and analyses the mechanisms of polymerization reactions	CHEM1A_U05
U02	carries out synthesis reactions of selected polymers and resins	CHEM1A_U06
U03	identifies polymer substances on the basis of colour reactions	CHEM1A_U05
within the scope of SOCIAL COMPETENCE:		
K01	assesses the role of polymer, metallic, and ceramic materials in modern economy, is critical of information propagated in mass media, especially in the field of exact sciences	CHEM1A_K01

4.4. Methods of assessment of the intended learning outcomes

Teaching outcomes (code)	Method of assessment (+/-)														
	Exam oral /written*			Test*			Project*			Group-work*			Others* e.g. standardized test used in e-learning		
	Form of classes			Form of classes			Form of classes			Form of classes			Form of classes		
	L	€	...	L	C	...	L	€	...	L	€	...	L	€	...
W01	+														
W02	+														
W03	+				+										
U01	+				+										
U02					+										
U03					+										
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 : the student must earn at least 60% of the total points
	3,5	Exam : the student must earn at least 66% of the total points
	4	Exam : the student must earn at least 76% of the total points
	4,5	Exam : the student must earn at least 86% of the total points
	5	Exam : the student must earn at least 96% of the total points
Laboratory	3	Student performed all practical tasks; wrote reports with corrections; earned >60% of corrected answers.
	3,5	Student performed all practical tasks; wrote reports with corrections; earned >66% of corrected answers.
	4	Student performed all practical tasks; wrote reports with corrections; earned >76% of corrected answers.
	4,5	Student performed all practical tasks; wrote reports with corrections; earned >86% of corrected answers.
	5	Student performed all practical tasks; wrote reports with corrections; earned >96% of corrected answers.

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

Category	Student's workload	
	Full-time studies	Extramural studies
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER	60	

/CONTACT HOURS/		
<i>Participation in lectures*</i>	30	
<i>Participation in classes, seminars, laboratories*</i>	30	
<i>Preparation in the exam/final test*</i>		
<i>Others*</i>		
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	40	
<i>Preparation for the lecture*</i>		
<i>Preparation for the classes, seminars, laboratories*</i>	20	
<i>Preparation for the exam/test*</i>	20	
<i>Gathering materials for the project/Internet query*</i>		
<i>Preparation of multimedia presentation</i>		
<i>Others*</i>		
TOTAL NUMBER OF HOURS	100	
ECTS credits for the course of study	4	

**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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