KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Chemistry of polymers	13.3.0420

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Chemii	Chemia	type	pierwszego stopnia
		form	stacjonarne
		specialty	chemia biomedyczna, chemia kosmetyków
		specialization	wszystkie

Teaching staff

prof. dr hab. Piotr Rekowski; dr hab. Jarosław Ruczyński

Forms of classes, the realization and number of hours

Forms of classes

Auditorium classes, Laboratory classes, Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 30 hours, Laboratory classes: 15 hours, Auditorium classes: 15 hours

ECTS credits

5
classes - 60 h
tutorial classes – 15 h
student's own work – 50 h

Total: 125 h - 5 ECTS

The academic cycle

2024/2025 winter semester

Type of course

obligatory

Language of instruction

polish

Teaching methods

- conducting experiments
- multimedia-based lecture
- problem solving

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

- Graded credit
- Examination

Assessment methods

- written exam with open questions
- (mid-term / end-term) test
- oral exam

The basic criteria for evaluation

	C. The basic criteria for evaluation or exam requirements • positive grade received in written exam composed of 8-12 open questions covering issues listed in the course contents; answers to these questions will require solving tasks specified in educational outcomes; the grading scale would be adjusted to the range of all rated exams • to take the exam both the laboratory classes and tutorials must be passed; Tutorials: • passing one written colloquium covering: nomenclature, structure, isomerism and classification of polymers, methods for preparing polymers, examples of polyaddition reactions, polycondensation, copolymerization and coordination polymerization, chemical reactions of polymers, methods for the preparation of selected monomers used in polymerization reactions • each negative grade should be improved at repeat colloquium. Laboratory classes: • positive grade received in 3 preliminary testes, that check knowledge required to perform experiments during the classes; accomplishment of all planned experimental work (quality of laboratory work, ability to team work and mode of work would be graded); analysis of obtained results performed as written report; • to complete the laboratory course each negative grade must be improved

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements

Organic chemistry (bachelor level)

B. Prerequisites

Fundamentals of organic chemistry, skills to work in a chemical laboratory, knowledge of basic laboratory glassware and equipment

Aims of education

• to acquaint students with all issues mentioned in the lecture contents;
• to acquaint students with the nomenclature used in polymer chemistry; learning about the structure • to familiarize students with the basic types of chemical reactions used in the synthesis of polymers
• to teach students the prediction of some physicochemical properties of polymers depending on their chemical structure and microstructure
• to develop the ability to critically evaluate information on the environmental harmfulness of using synthetic polymers in everyday life and industry

Course contents

A. Lecture topics: polymers - the concept of macromolecule, polymer and biopolymer, chemical structure description, polymer microstructure (tacticity, stereochemistry). Structure-property relationships: relation of glass transition to structure. The main synthesis methods of macromolecules; polymerisation and polycondensation; copolymerization; elementary reactions: initiation, propagation, termination; polymerization: radical, ionic (cationic and anionic) and coordination. Polymer classes: carbo- and hetero-chain polymers, polyolefins, vinyl polymers, polyesters, polyamides; phenolic and epoxy resins. Industrial methods of obtaining monomers for the synthesis of polymers. Chemical reactions of polymers: crosslinking, grafting, oxidation.. The use of polymers: in modern technologies, industry, medicine, special polymers (electrically conductive, thermally resistant), biodegradable polymers, polymers and the natural environment.
B. Tutorial: naming, structure, isomerism and classification of polymers, methods for obtaining polymers, examples of polyaddition reactions, polycondensation, copolymerization and coordination polymerization, chemical reactions of polymers, methods of obtaining selected monomers used in polymerization reactions
C. The lab: completion of three experiments with the following topics: 1. Preparation of poly(methyl methacrylate); 2. Preparation of a nylon thread (nylon 6,10); 3. Identification of polymer materials

Bibliography of literature

Literature required to pass the course:
Rabek J.F., „Współczesna wiedza o polimerach”, PWN 2008
Pieluchowski J., Puszyński A., „Chemia Polimerow” Wydawnictwo AGH, Kraków 1998
Walton D., Lorimer P., ”Polymers”, Oxford University Press 2001
Stevens M.P., Polymer Chemistry, Oxford University Press, 1999
Monographic works provided by assistants leading classes
Extracurricular readings:
Various academic handbooks concerning polymer chemistry

The learning outcomes (for the field of study and specialization)	Knowledge
	1. defines the basic principles of polymer chemistry

	2. illustrates polymerization stages by chemical reactions, 3. characterizes the ways of describing the polymer microstructure 4. characterizes methods of radical, ionic and coordination polymerizations 5. describes the polyaddition and polycondensation 6. lists the most important applications of popular synthetic polymers
	Skills
	1. uses chemical terminology to the extent necessary to present(both in oral and written form) the content presented in the course; 2. shows the structure of the commonly used synthetic polymers 3. uses basic descriptions of polymer microstructures 4. provides for some physicochemical properties (eg glass transition temperature) of polymers depending on their chemical structure and microstructure 5. analyzes and evaluates the influence of some polymers on the natural environment
	Social competence
	none

Contact

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