

Course title Chemia polimerów / Polymer chemistry		ECTS code 13.3.0980	
Name of unit administrating study Faculty of Chemistry			
Studies			
Field of study	Type	Form	
Chemistry	Bachelor	Full-time studies	
Teaching staff prof. dr hab. Piotr Rekowski, dr Jarosław Ruczyński			
Forms of classes, the realization and number of hours		ECTS credits 4	
A. Forms of classes, in accordance with the UG Rector's regulations lecture, auditorium classes, laboratory classes		classes - 60 h tutorial classes – 10 h student's own work – 30 h	
B. The realization of activities in-class learning		Total: 100 h - 4 ECTS	
C. Number of hours 60 h (30 h lecture, 15 h auditorium classes, 15 h laboratory classes)			
The academic cycle 2021/22 winter semester			
Type of course obligatory		Language of instruction Polish	
Teaching methods Lecture with multimedia presentation Problem-solving tutorials Laboratory experiments		Form and method of assessment and basic criteria for evaluation or examination requirements	
		A. Final evaluation, in accordance with the UG study regulations lecture – exam lecture – exam auditorium classes – course completion (with a grade) laboratory classes – course completion (with a grade)	
		B. Assessment methods - Written exam with open questions	
		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; <i>Tutorials:</i> • 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

Required courses and introductory requirements

Organic chemistry (bachelor level)

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

A. 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

B. Extracurricular readings:

Various academic handbooks concerning polymer chemistry

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

1. Understands the need of continuous education;
2. Takes care of laboratory equipment;
3. Carefully uses laboratory equipment and works cautiously with chemicals;
4. Appreciates the need of ability to team work according to assigned role (team leader/team member);
5. Is aware of the need of critical analysis of own work;
6. Shows cautious criticism when acquiring knowledge, especially these coming from mass media;
7. Is aware of the necessity of fair and reliable work;