COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technology of Polymeric Materials

Course

Field of study
Chemical Technology

Year/Semester
III/5

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

Tutorials
15

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:
Agnieszka Marcinkowska, D.Sc., Eng.
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Responsible for the course/lecturer:

Prerequisites

Student starting this subject should have knowledge of the basic principles of general, organic, physical chemistry, and chemical engineering.

Student should have the ability to obtain information from scientific literature, databases and other properly selected sources.

Course objective

Gaining basic knowledge about polymers, polymer materials, their synthesis (chain and step polymerization reactions, steps of polymerization reactions, kinetics of polimerization), properties and areas of application.

Course-related learning outcomes

Knowledge

Student has expanded and well-established knowledge in the field of polymer structure, polymer

preparation methods and their properties (K_W08). The student has a basic knowledge of development trends in the field of polymeric materials and their applications in the plastics industry (K_W09). The student knows the basic methods used to solve simple tasks in the field of polymer material technology (K_W15).

Skills

Student has the ability to obtain and critically evaluate information from literature and other sources (K_U01). Student works both individually and in a group (K_U02). Student distinguishes between types of reactions in obtaining polymers and has the ability to select them for chemical processes (K_U18).

Social competences

Student understands the need of further continuous education in area of polymer chemistry (K_K01). the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for decisions (K_K02). Students can work in a team and are aware of their responsibility for their work (K_K03).

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Solving problems during classes. Final test.

Programme content

Radical polymerization: radical polymerization stages: initiation (and initiators), propagation, termination (types, consequences of chain transfer reactions, regulation of molecular weight, kinetics of free radical polymerization).
Ion polymerization (anionic and cationic): initiators, monomers, stages and mechanism of polymerization, living polymerization.
Polycondensation: types of polycondensation, comparison of radical polymerization and polycondensation, the most important characteristics and quantities describing the process, equilibrium and non-equilibrium polycondensation, bifunctional and multifunctional polycondensation, Carothers equation.
Polyaddition, characteristics, examples.
Crosslinking of polymers: crosslinking methods, examples, vulcanization.

Teaching methods

Auditorium exercises: solving tasks.

Bibliography

Basic

1. Z. Floriańczyk, S. Penczek, Chemia Polimerów, t.I i II, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001
2. J. Pielichowski, A. Puszyński, Technologia tworzyw sztucznych, WNT, Warszawa 2003
3. J. Pielichowski, A. Puszyński, Chemia polimerów, TEZA, Kraków 2004

4. J.F. Rabek, Współczesna wiedza o polimerach, PWN, Warszawa 2008
5. B. Łączyński, Tworzywa wielkocząsteczkowe: rodzaje i własności, WNT, Warszawa 1982.

Additional

1. I. Gruin, Materiały polimerowe, PWN, Warszawa 2003
2. D. Żuchowska, Polimery konstrukcyjne, WNT, Warszawa 2000
3. K. Czaja, Poliolefiny, WNT, Warszawa 2005
4. Principles of Polymerization, 4-th edition, G. Odian , Wiley-Intersciene:Hoboken, New York, 2004
5. Principles of Polymer Chemistry, 2-nd edition, A.Ravve, Kluver Academic/Plenum Publishers, New York, 2000
6. Handbook of radical polymerization, K. Matyjaszewski, T.P. Dawis, Wiley Interscience, 2002

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,0
Classes requiring direct contact with the teacher	20	0,7
Student's own work (literature studies, preparation for tutorials, preparation for test) [1]	10	0,3

[1] delete or add other activities as appropriate