COURSE DESCRIPTION CARD - SYLLABUS

Course name
Recycling and recovery of polymeric materials [S2TCh2-TP>RiOMP]

Course

Field of study
Chemical Technology

Year/Semester
2/3

Area of study (specialization)
Polymer Technology

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

Structured and systematic knowledge in the field of general, organic chemistry, polymers and chemical technology, and apparatus of the chemical industry. Ability to solve elementary engineering problems based on knowledge. Ability to obtain information from the indicated sources in Polish and a foreign language. Understanding the need for further education, understanding the need to expand their competences, readiness to cooperate within a team.

Course objective

Gaining knowledge about the impact of polymers on the environment in the context of false media reports. Understanding the methods of material recycling, material recovery and energy recovery of polymer materials. Principles of green chemistry in the context of recycling

Course-related learning outcomes

Knowledge:
K_W2 - has expanded and in-depth knowledge in chemistry and other related areas of science, allowing to formulate and solve complex tasks related to chemical technology
K_W3 - has knowledge of complex chemical processes, including the appropriate selection of materials,

raw materials, methods, techniques, apparatus and equipment for carrying out chemical processes and characterizing the products obtained
K_W11 - has a well-established and expanded knowledge of the selected specialty
K_W13 - has extended knowledge of advanced devices and apparatus used in chemical technology

Skills:
K_U1 - has the ability to obtain and critically evaluate information from literature, databases and other sources, and formulate opinions and reports on this basis
K_U11 - is able to properly verify the concepts of engineering solutions in relation to the state of knowledge in technology and chemical engineering
K_U12 - has the ability to adapt knowledge of chemistry and related fields to solve problems in the field of chemical technology and planning new industrial processes
K_U15 - can critically analyze industrial chemical processes and introduce modifications and improvements in this area, using the acquired knowledge, including knowledge about the latest achievements of science and technology
K_U16 - has the ability to assess the technological suitability of raw materials and the selection of the technological process in relation to the quality requirements of the product

Social competences:
K_K1 - is aware of the need for lifelong learning and professional development
K_K2 - is aware of the limitations of science and technology related to chemical technology, including environmental protection
K_K6 - can think and act in a creative and entrepreneurial way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Test in an on-site system: the knowledge acquired during the lecture is verified in the form of a written test at the end of the lecture cycle.
Remote test: closed-ended question test with twenty questions at the end of the lecture cycle.

Programme content

Issues concerning the impact of polymers on the environment in the context of false media reports.Methods of material recycling, material recovery and energy recovery of polymer materials and principles of green chemistry in the context of recycling.

Course topics

Principles of green chemistry in the context of recycling. Basics of functioning of the recycling system. 3/4 R principle. Life cycle assessment (LCA), primarily with reference to packaging materials. Identification and sorting of plastics. Recycling of materials from the automotive and electrotechnical industries. Reprocessing and recovery of tires and rubber waste. Agglomeration as a processing method used in material recycling. Methods of material recovery used for plastics. Energy recovery (combustion) of plastics, ecological aspects, combustion of plastics in the light of emissions of pollutants and dioxins. Material recycling, raw material recovery and energy recovery for specific types of polymers such as: polyethylene, polypropylene, polystyrene, polar polymers, polyurethanes, duroplastics and others. Legal aspects of material recycling and recovery of materials and energy from plastics. Tasks related to the design of technological lines for polymer processing and recycling.

Teaching methods

Lecture - multimedia presentation

Bibliography

Basic:
1. „Recykling materiałów polimerowych”, A. K. Błędzki , WNT, Warszawa, 1997
2. „Podstawy recyklingu tworzyw sztucznych”, M. Kozłowski , Wydawnictwo Politechniki Wrocławskiej, Wrocław, 1998
3. Dzienniki Ustaw, Warszawa

4. „Plastics Fabrication and Recycling”, M. Chanda, S. K. Roy, CRC Press Taylor&Francis Group, 2008
5. “Plastics and the Environment”, A. L. Andrady, Wiley-Interscience, 2003
6. “Polymers, the Environment and Sustainable Development”, A. Azapagic, A. Emsley & I. Hamerton, J. Wiley et Sohns Ltd. 2003

Additional:
1. Proceedings of the Central-European Conferences RECYCLING AND RECOVERY OF THE POLYMER MATERIALS, SCIENCE - INDUSTRY, Wrocław/Szczecin, 2000-2018.

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50