COURSE DESCRIPTION CARD - SYLLABUS

Course name
COMPOSTABLE POLYMERIC MATERIALS [S5NC>KMP]

Course

Proposed by Discipline
–

Year/Semester
3/6

Level of study
Doctoral School

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
4

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

dr hab. inż. Agnieszka Marcinkowska prof. PP
agnieszka.marcinkowska@put.poznan.pl

Lecturers

dr hab. inż. Agnieszka Marcinkowska prof. PP
agnieszka.marcinkowska@put.poznan.pl

Prerequisites

Knowledge: The student has knowledge of basic issues of organic chemistry and polymer chemistry and technology. The student knows the principles of environmental protection related to the chemical production of polymers and polymer waste management. Skills: The student can obtain information from literature, databases and other sources of chemical and environmental sciences, he/she can interpret them, draw conclusions, and formulate opinions. Social competencies: The student understands the need for further education and improvement of his/her professional and personal competences.

Course objective

The aim of the course is to provide PhD students with knowledge on compostable polymeric materials, methods of their production and processing, factors influencing their biodegradation, as well as on the biodegradation mechanism, biodegradation methods and standards that should be met by both compostable polymeric materials and the compost resulting from their decomposition, and to familiarize PhD students with research methods used to assess the biodegradation process.

Course-related learning outcomes

Knowledge
A PhD student who graduated from doctoral school knows and understands:
1) global achievements, covering theoretical foundations as well as general and selected specific issues

that are relevant to scientific disciplines studied at the Doctoral School, to the extent that enables revision of existing paradigms, [P8S_WG/SzD_W01]
2) key developmental trends of disciplines of science in which education at the Doctoral School takes place, [P8S_WG/SzD_W02]
3) fundamental dilemmas of the contemporary civilization, [P8S_WK/SzD_W05].

Skills
A PhD student who graduated from doctoral school can: The student is able to use information obtained from the literature to solve existing problems related to biodegradation and compostability of plastics.
1) critically analyze and assess scientific research results, work of experts and other creative activities together with their contribution into knowledge development, [P8S_UW/SzD_U02]
2) take part in scientific discourse, [P8S_UK/SzD_U07].

Social competencies
A PhD student who graduated from doctoral school is ready to:
1) critically assess achievements within a given scientific discipline, [P8S_KK/SzD_K01]
2) acknowledge the importance of knowledge in solving cognitive and practical problems, [P8S_KK/SzD_K03]
3) fulfilling the social obligations of researchers and creators, [P8S_KO/SzD_K04].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Test - exam (colloquium) in writing (50%-60%: 3.0, 60%-70%: 3.5, 70.-80.0%: 4.0, 80%-90%: 4.5, 90%-100%: 5.0)

Programme content

This course provides an overview of biodegradable polymers, including both natural and synthetic materials, with emphasis on their synthesis, properties, applications, and processing. Particular attention is given to potential applications of biodegradable polymers as alternatives to non-degradable polymeric materials. The course also covers the fundamentals of biodegradation, including biodegradation mechanisms, factors influencing the process, and methods used to study and evaluate biodegradation.

Course topics

Biopolymers: classification, selected properties, and applications; environmental degradation and biodegradation of polymeric materials.
Mechanisms and pathways of polymer degradation and biodegradation, including abiotic and biotic processes under aerobic and anaerobic conditions.
Factors affecting the rate and extent of polymer biodegradation, including material properties, environmental conditions, and the activity of microorganisms.
Methods for assessing polymer biodegradability and biodegradation; experimental conditions and evaluation criteria.
Composting of biodegradable polymeric materials: process conditions, applicable standards, labeling and identification of compostable materials, compost quality requirements, and applications of compost.

Teaching methods

Lecture: multimedia presentation including illustrations and examples.

Bibliography

Basic
1. Emo Chiellini, Roberto Solaro (Eds), Biodegradable polymers and plastics, Springer Science + Business Media New York, 2003.
2. Sabu Thomas, Ajitha AR, Cintil JoseChirayil, Bejoy Thomas Editors, Handbook ofBiopolymers, Springer 2023.
3. Catia Bastioli, Handbook of Biodegradable Polymers, 3nd Edition, De Gruyter, 2020.
4. Ewa Rudnik, Compostable polymer materials, Elsevier Ltd, 2008.

Additional
1. Gerald Scott (Ed), Degradable Polymers, Principles and Applications, 2nd Edition, Springer Science+Business Media, B.V., 2002.
2. Sayed Ali Ashter, Introduction to bioplastics engineering, Elsevier Inc., 2016.

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	4	0,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	21	1,00