COURSE DESCRIPTION CARD - SYLLABUS

Course name
Product Recycling and Disposal
Course

Field of study
Product Lifecycle Engineering
Area of study (specialization)

Year/Semester
/3
Profile of study

Level of study
Second-cycle studies
Form of study
full-time

Course offered in
English
Requirements
compulsory

Number of hours

Lecture
5
Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars
10

Number of credit points

1

Lecturers

Responsible for the course/lecturer:
dr. hab. inż. Dorota Czarnecka-Komorowska

email: Dorota.Czarnecka-Komorowska@put.poznan.pl

tel. 61 665 27 32

Faculty of Mechnical Engineering

Piotrowo 3 Street, 60-965 Poznan

CMBiN/ 306 room

Responsible for the course/lecturer:
dr hab. inż. Mateusz Barczewski

email: mateusz.barczewski@put.poznan.pl

tel. 61 647 5858

Faculty of Mechnical Engineering

Piotrowo 3 Street, 60-965 Poznan

Prerequisites

The student has basic knowledge in the field of ecology, chemistry and production management as well

as knowledge about basic activities related to the processing of materials. The student is aware of the role of environmental knowledge in engineering practice.

Course objective

To familiarize students with the principles and methodology for recycling materials waste from various industrial sectors. The student will acquire the ability to apply procedures and criteria for the selection of waste management techniques in the last product life cycle. The student will acquire the ability to design glass, paper and plastic products for recycling (Design for recycling).

Course-related learning outcomes

Knowledge

The student should be able to define the basic aspects of human health and the environmental impact of products, processes and activities related to metals and non-metals.The student should be able to understand the importance of environmental design of products from different materials.

Skills

The student will be able to recognize and assess environmental aspects throughout the life cycle assessment of the glass, paper, and plastics product (LCA). The student will be able to correctly choose the techniques of product equalization and is able to design a product for recycling.

Social competences

The student will be able to interact creatively in a group, inspire to think oriented on materials recycling (Life Cycle Thinking - LCT). The student will be aware of the effects of industrial activities in the environmental field and recognize the importance of designing products including their recycling.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Credit based on a colloquium consisting of closed questions carried out at the end of semester.

Project: Credit based on a final project prepared as instructed by the teacher.

Programme content

Lecture:

1. The importance of plastics for the circular economy. The role of materials in sustainable development.

2. Ecological aspects of glass, paper and plastics recycling (techniques, examples).

3. The use of LCA (Life Cycle Assessment) and MFA (Mass Flow Analysis) techniques to assess the life cycle of selected materials processes and products.

4. Practical aspects of designing products (e.g. packaging) from glass, papers and plastics, taking into account the principles of circular economy.

Project:

1. Development of a circular roadmap for selected polymer products regarding human health and the environmental impact of products, processes and activities related to glass, papers, and plastics.

Teaching methods

Lecture suported by multimedia presentations.

Bibliography

Basic

https://www.plasticseurope.org/pl/focus-areas/life-cycle-thinking

J. Brandrup, Muna Bittner, Walter Michaeli, Georg Menges, Recycling and Recovery of Plastics, Hanser Publishers, 1996-893

Francesco La Mantia, Handbook of Plastics Recycling, iSmithers Rapra Publishing, 2002 - 442,

David Schönmayr, Automotive Recycling, Plastics, and Sustainability: The Recycling Renaissance, Springer, 31 maj 2017 - 184

Walter Klöpffer Birgit Grahl, Life Cycle Assessment (LCA): A Guide to Best Practice, Chapter 2, Copyright © 2014 Wiley-VCH Verlag GmbH & Co. KGaA

H. Brunner and Helmut Rechberger. Practical handbook of material flow analysis. LEWIS PUBLISHERS, A CRC Press Company,Boca Raton London New York Washington, D.C. 2005

Additional

https://www.yordasgroup.com/whitepapers/a-beginners-guide-to-life-cycle-assessment

https://www.sciencedirect.com/topics/earth-and-planetary-sciences/life-cycle-assessment

Moriguchi Y., Hashimoto S. (2016) Material Flow Analysis and Waste Management. In: Clift R., Druckman A. (eds) Taking Stock of Industrial Ecology. Springer, Cham

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	15	0,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	10	0,5

1 delete or add other activities as appropriate