



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Recycling

Course

Field of study

Mechanical Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

IV/8

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

8

Tutorials

Laboratory classes

8

Projects/seminars

Other (e.g. online)

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

PhD. Eng. Dorota Czarnecka-Komorowska

e-mail: dorota.czarnecka-

komorowska@put.poznan.pl

phone: 0048 61 665 2732/CMBiN room 306

Faculty of Mechanical Engineering

Piotrowo 3 Str., 60-965 Poznan, Poland

Responsible for the course/lecturer:

PhD. Eng. Łukasz Bernat

e-mail: lukasz.bernat@put.poznan.pl

phone: 0048 61 665 2422/ hala A15 - ZO

Faculty of Mechanical Engineering

Piotrowo 3 Str., 60-965 Poznan, Poland



Prerequisites

Basic knowledge in field of materials technology, chemistry, and material processing (both metal and non-metal-plastics).

Course objective

Learning basic problems related to waste recycling and their importance for sustainable civilization development.

Course-related learning outcomes

Knowledge

Allowing identification of waste regarding materials for their further processing (recycling). Allowing identification of relations between technology and environment (places of forming the waste). Allowing indication of actions limiting quantities of wastes in production used in mechanical engineering.

Skills

Organization of segregation of industrial waste (metal and plastics). Conducting recycling processes for waste of metals and plastics. Critical evaluation of technical process activities on the environment; can propose actions (processes) reducing quantities of wastes formed during production.

Social competences

Awareness of influence of technology in mechanical engineering on natural environment. Awareness of necessity of cooperation between specialists of different fields (technology, management).

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Written a test (10 questions), criterion: 3 from 50.1 to 60%, 3.5 from 60.1 to 70%, 4 from 70.1 to 80%, 4.5 from 80.1 to 90.0% and 5 above 90.1% .

Laboratory: Attendance to all classes. Positive assessments from reports and answers for questions asked by a teacher.

Programme content

Lecture: Waste and environmental protection. Hazardous waste. After-production and after-use waste. Reclaiming and recycling of materials. Recycling of metal and non-metal materials (plastics, paper). Techniques and machines for recycling of metals, plastics, rubber, etc. Course of processing processes and their effects. Studies of regranulate plastics and metal.

Laboratory: Classification and segregation of metals waste, alloys and plastics. Examples of processing waste out of selected plastics. Re-melting of metal scrap and plastics reprocessing.

Teaching methods

Lecture: multimedia presentation. Laboratory exercises: performing exercises, discussion, team work.

Bibliography



Basic

1. Kozłowski M., Plastics Recycling in Europe, Wyd. Politechniki Wrocławskiej 2006.
2. Tim A. Osswald Natalie Rudolph, Polymer Rheology Fundamentals and Applications, Hanser Publishers, Munich 2015. Book ISBN978-1-56990-517-3.
3. Mark E. Schlesinger, Aluminum Recycling, Second Edition, CRC Press 2013.
4. Ulewicz M., Siwka J., Procesy odzysku i recyklingu wybranych materiałów, Wyd. Wydziału Inż. Proc., Mat. i Fizyki Stosowanej Politechniki Częstochowskiej, Częstochowa 2010.

Additional

1. Oprzędkiewicz J., Technologie i systemy recyklingu samochodów, WNT Warszawa 2003
2. Praca zbiorowa pod red. Jerzego J. Sobczaka, Odlewnictwo Współczesne. Poradnik Odlewnika, Wyd. Stowarzyszenia Technicznego Odlewników Polskich, Tom 1. Materiały, Kraków 2013. ISBN: 878-83-904306-9-0
3. Brandrup, J., Bittner, M., Menges, G., and Michaeli, W. (1996) Recycling and recovery of plastics, Carl Hanser Verlag, Germany.
4. Letcher T., Plastic Waste and Recycling: Environmental Impact, Societal Issues, Prevention, and Solutions, 1st Edition, Academic Press 2020.

Breakdown of average student's workload

	Hours	ECTS
Total workload	24	1,0
Classes requiring direct contact with the teacher	16	0,6
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	8	0,4

¹ delete or add other activities as appropriate