SYLLABUS

Name: *Design Processes for Low-Waste Materials and Products*
Name in Polish:
Name in English: *Design Processes for Low-Waste Materials and Products*

Information on course:

Course offered by department:	Faculty of Organisation and Management
Course for department:	Silesian University of Technology
Study level and form:	Bachelor's degree, Full-time
Term:	winter semeser 2025/2026
Coordinator of course edition:	Tomasz Wałek, Ph.D., Eng.

Default type of course examination report:

PASS

Language:

English

Course homepage:

https://platforma.polsl.pl/roz/

ECTS

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Short description:

The course aims to familiarize students with the essence of waste in modern terms meaning the broad definition of waste according to the 3M principles, and to familiarize them with methods of waste identification and various methods and strategies for introducing measures to reduce waste in production processes and the widespread use of low-waste materials and technologies.

Description:

Lectures:
1. Various types of waste in production processes.
2. Identification of waste in production processes.
3. Low-waste design methods.
4. Reduction of waste in existing and newly-designed processes.
5. Low-waste strategies in management.

Laboratory classes:
1. Identification of various types of waste.
2. 3M type strategies in production processes.
3. Reduction of waste in an exemplary production system.

Number of hours with direct participation of academic teachers or other persons teaching courses and students:
Lecture: 15
Laboratory classes: 15

Student's own work:
Preparation for the test: 15
Preparation of the laboratory reports: 15

Total workload: 60

Bibliography:

1. Khan M., Rafiqul M., Zero waste engineering, John Wiley & Sons, 2012,
2. Nielsen C.J., Recycling : processes, costs and benefits, New York, Nova Science Publishers, 2011,
3. Gibson I., Rosen D., Stucker B., Additive manufacturing technologies: 3D printing, rapid prototyping and direct digital manufacturing, New York, Springer 2015,
4. Dobrzanski, L.A., ed. 2017. Powder Metallurgy - Fundamentals and Case Studies. InTech., doi:10.5772/61469,
5. N.T. Yap, Risk Reduction and Integrated Risk Management: The Use of Low-Waste Technologies, Canadian Environmental Assessment Research Council, 1987.

Learning outcomes:

Knowledge: (knows and understands)
K1A_W1 - Advanced topics in mathematics, physics, statistics and the field of engineering and technical sciences, useful for formulating and solving tasks in the field of management and production engineering, related to low-waste materials and products.
K1A_W3 - Basic engineering processes and technologies occurring in the life cycle of equipment, objects and technical systems, as well as ways of solving typical engineering tasks, especially in relation to the organization of production processes and production management in the scope of low-

waste materials and products.
K1A_W7 - Fundamental problems of modern civilization inherent in management and production engineering subjects related to low-waste materials and products.
Skills: (is able to)
K1A_U1 - Identify, formulate and solve complex and unusual engineering problems related to production management and engineering in aspects of low-waste materials and products, by applying engineering, scientific and mathematical principles, and perform tasks under conditions that are not fully predictable.
K1A_U5 – Make a critical analysis of the functioning of existing technical and technological solutions related to low-waste strategy in production system function, evaluate these solutions and suggest appropriate improvements and innovations in this regard.
K1A_U6 - Design - according to given specifications related to low-watse strategy- new and supervise existing production and operational facilities, processes and systems, using appropriate methods, techniques, tools and materials.
K1A_U12 - Speak a foreign language in the scope of low-waste production at the B2 level of the Common European Framework of Reference for Languages.
Social competence: (is ready for)
K1A_K2 - Fulfill social obligations, co-organize activities for the social environment, initiate activities for the public interest, think and act in an entrepreneurial manner, with elements of low-waste strategy concepts.

Assessment methods and assessment criteria:

Lectures – written single-choice test.
Laboratory classes – written reports.

Practical placement: