



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Product ecology

Course

Field of study

Product Lifecycle Engineering

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

English

Requirements

compulsory

Number of hours

Lecture

5

Tutorials

Laboratory classes

Projects/seminars

10

Other (e.g. online)

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

Piotrowo Street No 3, 60-965 Poznań

Responsible for the course/lecturer:

dr inż. Damian Grajewski, dr inż. Jacek Diakun,

mgr inż. Filip Osiński

Prerequisites

Student starting this subject should have a basic knowledge of the use of IT tools supporting design with particular emphasis on 3D CAD systems, as well as knowledge of engineering graphics and machine technology. He should also have the ability to prepare product documentation in the 3D CAD system and obtain information from the indicated sources and be ready to cooperate as part of a team.



Course objective

Providing students with basic knowledge in the field of methods of environmental assessment of the product at the design stage. Developing students' skills in product environmental assessment, ecodesign and modeling in 3D CAD systems as well as recycling analysis of products designed in a 3D CAD environment.

Course-related learning outcomes

Knowledge

1. has detailed knowledge of the methods used for product analysis and environmental assessment, with particular emphasis on LCA and the carbon footprint;
2. has knowledge of the principles of ecodesigning products with particular emphasis on recycling aspects;
3. has knowledge about the possibilities of using computer systems in eco-design.
4. has knowledge about the possibilities of using tools that enable product recycling assessment.

Skills

1. has the ability to use LCA for environmental product assessment at the design stage;
2. can carry out product recycling assessment at the design stage using a 3D CAD system.

Social competences

1. understands that eco-design knowledge and skills are essential for an engineer;
2. is able to operate in a design team using eco-design computer support systems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified by one 45-minute colloquium carried out at the last lecture. The test consists of 10-15 questions (test and open), variously scored. Passing threshold: 50% of points.

Skills acquired as part of the project classes are verified based on the project made by the students.

Programme content

Lectures

1. Definitions of basic concepts: sustainable development, eco-design, environmental assessment, recycling assessment.
2. Product Life Cycle (LCA) - introduction, concepts and basic assumptions, practical applications, case study.
3. Selected methods of environmental product analysis - carbon footprint, water footprint, ecological footprint, energy footprint. Application, method limitations and case studies.



4. Ecodesign methods.
5. Product recycling assessment in selected 3D CAD systems.
6. Recycling product model and its implementation in a 3D CAD environment.
7. Agent system supporting product recycling assessment.

Project:

Performing environmental product analysis for the designed product using LCA. Carbon footprint calculation. Development of the Recycling Product Model in the 3D CAD system. Conducting a recycling assessment of the designed product in a 3D CAD environment using an agent system.

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples on the board.
2. Project: preparation of the individual project by students according to the given assumptions, instructions for building the Recycling Product Model in the 3D CAD system and instruction for recycling analysis.

Bibliography

Basic

Wimmer W., Zuest R., Lee K.M., Ecodesign implementation. A systematic guidance on integrating environmental considerations into product development, Springer, Dordrecht, 2004.

Dostatni E., Diakun J., Grajewski D., Wichniarek R. Karwasz A., Functionality assessment of ecodesign support system, Management and Production Engineering Review, 6(1), 10–15, 2015.

Additional

Cushman-Roisin B., Tanaka Cremonini B., Useful numbers for environmental studies and meaningful comparisons, Dartmouth College, 2019.

ISO, ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification and communication, International Organization for Standardization, Geneva, Switzerland.

BSI 2008, Guide to PAS 2050 How to assess the carbon footprint of goods and services, BSI, UK.



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

