



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Ecobalancing of technical objects [S2Trans1-TrN>EOT]

### Course

Field of study

Transport

Year/Semester

1/2

Area of study (specialization)

Low-emission Transport

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

30

Projects/seminars

0

### Number of credit points

4,00

### Coordinators

dr inż. Jędrzej Kasprzak

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### Lecturers

### Prerequisites

Knowledge: Student has a basic knowledge about the questions of environmental impacts of technical objects and technologies, and environmental protection Skills: Student is able to use MS Word, Excel and PowerPoint software (or other similar). He can collect and transform information acquired from Internet or other digital or traditional sources Social competencies: Student is aware of the importance of human activities in relationship with the environment, he understands their general aspects and consequences. He can work in the workgroup, and clearly distribute the tasks. He can do the verbal presentation of the results obtained.

### Course objective

Commitment and broadening the knowledge about the environmental impacts of technical objects. History, applications and methodological assumptions of the ecobalancing methods, especially the life cycle assessment (LCA) method. Commitment of the practical skills in the field of ecobalancing analyses preparation and use of the specific environmental software

### Course-related learning outcomes

Knowledge:

Student has ordered and theoretically founded general knowledge related to key issues in the field of transport engineering  
Student has advanced and detailed knowledge of the processes taking place in the life cycle of transport systems

#### Skills:

Student can find information from literature, databases and other sources (in Polish and English), integrate them, interpret and critically evaluate them, draw conclusions and formulate and exhaustively justify opinions

Student can - when formulating and solving engineering tasks - integrate knowledge from various areas of transport (and, if necessary, also knowledge from other scientific disciplines) and apply a systemic approach, also taking into account non-technical aspects

#### Social competences:

Student understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems

Student is aware of the need to develop professional achievements and adhere to the rules of professional ethics

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Written exam (5 open questions), presentation of the results of individual or group work (analysis of environmental impacts in the life cycle of selected objects or processes using dedicated software)

### Programme content

Terminology concerning ecobalancing and environmental issues. General questions related with the term of environment (structure, resources, threats). The life cycle of technical objects. History of ecobalances. Methodology of the ecobalances. Application and tools of ecobalances. The examples of the ecobalancing analyses with the particular consideration of the specificity of the operations, potential problems, interpretation. Simplified ecobalances. LCA as the component of LCM. Self-preparation of the environmental analysis of the chosen technical object.

### Course topics

#### Lectures:

1. BASIC CONCEPTS, HUMAN IMPACT ON THE ENVIRONMENT, LIFE CYCLE
2. HISTORY, METHODOLOGY, APPLICATION OF ECO BALANCES
3. LCA - MAIN STEPS SUPPORTING TOOLS - part 1
4. LCA - MAIN STEPS SUPPORTING TOOLS - part 2
5. APPLICATION EXAMPLES 1
6. APPLICATION EXAMPLES 2
7. APPLICATION EXAMPLES 3
8. Exam in the lecture part

#### Exercises:

1. Introduction to environmental analyzes using the LCA method. Assumptions of exercise tasks
2. Definition of the purpose and scope of the analysis
- 3-6. Data inventory
- 7-11. Impact assessment
- 12-13. Interpretation
- 14-15. Finalization of the environmental report

### Teaching methods

Informative lecture, exercise method in the form of auditorium exercises, project method, laboratory method

### Bibliography

#### Basic

1. Lectures with multimedial presentation
2. Norma PN-EN ISO 14040:2009 Zarządzania środowiskowe – Ocena cyklu życia – Zasady i struktura
3. Norma PN-EN ISO 14044:2009 Zarządzania środowiskowe – Ocena cyklu życia – Wymagania i wytyczne
4. Kłos Z., Kurczewski P., Kasprzak J., Środowiskowe charakteryzowanie maszyn i urządzeń. Podstawy ekologiczne, metody i przykłady. Poznań 2005, ISBN 83-7143-386-7.

#### Additional

1. Baumann H., Tillman A.: The Hitch Hiker's Guide to LCA. An orientation in life cycle assessment methodology and application Sweden, 2004, ISBN ISBN 91-44-02364-2
2. The International Journal of Life Cycle Assessment - review of the journals annuals

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	95	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	35	1,50