

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Life Cycle Assessment</b>		Code <b>1010622221010610383</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>Ecology of Transport</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>		Form of study (full-time, part-time) <b>full-time</b>
No. of hours Lecture: <b>1</b> Classes: <b>2</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b>
<b>Responsible for subject / lecturer:</b> Prof. Zbigniew Klos, Ph.D.(Eng.), D.Sc. email: zbigniew.klos@put.poznan.pl tel. 61 665 2231 Faculty of Machines and Transport ul. Piotrowo 3, 60-965 Poznań		<b>Responsible for subject / lecturer:</b> Jedrzej Kasprzak, Ph.D. (Eng). email: jedrzej.kasprzak@put.poznan.pl tel. 616652232 Faculty of Machines and Transport ul. Piotrowo 3, 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Student has a basic knowledge about the questions of environmental impacts of technical objects and technologies, and environmental protection
2	<b>Skills</b>	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
3	<b>Social competencies</b>	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.
<b>Assumptions and objectives of the course:</b> 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		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Student knows the basic kinds of interaction human ? technical object ? environment - [K2A_W03] 2. He knows the main assumptions of the ecobalancing - [K2A_W06] 3. He can name the examples of the ecobalancing methods - [K2A_W13] 4. He knows the specific features of the LCA method - [K2A_W16] 5. He can name the main stages and steps of the LCA method - [K2A_W22] 6. He can describe the main difficulties in the ecobalancing preparation, especially in relation with LCI phase - [-] 7. He knows the basic LCA terminology - [-] 8. He knows the technical life cycle idea - [-]		
<b>Skills:</b>		
1. Student can describe the main assumptions of the first LCA stage: goal, function and functional unit - [K2A_U01] 2. He can design the life cycle model for the selected objects and processes - [K2A_U05] 3. He can collect and transform the inventory data, he is able to put them to the inventory tables of the specific software - [K2A_U06] 4. He can make the environmental impact assessment using LCIA method - [K2A_U10] 5. He can identify the main sources of the negative environmental impacts in the life cycle of selected technical objects - [-] 6. He is able to suggest the directions of the environmental optimization of the technical objects analyzed - [-]		

<b>Social competencies:</b>
1. Student can cooperate with others members of the working group - [K2A_K04]
2. He has an increased environmental awareness, resulting from the skillful anticipation of the negative environmental impacts, related with the manufacturing and use of the technical objects - [K2A_K05]
3. He can present the results of the LCA analyse - [K2A_K06]

<b>Assessment methods of study outcomes</b>
Written examination, presentation of the results of the individual or group work

<b>Course description</b>
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

<b>Basic bibliography:</b>
1. Lectures
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. Kłós Z., Kurczewski P., Kasprzak J., Środowiskowe charakteryzowanie maszyn i urządzeń. Podstawy ekologiczne, metody i przykłady. Poznań 2005, ISBN 83-7143-386-7.

<b>Additional bibliography:</b>
1. Adamczyk W., Ekologia wyrobów. Jakość. Cykl życia. Projektowanie. PWE, Warszawa 2004.
2. 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
3. Kowalski Z., Kulczycka J., Góralczyk M.: Ekologiczna ocean cyklu życia procesów wytwórczych. Wydawnictwo Naukowe PWN, Warszawa 2007, ISBN 978-83-01-15184-3
4. Kurczewski P., Lewandowska A (red.): Zasady prośrodowiskowego projektowania obiektów technicznych dla potrzeb zarządzania ich cyklem życia; Wyd. KMB Druk; Poznań 2008; ISBN 978-83-61352-20-4
5. Lewandowska A.: Środowiskowa ocena cyklu życia na przykładzie wybranych typów pomp przemysłowych; Wyd. UEP; 2006, ISBN 83-7417-133-2
6. Przegląd roczników czasopisma ?The International Journal of Life Cycle Assessment?

<b>Result of average student's workload</b>
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Activity	Time (working hours)
1. Presence at the lectures	15
2. Review of the lectures	7
3. Consultations	7
4. Preparation to examinatio	10
5. Presence at the examination	2
6. Preparation to the classes	5
7. Presence at the classes	30
8. Project preparation	15

<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	91	3
Contact hours	54	2
Practical activities	37	1