GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Life cycle analysis in engineering applications, PG_00069301
Field of study	Chemical Technology

Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej

Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Anna Kuczyńska-Łażewska
	Teachers	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	E-learning hours included: 0.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	45	5.0	25.0	75

Subject objectives	The purpose of the course is to learn the theory related to life cycle assessment (LCA) and the principles of implementing life cycle assessment and environmentally friendly design of products and technological processes, using specialized software. To familiarize students with the use of software for conducting LCA and to impart practical skills related to the creation of reports and presentation of results to various audiences.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K03] can interact and work in a group, taking on a variety of roles	The student is able to interact in a laboratory group according to the accepted role during the implementation of tasks.	[SK1] Assessment of group work skills
	[K7_U07] takes into account ethical issues and regulations in research planning and product and process design	The student is able to take into account the knowledge of ethical issues and regulations in the context of LCA results, process design and technological products.	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K7_W04] recognises scientific, technological, organisational and economic opportunities and constraints in technology and related fields	The student recognizes opportunities and constraints in different areas by formulating recommendations at the end of the LCA.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation

Subject contents	LECTURE 1. definition, principles, procedure and application of life cycle assessment (LCA) in determining the environmental impact of technological processes and products. 2. purpose and scope of environmental life cycle assessment. 3. analysis of the set of inputs and outputs. 4. Determination of data quality and sources. 5. Life cycle impact assessment. 6. programs and methods. 7. Interpretation of results and completeness testing. 8. Environmental Product Declaration (EPD) - work with examples. 9. uncertainty analysis. Monte Carlo method and others. 10. life cycle cost (LCC) analysis. 11. Practical examples of LCA application in industry. LABORATORY EXERCISES 1. familiarization with the creation of inventory tables and collection of data from primary and secondary sources. 2. working with specialized (SimaPro) and free (OpenLCA) software. 3. Self-conducted analysis for a selected case. 4. Presentation of results and proposals for solving environmental problems. 5. Preparation of a sample EPD. 6. Preparation of a report including sensitivity analysis.

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	60.0%	50.0%
	presentation	60.0%	25.0%
	report	60.0%	25.0%

Recommended reading	Basic literature	1. Norma ISO 14041:2002 Zarządzanie środowiskowe - Ocena cyklu życia - Określenie celu i zakresu oraz analiza zbioru, (2002)
		2. Norma ISO 14042:2002 Zarządzanie środowiskowe - Ocena cyklu życia - Ocena wpływu cyklu życia, (2002)
		3. Norma ISO 14043:2002 Zarządzanie środowiskowe - Ocena cyklu życia - Interpretacja cyklu życia, (2002)
		4. Norma ISO 14040:2009 Zarządzanie środowiskowe - Ocena cyklu życia - Zasady i struktura, (2009)
		5. Norma ISO 14044:2009 Zarządzanie środowiskowe - Ocena cyklu życia - Wymagania i wytyczne, (2009)
	Supplementary literature	1. Ciambrone, D. F., Environmental Life Cycle Analysis, CRC Press (2019)
		2. Hauschild, M. Z., Rosenbaum, R. K., Olsen, S. I. , Life Cycle Assessment., Springer (2018) DOI: 10.1007/978-3-319-56475-3
		3. Simonen, K. , Pocket Architecture: Technical Design Series, Life Cycle Assessment, Routledge, (2014)
	eResources addresses	

Example issues/ example questions/ tasks being completed	1 What are the basic steps of LCA? 2. how to conduct sensitivity and completeness analysis? 3. LCA in practice and software operation. Different software programs for conducting LCA. 4. The differences between the methods used in LCA. 5. Preparing the report for different audiences. 6. How to define the purpose and scope of life cycle analysis? 7. Interpretation of results, ability to draw conclusions and formulate solutions to problems. 8. What are the differences between weighting, clustering and normalization? 9. what are the mandatory and optional elements of LCA? 10. how to make LCA the most authoritative and subjective? What affects the quality of the results obtained? 11. comparative analysis. What does it consist of and what are the requirements for conducting it? 12. defining the functional unit, and the purpose and scope of the analysis. 13. How to correctly adjust the scope of analysis, detail and data sources to the purpose of the analysis?
Work placement	Not applicable

Document generated electronically. Does not require a seal or signature.