



## Subject card

Subject name and code	, PG_00064668						
Field of study	Recycling and Energy Recovery						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Sanitary Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Grzegorz Boczkaj				
	Teachers		dr hab. inż. Grzegorz Boczkaj				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	10.0	0.0	0.0	0.0	30
	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	30		2.0		18.0	50
Subject objectives	Comprehensive presentation of issues related to the concept of a circular economy (CE), with particular emphasis on:  Assumptions and legal regulations,  Fundamentals of CE,  Related and complementary concepts,  Examples of implementation and realization of CE.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W06] integrates and extracts data from multiple sources to analyze complex engineering and technology problems.	Integrates and acquires data from multiple sources to analyze complex engineering and technological problems related to circular economy issues.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
	[K6_U71] is able to apply knowledge from humanistic, social, economic or legal sciences in order to solve problems in a social environment	Is able to apply knowledge from the humanities, social, economic and legal sciences to solve problems in the social environment in the field of the circular economy.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	[K6_K71] is conscious of the need to apply knowledge from humanistic, social, economic or legal sciences in order to function in a social environment	Is aware of the need to use knowledge from the humanities, social, economic and legal sciences in functioning in the social environment to implement the idea of a circular economy.	[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness [SK1] Assessment of group work skills
	[K6_W71] has general knowledge in humanistic, social, economic or legal sciences	Has general knowledge in the field of humanities, social, economic, legal sciences in the field of circular economy.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[K6_U06] uses information technology to improve data analysis and design support.	Applies information technologies to improve data analysis and support design in the field of circular economy.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment	
Subject contents	<p>Definitions and basic concepts</p> <p>The concept of circular economy</p> <p>Life cycle analysis/assessment</p> <p>3R, 6R and 9R principles, Sustainable consumption concept</p> <p>Circular economy business models: Ecodesign, renting instead of owning, reusing and regenerating</p> <p>Implementing circular economy in the economy</p> <p>Methods and technologies for minimizing environmental impact and reducing waste</p> <p>Methods and technologies for waste conversion and resource recovery</p> <p>Examples (case studies) of implementing circular economy in Poland and worldwide</p>		
Prerequisites and co-requisites	Basic knowledge of social sciences, geography, biology, chemistry, physics and mathematics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Passing the lecture part	60.0%	65.0%
	Passing the exercises	60.0%	35.0%

Recommended reading	Basic literature	<p>Charef, R. (Ed.). (2024). Circular Economy for the Built Environment: Research and Practice (1st ed.). Routledge. <a href="https://doi.org/10.1201/9781003450023">https://doi.org/10.1201/9781003450023</a></p> <p>Erdiaw-Kwasie, M. O., Monirul Alam, G. M. (ed) (2023) Circular Economy Strategies and the UN Sustainable Development Goals, Springer Nature Singapore Pte Ltd. <a href="https://doi.org/10.1007/978-981-99-3083-8">https://doi.org/10.1007/978-981-99-3083-8</a></p> <p>Gallaud, D., Laperche, B. (ed) (2016) Circular Economy, Industrial Ecology and Short Supply Chain, vol.4. Wiley. <a href="https://doi.org/10.1002/9781119307457">https://doi.org/10.1002/9781119307457</a></p> <p>Alvarez-Risco, A., Muthu, S. S., Del-Aguila-Arcentales, S. (ed) (2022) Circular Economy Impact on Carbon and Water Footprint, Springer Nature. <a href="https://doi.org/10.1007/978-981-19-0549-0">https://doi.org/10.1007/978-981-19-0549-0</a></p> <p>Lewicka, D., Zarębska, J., Batko, R., Tarczydło, B., Woźniak, M., Cichoń, D., &amp; Pec, M. (2023). Circular Economy in the European Union: Organisational Practice and Future Directions in Germany, Poland and Spain (1st ed.). Routledge. <a href="https://doi.org/10.4324/9781003411239">https://doi.org/10.4324/9781003411239</a></p> <p>Koval, V., Olczak, P. (ed) (2023) Circular Economy for Renewable Energy, Springer Nature. <a href="https://doi.org/10.1007/978-3-031-30800-0">https://doi.org/10.1007/978-3-031-30800-0</a></p> <p>Christ, C. (ed.) (1999) Production-integrated environmental protection and waste management in the chemical industry. WILEY-VCH. <a href="https://doi.org/10.1002/9783527613861">https://doi.org/10.1002/9783527613861</a></p> <p>Tomaszek, J.A., Koszelnik, P. (2015) Progress in environmental engineering. CRC press. <a href="https://doi.org/10.4324/9781138027992">https://doi.org/10.4324/9781138027992</a></p>
	Supplementary literature	<p><a href="https://environment.ec.europa.eu">https://environment.ec.europa.eu</a></p> <p><a href="https://www.europarl.europa.eu">https://www.europarl.europa.eu</a></p> <p>Scientific publications</p>
	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Gospodarka obiegu zamkniętego - Moodle ID: 41657  <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=41657">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=41657</a></p>
Example issues/ example questions/ tasks being completed	<p>Describe the concept of circular economy What is Life Cycle Analysis/Assessment Explain the 3R, 6R and 9R Principles, the Sustainable Consumption Concept Explain one of the circular economy business models: Ecodesign, renting instead of owning, reusing and regenerating Describe examples of implementing circular economy in the economy Present methods and technologies for minimizing environmental impact and reducing waste in a selected aspect. Present methods and technologies for waste conversion and resource recovery in a selected aspect Describe a selected example (case study) of implementing circular economy in Poland and around the world</p>	
Work placement	Not applicable	

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