

## MODULE INFORMATION SHEET

<b>Name of Module Unit</b>	<b>Elements of Circular Economy in Environmental Engineering</b>
Name in Polish	Elementy gospodarki o obiegu zamkniętym w inżynierii środowiska
Module type	compulsory / elective
Form of studying	full-time day courses
Level of study	graduate course (M.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environment Protection Engineering
Responsible department	Hydro-Engineering and Hydraulics Department
Responsible person	dr inż. Łukasz Szarek

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
4	15				30	3

### Learning outcomes (knowledge, skills, competences)

Knowledge: The student has structured knowledge of the assumptions of circular economy and understands its importance for environmental engineering.  
 Skills: The student is able to discuss and interpret the essence of the activities in the area of the circular economy.  
 Competences: The student is aware of the need for continuous replenishment of acquired knowledge.

### Prerequisites

No prerequisites.

### Rules for integrated grade setting

$0.4*L + 0.6*P$

### Recommended readings

Towards the circular economy. The economic and business rationale for an accelerated transition. Ellen MacArthur Foundation. 2013.  
 Kledyński, Z., Bogdan, A., Jackiewicz-Rek, W., Lelicińska-Serafin, K., Machowska, A., Manczarski, P., ... & Zubrowska-Sudol, M. (2020). Condition of circular economy in Poland. Archives of Civil Engineering, 66(3).  
 Ellen MacArthur Foundation. The Circular Economy Opportunity for Urban and Industrial Innovation in China (Ellen MacArthur Foundation, 2018).  
 Bleischwitz, R., Spataru, C., VanDeveer, S. D., Obersteiner, M., van der Voet, E., Johnson, C., ... & Van Vuuren, D. P. (2018). Resource nexus perspectives towards the United Nations sustainable development goals. Nature Sustainability, 1(12), 737-743.  
 Geng, Y., Sarkis, J., & Bleischwitz, R. (2019). How to globalize the circular economy.  
 Stahel, W. R. (2016). The circular economy. Nature News, 531(7595), 435.  
 Keijer, T., Bakker, V., & Slootweg, J. C. (2019). Circular chemistry to enable a circular economy. Nature chemistry, 11(3), 190-195.

- Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular economy: the concept and its limitations. *Ecological economics*, 143, 37-46.
- Bonviu, F. (2014). The European economy: From a linear to a circular economy. *Romanian J. Eur. Aff.*, 14, 78.
- Prieto-Sandoval, V., Jaca, C., & Ormazabal, M. (2018). Towards a consensus on the circular economy. *Journal of cleaner production*, 179, 605-615.
- Rajput, S., & Singh, S. P. (2019). Connecting circular economy and industry 4.0. *International Journal of Information Management*, 49, 98-113.
- Geissdoerfer, M., Savaget, P., Bocken, N. M., & Hultink, E. J. (2017). The Circular Economy—A new sustainability paradigm?. *Journal of cleaner production*, 143, 757-768.
- Wastling, T., Charnley, F., & Moreno, M. (2018). Design for circular behaviour: Considering users in a circular economy. *Sustainability*, 10(6), 1743.
- Lacy, P., Long, J., & Spindler, W. (2020). *The circular economy handbook*. Palgrave Macmillan UK.
- Velenturf, A. P., Archer, S. A., Gomes, H. I., Christgen, B., Lag-Brotons, A. J., & Purnell, P. (2019). Circular economy and the matter of integrated resources. *Science of the Total Environment*, 689, 963-969.
- Payne, J., McKeown, P., & Jones, M. D. (2019). A circular economy approach to plastic waste. *Polymer Degradation and Stability*, 165, 170-181.

### Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	The concept of Circular Economy, regulations in Poland and EU, CE from different perspective: subjective (waste streams, energy), sectoral (construction, wastewater treatment plants, coal energy), resource-related (anthropogenic minerals, phosphorous minerals).	8	Ex
2	Presenting the idea of zero-energy buildings, zero-waste coal power, municipal solid waste/biowaste/food/plastic waste management, wastewater management, CE in construction, CCBs management.	7	S
<b>Total</b>		<b>15</b>	<b>hours</b>

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

### Lecturers

dr inż. Łukasz Szarek

### Assessment method

Test and oral presentation.

### Contents of guided projects

	Topics	Time (hrs.)	Scope (S / Ex)
1	Preparing projects including Life Cycle Analysis.	12	Ex
2	Carbon Footprint Analysis of selected products/objects.	12	Ex
3	Visiting laboratories.	6	Ex
<b>Total</b>		<b>30</b>	<b>hours</b>

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

**Persons responsible for guided projects**

dr inż. Łukasz Szarek

**Assessment method for guided projects**

Active participation in classes, carrying out project tasks; assessment of reports; oral presentations.