SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Building Services Engineering
1.3	Department	Building Services Engineering
1.4	Field of study	Civil Engineering and Building Services
1.5	Cycle of study	Master
1.6	Program of study/Qualification	Building Services for Regenerative Cities / MS Engineer
1.7	Form of education	Full time

2. Data about the subject

2.1	Subject name			Circular economy	Subject code	6.00
2.2	Course responsible/lecturer			Assoc.Prof.PhD.Eng. Tania RUS - tania.rus@insta.utcluj.ro		
2.3	Teachers in charge of laboratory			Assoc.Prof.PhD.Eng. Tania RUS - tania.rus@insta.utcluj.ro		
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment		Colloquy
2.7 Subject category	Formative category					DC
	Optionality					DOB

3. Estimated total time

3.1 Number of hours per week	2	of which	3.2 Course	1	3.3 Seminar		3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	28	of which	3.5 Course	14	3.6 Seminar		3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Exams and tests	2
(b) Manual, lecture material and notes, bibliography	14
(c) Supplementary study in the library, online and in the field	14
(d) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(e) Tutoring	3
(f) Other activities	-

3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	47
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	Bachelor's degree
4.2	Competence	Technical competences in the field of civil engineering and building services

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 128-130
5.2	For the applications Laboratory	Classroom - 21 December 1989 Blvd., no. 128-130

6. Specific competences

Professional competences	CP4 - promote innovative infrastructure design CP6 - assess environmental impact CP21 - combine multiple fields of knowledge CP23 - advise on construction materials
Cross competences	CT2 - thinks holistically CT4 - respects the diversity of values and cultural norms

7. Expected Learning Outcomes

Knowledge	CP4 - Knows the principles of sustainable development and the circular economy. CP6 – Knows the principles of sustainable development in the context of regenerative cities. CP21 – Possesses integrated knowledge from diverse fields (building services engineering, architecture, urban planning, environmental sciences, circular economy, public policy, urban sociology), essential for a holistic approach to regenerative cities. CP23 – Knows the construction materials used in urban infrastructure (pipes, structures, sustainable and recycled materials), their technical properties, durability, environmental impact, and quality standards.
Skills	CP4 - Promotes awareness of environmental issues within urban infrastructure projects, develops informational and training materials, organizes awareness campaigns for communities and project teams, and provides consultancy on reducing environmental impact and promoting sustainable solutions. CP6 – Evaluates the integration of circular economy principles and climate resilience in urban infrastructure projects. CP21 – Integrates perspectives from multiple disciplines in the analysis and solution of complex urban problems, collaborates effectively with specialists from different fields, and develops interdisciplinary solutions that simultaneously address technical, social, economic, and environmental requirements. CP23 – Analyzes technical and environmental requirements for urban infrastructure projects, evaluates material alternatives from technical, economic, and sustainability perspectives, and provides well-argued recommendations for optimal material selection.
Responsibilities and autonomy	CP4 - Acts as a promoter of sustainability within urban infrastructure projects, assuming responsibility for increasing environmental awareness among all stakeholders, promoting best practices, and integrating sustainable development principles into organizational and community culture. CP6 – Approaches environmental impact assessment processes and circular economy principles with responsibility and efficiency, in accordance with national and European regulations. CP21 – Addresses the challenges of regenerative urban development from a holistic and integrated perspective, in collaboration with all stakeholders and with respect for cultural and social diversity. CP23 – Acts as a specialist in material selection for urban infrastructure within the context of the circular economy and regenerative urban development.

8. Discipline objectives (as results from the *key competences gained*)

8.1	General objective	Development of students' capacity to integrate the principles of the circular economy and regenerative urban development into the analysis, design, and evaluation of urban infrastructure, through an interdisciplinary, sustainability-oriented approach aimed at reducing environmental impact.
8.2	Specific objectives	• Acquisition of fundamental concepts of sustainable development, circular economy, and regenerative cities. • Development of the capacity to assess the environmental impact of urban infrastructure projects, including the integration of climate resilience and circularity principles. • Development of skills for analyzing and selecting construction materials based on technical performance, durability, and environmental impact. • Development of holistic and interdisciplinary thinking in addressing urban challenges, by integrating knowledge from fields such as engineering, architecture, urban planning, and environmental sciences. • Development of collaboration skills with specialists from diverse fields to create sustainable and innovative solutions for urban infrastructure. • Development of the capacity to design and implement strategies for promoting sustainability and environmental awareness within projects and communities. • Application of circular economy principles in the design and management of urban infrastructure, including the use of recycled materials and optimization of resource life cycles.

9. Contents

9.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. What is circular economy and why create circularity?	2	Video-Projector Teaching style based on the interactive teacher-student partnership;	
2. Circular economy principles for buildings	2		
3. Designing-out waste. Design for adaptability	2		
4. Design for disassembly and reuse	2		
5. Selecting materials and products	2		
6. Turning waste into a resource	2		
7. Virtuous circles. Coming full circle	2		

Bibliography

1. European Circular Economy Stakeholder Platform - https://circulareconomy.europa.eu/platform/;
2. European Commission (2020) - Leading the way to a global circular economy: state of play and outlook - https://ec.europa.eu/environment/circular-economy/pdf/leading_way_global_circular_economy.pdf;
3. Knowledge map – circular economy (2020) - https://kenniskaarten.hetgroenebrein.nl/en/knowledge-map-circular-economy/ce-environmental-benefits/.

9.2. Laboratory	Number of hours	Teaching methods	Notes
1. Measuring circularity	4	Teaching style based on the interactive teacher-student partnership;	
2. Case study: Identification, limitations and critical view over the building services materials - reuse, upcycle or recycle	4		
3. Case study: Identification, limitations and critical view over building services equipment - reuse, upcycle or recycle	4		
4. Presentation of the study cases	2		

Bibliography

1. The Circularity Gap Reporting Initiative a global score for circularity (2020) - https://assets.website-files.com/5e185aa4d27bcf348400ed82/5e4d0a24eb0887b1ddfa59b9_Measuring%20and%20Mapping%20Circularity%20-%20technical%20methodology%20document.pdf;
2. European Commission (2020) - Leading the way to a global circular economy: state of play and outlook - https://ec.europa.eu/environment/circular-economy/pdf/leading_way_global_circular_economy.pdf;
3. Sustainability guide - https://sustainabilityguide.eu/.

10. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies will be necessary for the employees who carry out their activity in complex interdisciplinary context for understanding the impact of their own specialty on the ecosystem and natural environment.

11. Evaluation

Activity type	11.1 Assessment criteria	11.2 Assessment methods (and evaluation form: continuous/summative)	11.3 Weight in the final grade
11.4 Course	The colloquium consists in verifying the theoretical and practical knowledge acquired	Oral examination	75%
11.5 Laboratory	Completion and submission of laboratory papers conditions the entrance to the colloquy.	Presentation of laboratory papers	25%
11.6 Minimum standard of performance			
Participation in the laboratory conditions the entrance to the exam. Exam grade components (E); Laboratory (L); Calculation formula of the grade $G = 0.75 \times E + 0.25 \times L$ Condition for obtaining credits: $G > 5.0$; where $E > 5.0$, $L > 5.0$			

Date of filling in:		**Title Surname Name**	**Signature**
12.05.2026	Lecturer	Assoc.Prof.PhD.Eng. Tania RUS	
	Teachers in charge of application	Assoc.Prof.PhD.Eng. Tania RUS	

Date of approval in the Department of Building Services Engineering 09.07.2026	Head of department Assoc.Prof.PhD.Eng. Ciprian BACOŢIU
Date of approval in the Council of the Faculty of Building Services Engineering 09.07.2026	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA