

AR-497

Building design in the circular economy

De Wolf Catherine Elvire L., Fivet Corentin

Cursus	Sem.	Type
Architecture	MA1, MA3	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	12
Hours	2 weekly
Courses	2 weekly
Number of positions	

Summary

The class introduces the concept of circular economy and its applications to building design, with a focus on design for disassembly, reuse, and life-cycle assessment (LCA). The class develops a critical mindset and provides ready-to-use techniques.

Content

Circular economy consists in maintaining and/or improving the value of products as long as possible, i.e. by extending or renewing their service life while minimising resource depletion, waste generation, and greenhouse gas emissions. When it comes to building design, a series of sometimes contradicting strategies emerges: to limit the quantity of used materials, to limit their ecological impact, to enhance the versatility of buildings, and to ensure the future repair, reuse, or recycling of their components. The class delves into recent literature and practice, aiming at providing the necessary expertise to adopt these strategies in a pragmatic state of mind.

The following chapters punctuate the semester:

1. Introduction & Overview
2. Environmental Footprint of Buildings: Situation & Assessment Methods
3. Circular Economy (& Industrial Ecology): History, Principles, and Expectations
4. Building Use: Density & Versatility
5. Low-Impact Materials & Material-Efficient Systems
6. Recycling & In-Situ Improvement
7. Design for Disassembly
8. Reversible and Adaptive Design
9. Material Sourcing & Stewardship
10. Regenerative and Restorative Design

Keywords

Circular Economy; Industrial Ecology; Reuse; Open Building; Regenerative Design; Product Stewardship; Material Passport; Urban Mining; Dematerialization; Depollution; Design-for-disassembly; Modularity; Reversibility; Recycling; Upcycling; Cradle-to-Cradle; Technical & Biological Cycles; Ecological Footprint; Social Ecology; Carbon Emissions; Waste Production & Management; Material Depletion; Urban Metabolism; Refurbishment; Building Management

Learning Prerequisites**Required courses**

none

Recommended courses

none

Important concepts to start the course

none

Learning Outcomes

By the end of the course, the student must be able to:

- Develop a critical mindset towards design theories and strategies for bettering the ecological footprint of buildings;
- Integrate design principles for building versatility, disassembly, and reuse;
- Synthesize a critical and nuanced opinion in written and oral forms;
- Recall the principles, methods, and references discussed in class;
- Assess / Evaluate the principles, methods, and references discussed in class.

Transversal skills

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Communicate effectively, being understood, including across different languages and cultures.
- Take responsibility for environmental impacts of her/ his actions and decisions.
- Demonstrate a capacity for creativity.
- Demonstrate the capacity for critical thinking
- Manage priorities.
- Summarize an article or a technical report.

Teaching methods

The course alternates flipped classrooms with traditional delivery.

Flipped classrooms are scheduled as follows. Prior to the classroom session, students review two given short texts and two given case studies (usually architecture projects) in relation to the topic of the session. During the classroom session, students debate the topic and instructors provoke and structure the debate. After the session, selected students write an essay on the topic, which will be the main discussion point during their own final exam.

Traditional delivery sessions structure the content, introduce analysis and design methods, apply them through short exercises, and/or provide additional references.

Expected student activities

Students are expected to:

- attend and enliven all classroom sessions;
- prepare classroom sessions by reviewing selected texts and case studies;
- write an essay synthesizing the reviews and discussions.

Assessment methods

Grades reflect both the student's activities during the semester and the final examination. The essay and its oral defense during the final examination account respectively for 30% and 20% of the final grade. Activities during the semester, e.g. quality and quantity of short reviews and participations in debates, account for the remaining 50%.

Supervision

Office hours	Yes
Assistants	No
Forum	No

Resources

Bibliography

A list of texts and case studies will be provided to the students at the beginning of the class.

Notes/Handbook

The slides presented in the classroom will be made available online.