

AR-497

Building design in the circular economy

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Cursus	Sem.	Type
Architecture	MA1, MA3	Opt.
Minor in Engineering for sustainability	H	Opt.
Minor in Integrated Design, Architecture and Sustainability	H	Opt.
Sustainable Construction minor	H	Opt.
Syst�mes urbains	MA1	Opt.
Territories in transformation and climate minor	H	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Oral
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 with reused components and design for disassembly. The class develops critical thinking skills over and above theoretical and technical inputs.

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 minimizing 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 themes punctuate the semester:

- Circular Economy: History & Principles
- Environmental Footprint of Buildings
- Waste & Recycling
- Reuse Assessment, Deconstruction & Procurement processes
- Design for Upstream Reuse (Resuing Structural and Non-Structural Components)
- Design for Downstream Reuse (Design for Disassembly, Reversible Design, Design for Flexibility, Modular Design)
- Design with Geo-based Materials
- New Circular Business Models and Legal Aspects

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; Life-cycle Assessment (LCA)

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.
- Assess / Evaluate current circular practices and design methods
- Critique current circular practices and design methods
- Characterize current circular practices and design methods

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 is partially conducted with a flipped classrooms.

Expected student activities

Students are expected to:

- attend and enliven all classroom sessions;
- prepare classroom sessions by reviewing selected texts and case studies

Assessment methods

Grades reflect both the student's activities during the semester and the final examination.

Supervision

Office hours	No
Assistant.e.s	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.

Moodle Link

- <https://go.epfl.ch/AR-497>