

AR-442

Comfort and architecture: sustainable strategies

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Cursus	Sem.	Type
Architecture	MA1, MA3	Opt.
Minor in Integrated Design, Architecture and Sustainability	H	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Oral
Workload	90h
Weeks	12
Hours	3 weekly
Lecture	2 weekly
Exercises	1 weekly
Number of positions	

Summary

This class offers an overview about comfort evaluations in architectural design and suggests passive and low-energy strategies suited to ensure the highest possible indoor environment quality for buildings.

Content

This course addresses occupant comfort, its evaluation and the relevant architectural and technological strategies to achieve a high level of comfort in indoor spaces. The course is structured as follows:

- **Theory lectures:** Introduction to the various indoor comfort requirements in buildings and their evaluation: thermal, visual and acoustical comfort and air quality. Comfort standards and metrics are introduced, as well as passive design strategies and the main energy targets to be met using active (mechanical) systems when passive systems are not sufficient to ensure adequate indoor comfort conditions. Main building physics principles are illustrated as well as their application in emblematic existing buildings. The theoretical lectures will be complemented by the introduction into suitable software tools to calculate and evaluate the indoor comfort and main energy parameters. The theory lectures pertaining to Acoustics and Air Quality will be given as guest lectures by established experts in these fields, respectively by Dr. Hervé Lissek, head of the acoustic group at LTS2 and Prof. Dusan Licina, director of the Human-Oriented Built Environment Laboratory (HOBEL).
- **Individual exercise:** Students will use and get familiar with the presented software tools by working individually on a pre-defined project. This exercise will be accompanied by dedicated sessions supported by lecturers and teaching assistants.
- **Project exercise:** The students will work in groups on a small design project and will have to optimize and evaluate the building under given comfort and energy requirements. This group work will be accompanied by several 'desk critique' sessions, where the students will discuss the work and receive guidance from the teachers.

Keywords

Comfort in buildings, passive architecture, building simulation.

Learning Outcomes

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

- Integrate comfort and energy requirements in the design process.
- Analyze integration constraints in the architecture project.
- Propose passive architectural measures to ensure/improve indoor comfort.
- Choose and use adequate simulation tools to quantitatively evaluate energy performance and comfort of a design project.

Assessment methods

After the individual exercise, a written report (due after 3 weeks) is required. Weight: 15%.

A mid-term-evaluation on a poster-presentation. Weight 10%.

The final exam consists of a report and an oral presentation. Weight: 75%.

Resources

Moodle Link

- <https://go.epfl.ch/AR-442>