

Bioclimatic building design (2020-2021)

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Topics

A. Lectures

- Motivation and basic concepts
- Building energy balance, heat transfer and structures
- Thermal insulation and materials
- Comfort criteria and HVAC systems
- Daylight and lighting systems
- Passive design and examples
- Loads and building automation
- Standards, indicators, and certifications
- Local generation and storage

B. Exercises

- Software overview and examples
- Building thermal model in MATLAB/Simulink
- Estimation of building element properties and thermal loads
- Preliminary sizing of glazing and lighting system
- Daylight evaluation in DIALux
- Sizing of lighting system in DIALux
- Building lighting model in MATLAB/Simulink
- Dynamic building thermal model (e.g. in TRNSYS)
- Example of energy certification

Teaching

- Lectures streaming on Monday 9.00 to 11.30 (am, Central European Time) via Zoom
<https://uniroma1.zoom.us/meeting/register/tZcofuyqqTsoHtEVg2TdEV55ggGicbEzgt9>
- Exercises recorded and posted on Google Classroom
<https://classroom.google.com/c/MzQxMzM5NDUxNTIa?cjc=ccob7yh> (with course code ccob7yh)
and on associated Google Drive folder
- Attendance is strongly recommended

References

Lectures notes posted on Google Classroom (and on Google Drive folder), including suggested references.

Exam

- I. Submission of a short report, via email prior to discussion, including:
 - A. Synthetic outcomes of exercises (1 page each, including e.g. 1 scheme and 1-2 plots, with comments on results; more info will be provided based on specific topic during exercises).
 - B. Short essay (approx. 1 page and 2 figures) on 1 topic selected among the following:
 - a. a technique or solution (explaining operational principles and pro/cons), or
 - b. a material or structure (describing properties and pro/cons), or
 - c. a project or building (presenting implemented solutions and achievements).
- II. Discussion of essay (approx. 5 slides) and questions on exercises and theory (approx. 20-30 min, via Google Meet or the like).

Template and instructions will be provided during exercises and posted.