Course learning objectives

- Identify the environmental elements applying to buildings
- Recognize our human needs relating to buildings
- Propose ways to control the building’s response to the outside environment
- Select the adequate design and materials for a given building configuration
Course contents

- Thermal aspects of a building
  - Outside environment and human needs
  - Heat and air flow
  - Humid air and thermal comfort
  - Passive heating and cooling
  - Thermal insulation
  - Condensation and moisture
  - Active heating, HVAC
  - Thermal balance
Course contents

- Thermal aspects of a building
- Lighting aspects of a building
  - Physics of light, photometry
  - Vision and colors, visual comfort
  - Design methods for sunlight and daylight
  - Case studies and window materials
  - Electric lighting
Course contents

- Thermal aspects of a building
- Lighting aspects of a building
- Acoustic aspects of a building
  - Sound and hearing
  - Sound insulation
  - Room acoustics
Course contents

- Thermal aspects of a building
- Lighting aspects of a building
- Acoustic aspects of a building
- Construction methods
  - Foundations
  - Wood
  - Steel
  - Masonry and concrete
Assignments

- Participation and homework 40%
  - problem sets, reading assignments
  - building analyses

- In-class quizzes 30%
  - March 22, May 10
  - 1h30’

- Design project 30%
  - selection of building
  - 3 parts: thermal balance, lighting and acoustic analysis, proposal for a relocation of the building in a different climate
  - teams of 2
  - short written reports (3-5 pages)
Building functions as an integrated system

Any design decision has repercussions on many other issues

- choice of materials ...
- thermal properties
- acoustics
- lighting ...
- wiring, piping ...
- structural resistance, fire protection, maintenance ...

Figure by MIT OCW.