Course Specifications
Valid as from the academic year 2020-2021

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Study time</th>
<th>Contact hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>90 h</td>
<td>20.0 h</td>
</tr>
</tbody>
</table>

Course offerings and teaching methods in academic year 2020-2021

- **A (semester 1)**
  - Language: English
  - Location: Gent
  - Lecture: 7.5 h
  - Self-reliant study activities: 15.0 h
  - Seminar: 7.5 h

Lecturers in academic year 2020-2021

- **Janssens, Arnold**
  - TW01 lecturer-in-charge
- **Laverge, Jelle**
  - TW01 co-lecturer

Offered in the following programmes in 2020-2021

<table>
<thead>
<tr>
<th>Programme</th>
<th>Credits</th>
<th>Offering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Science in Engineering: Architecture (main subject Architectural Design and Construction Techniques)</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Engineering: Architecture (main subject Urban Design and Architecture)</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Exchange Programme Architecture</td>
<td>3</td>
<td>A</td>
</tr>
</tbody>
</table>

Teaching languages

- English

Keywords

- building physics, numerical simulation, performance based design

Position of the course

Due to the increasing interest in performance-based design (e.g. in the context of sustainable construction), computer simulations to evaluate building physics performances is becoming more important. This elective course aims to teach the principles, possibilities and limitations of simulation methods for building physics applications. The course is organised as a series of lectures and seminars in which theoretical insights are applied to simulation assignments to assess specific performances using various simulation tools. The evaluation of this course is based on the report of the simulation tasks.

Contents

- The role of building performance simulation in the design and construction process.
- Building Energy Simulation (BES):
  - Heat and mass balance, numerical approaches (semi-steady state to dynamic)
  - Boundary conditions and performance assessment criteria
  - Verification, validation and optimization
  - Applications: Indoor Air Quality, Summer Comfort, Energy use, Load duration curve
- Hygrothermal simulations (HAM)
  - Numerical approaches
  - Material properties, boundary conditions and performance criteria
  - Applications: Facade renovation, Double skin Facades
- Simulation assignment: BES and HAM performance assessment

Initial competences

- Bouwfysica, technische installaties

Final competences

1. Gain insight into the principles, possibilities and limitations of numerical simulation

(Approved)
methods and tools for applications in building physics
2 Understand the complex interaction between building physical performances, such as indoor climate and energy use, and the climate, users and architectural and technical subsystems
3 Use building performance simulation to assess and optimise the building physical performances of a building or construction design

Conditions for credit contract
Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract
This course unit cannot be taken via an exam contract

Teaching methods
Lecture, seminar, self-reliant study activities

Learning materials and price
Hand-outs and papers, available on the digital learning platform

References

Course content-related study coaching

Evaluation methods
end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period
Oral examination, assignment

Examination methods in case of periodic evaluation during the second examination period
Oral examination, assignment

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation
not applicable

Calculation of the examination mark

(Approved)