

# Syllabus

## *Syllabus*

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| Titul dl curs                                | Laboratorio di Edilizia ad alte prestazioni: comfort, efficienza energetica                                                                                                                                                                                                                                                                                                                                                                                |
| Codesc dl curs                               | 42642                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Titul suplementar                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| SSD                                          | NN                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Lingaz                                       | Inglese                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Curs de laurea                               | Corso di laurea professionalizzante in Tecnologie del Legno                                                                                                                                                                                                                                                                                                                                                                                                |
| D'autri cursc de laurea<br>(cursc deberieda) |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Dozenc                                       | prof. Giovanni Pernigotto,<br>Giovanni.Pernigotto@unibz.it<br><a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/30622">https://www.unibz.it/en/faculties/engineering/academic-staff/person/30622</a><br>dr. Federica Morandi,<br>Federica.Morandi@unibz.it<br><a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/41968">https://www.unibz.it/en/faculties/engineering/academic-staff/person/41968</a> |
| Assistent didatich                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Semester                                     | Primo semestre                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Ann/Agn de stude                             | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Credic universitars                          | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Ores de insegnament                          | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Ores de laboratore                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Ores de stude individual                     | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Ores de riceviment<br>prevedudes             |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Ressumé di contegnus                         | <ul style="list-style-type: none"> <li>• Knowledge of instruments and tools to characterize the thermal behaviour of building materials and building envelope elements.</li> <li>• Knowledge of instruments to monitor Indoor Environmental Quality.</li> <li>• Calculation tools to assess the thermal behaviour of building</li> </ul>                                                                                                                   |

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|                                                    | <p>envelope element and connection nodes</p> <ul style="list-style-type: none"> <li>• Calculation tools to assess the energy performance of the whole building system, specific HVAC subsystems and artificial lighting systems.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Argomenc dl curs</b>                            | <p>The present laboratory deals with the practical aspects of the design of high-performance buildings. It consists of 20 hours of practical activities carried out both in the Laboratories of Building Physics of the Free University of Bozen-Bolzano at the NOI Techpark and in university classrooms (exercises, computer modelling and energy simulations).</p> <p>Laboratory activities will be related to:</p> <ul style="list-style-type: none"> <li>- Characterization of the thermo-physical properties of building materials.</li> <li>- Measurement of heat flux through building envelope elements.</li> <li>- Characterization of Indoor Environmental Quality through the use of different monitoring instruments.</li> </ul> <p>Exercise activities will be related to:</p> <ul style="list-style-type: none"> <li>- Calculation of thermos-hygrometric and energy performance of building elements (windows, walls) and connection nodes (thermal bridges).</li> <li>- Calculation of the energy performance of case-study building envelope configurations.</li> <li>- Calculation of the energy performance of case-study building HVAC configurations / artificial lighting systems.</li> </ul> |
| <b>Paroles clef</b>                                | building energy performance; indoor environmental quality; heat flux measurement; temperature measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Prerequisic aconsiés</b>                        | Heat and mass transfer (preferably).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Cursc propedeutics</b>                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Modalité de enseignament</b>                    | Practical lectures in the Building Physics Labs and exercise lectures in the classroom. Teaching material and additional materials will be provided during the semester.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Oblianza de frecuencia</b>                      | Strongly recommended.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Obietifs formatifs y competenzes da arjonje</b> | The present laboratory deals with the practical aspects of the design of high-performance buildings. It consists of 20 hours of practical activities carried out both in the Laboratories of Building Physics of the Free University of Bozen-Bolzano at the NOI Techpark and in university classrooms (exercises, computer modelling and energy simulations).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

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|  | <p>Laboratory activities will be related to:</p> <ul style="list-style-type: none"> <li>- Characterization of the thermo-physical properties of building materials.</li> <li>- Measurement of heat flux through building envelope elements.</li> <li>- Characterization of Indoor Environmental Quality through the use of different monitoring instruments.</li> </ul> <p>Exercise activities will be related to:</p> <ul style="list-style-type: none"> <li>- Calculation of thermos-hygrometric and energy performance of building elements (windows, walls) and connection nodes (thermal bridges).</li> <li>- Calculation of the energy performance of case-study building envelope configurations.</li> <li>- Calculation of the energy performance of case-study building HVAC configurations / artificial lighting systems.</li> </ul> <p>Intended Learning Outcomes (ILO):</p> <p>Knowledge and understanding</p> <p>1. Knowledge of the calculation methods described by the current technical standards for building energy performance assessment. Knowledge of the laws currently in force regarding building energy efficiency and requirements.</p> <p>Applying knowledge and understanding</p> <p>2. Capability to implement the procedures described by the technical standards; capability to develop design and diagnostic skills related to energy efficiency, comfort, and indoor lighting; capability to improve the energy performance of a real case-study.</p> <p>Making judgements</p> <p>3. The student will be able to assess the energy performance of both existing and new buildings, to identify the critical aspects and suggest improvement solutions.</p> <p>Communication skills</p> <p>4. The student will be able to discuss the learned knowledge with vocabulary and technical terms of the discipline.</p> <p>Ability to learn</p> <p>5. Lifelong learning capability through the acquisition of critical tools and critical evaluation of product specifications.</p> |
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| <b>Obietifs formatifs y competenzes da arjonje (informazions suplementares)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Sort de ejam</b>                                                             | <p>No exam is required. Students are either marked as "Passed" or "Failed".</p> <p>Attendance is strongly recommended, even if it is not mandatory.</p>                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Criters de valutazion</b>                                                    | <p>No exam is required. Students are either marked as "Passed" or "Failed".</p> <p>Attendance is strongly recommended, even if it is not mandatory.</p>                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Bibliografia obligatora</b>                                                  | Lessons and slides of the course                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Bibliografia aconsieda</b>                                                   | <p>Technical standards and, in particular:</p> <ul style="list-style-type: none"> <li>- UNI EN ISO 6946:2018</li> <li>- UNI EN ISO 52016-1:2018</li> <li>- UNI/TS 11300-1:2014</li> <li>- UNI EN ISO 10211:2018</li> <li>- UNI EN ISO 10077-1:2018 and -2:2018</li> <li>- EN 16798-1:2019</li> <li>- EN 12464-1:2021</li> </ul>                                                                                                                                                                                                                         |
| <b>Deplù informazions</b>                                                       | <p>Software used:</p> <p>Main tools used during the course:</p> <ul style="list-style-type: none"> <li>• Berkeley Lab THERM (freeware, <a href="https://windows.lbl.gov/therm-software-downloads">https://windows.lbl.gov/therm-software-downloads</a>)</li> <li>• Berkeley Lab WINDOW (freeware, <a href="https://windows.lbl.gov/window-software-downloads">https://windows.lbl.gov/window-software-downloads</a>)</li> <li>• DIALux evo (freeware, <a href="https://www.dialux.com/en-GB/dialux">https://www.dialux.com/en-GB/dialux</a>)</li> </ul> |
| <b>OSS</b>                                                                      | Buona salute, Città e comunità sostenibili, Energia rinnovabile e accessibile                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |