# Syllabus

## *Course Description*

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| **Course Title** | Laboratory of Material Sciences for energy efficiency |
| **Course Code** | 42620 |
| **Course Title Additional** | |
| **Scientific-Disciplinary Sector** | NN |
| **Language** | English |
| **Degree Course** | Professional Bachelor in Wood Technology |
| **Other Degree Courses (Loaned)** | |
| **Lecturers** | Dott. Chiara Tardini,<br>Chiara.Tardini@unibz.it<br>https://www.unibz.it/en/faculties/engineering/academic-staff/person/42844 |
| **Teaching Assistant** | |
| **Semester** | First semester |
| **Course Year/s** | 2 |
| **CP** | 3 |
| **Teaching Hours** | 0 |
| **Lab Hours** | 30 |
| **Individual Study Hours** | 45 |
| **Planned Office Hours** | 9 |
| **Contents Summary** | Thermal bridges: how to avoid them, given a tiny house with different structural materials, located in different places across Italy.<br>Choice of the materials/elements (windows, insulation with the proper thermal properties.<br>Calculation of winter and summer heat balance (thermal transmittance of the wall, Thermal loss, Ventilation loss, Solar gains, Internal gains). |
| **Course Topics** | Lab on a tiny house with different structural materials, located in various places across Italy. |

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| | Choice of the materials/elements (windows, doors, insulation with the proper thermal properties).<br>Calculation of winter and summer heat balance (thermal transmittance of the wall, Thermal loss, Ventilation loss, Solar gains, Internal gains). |
| **Keywords** | Thermal bridges, Thermal loss, Ventilation loss, Solar gains, internal gains, Winter and summer heat balance |
| **Recommended Prerequisites** | None. |
| **Propaedeutic Courses** | |
| **Teaching Format** | Project-based learning. |
| **Mandatory Attendance** | Attendance is not compulsory but highly recommended. |
| **Specific Educational Objectives and Learning Outcomes** | The lab is related to the analysis of a case-study (a small building) with the structural element made of timber, reinforced concrete, masonry, (at student's choice) located in different cities (different climate zones) in which any thermal bridge should be avoided.<br>The purpose of the course is to choose the best material with the proper thermal properties to avoid all the eventual thermal bridges.<br><br>Students will be aware of the ethical implications of their work in materials science, including environmental and sustainability concerns.<br>Analyzing the performance of materials in various environments and conditions.<br><br>Intended Learning Outcomes (ILO)<br>Knowledge and understanding:<br>1. Knowledge of the thermal properties of materials and understanding of the best solution for an energy effective use of building materials and components<br>2. Knowledge of the environmental impact of insulation materials<br>Applying knowledge and understanding:<br>3. Applying knowledge of thermal properties of building materials to select appropriate materials to avoid thermal bridges in the case-study building<br>Making judgments on:<br>4. the sustainability and environmental impact of materials<br>5. Selection of the most proper material according to the specific energy saving need. |

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| | Communication skills:<br>6. Students will learn to communicate their findings and collaborate with others in interdisciplinary teams<br>7. Writing technical reports on the work carried out during the Lab<br>Learning skills<br>8. Ability to deal with problems in a systematic way and find appropriate problem-solving solutions. |
| **Specific Educational Objectives and Learning Outcomes (additional info.)** | |
| **Assessment** | Examination of the course is conducted via an oral presentation (possibly jointly with the course of Structural mechanics) of the project carried out during the semester. An A1 poster with the drawings and the materials adopted and a written technical report will be also considered for the final evaluation (passed/not passed).<br><br>Formative Assessment Form: A1 Poster with drawings and list of materials; ILOs assessed: 1,2,3,8. |
| **Evaluation Criteria** | Passed/Not passed grading.<br>Criteria for grading: comprehension, problem-solving skills, technical competence and correct calculation of results will be evaluated. |
| **Required Readings** | KlimaHaus *Catalogue of Thermal Bridges,* 2023 |
| **Supplementary Readings** | |
| **Further Information** | Software used: Autocad 2D, Canva. |
| **Sustainable Development Goals (SDGs)** | Responsible consumption and production |