Syllabus

Course Description

Course Title	Laboratory of High-Performance Buildings: Comfort, Energy Efficiency
Course Code	42642
Course Title Additional	
Scientific-Disciplinary Sector	NN
Language	English
Degree Course	Professional Bachelor in Wood Technology
Other Degree Courses (Loaned)	
Lecturers	Prof. Giovanni Pernigotto, Giovanni.Pernigotto@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/30622
Teaching Assistant	
Semester	First semester
Course Year/s	3
CP	2
Teaching Hours	20
Lab Hours	0
Individual Study Hours	30
Planned Office Hours	
Contents Summary	• Knowledge of instruments and tools to characterize the thermal behaviour of building materials and building envelope elements. • Knowledge of instruments to monitor Indoor Environmental Quality. • Calculation tools to assess the thermal behaviour of building envelope element and connection nodes • Calculation tools to assess the energy performance of the whole building system, specific HVAC subsystems and artificial lighting systems.

Course Topics	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). Laboratory activities will be related to: - Characterization of the thermo-physical properties of building materials. - Measurement of heat flux through building envelope elements. - Characterization of Indoor Environmental Quality through the use of different monitoring instruments. Exercise activities will be related to: - Calculation of thermos-hygrometric and energy performance of building elements (windows, walls) and connection nodes (thermal bridges). - Calculation of the energy performance of case-study building envelope configurations. - Calculation of the energy performance of case-study building HVAC configurations / artificial lighting systems.
Keywords	building energy performance; indoor environmental quality; heat flux measurement; temperature measurement
Recommended Prerequisites	Heat and mass transfer (preferably).
Propaedeutic Courses	
Teaching Format	Practical lectures in the Building Physics Labs and exercise lectures in the classroom. Teaching material and additional materials will be provided during the semester.
Mandatory Attendance	Strongly recommended.
Specific Educational Objectives and Learning Outcomes	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). Laboratory activities will be related to: - Characterization of the thermo-physical properties of building materials. - Measurement of heat flux through building envelope elements.

	- Characterization of Indoor Environmental Quality through the use of different monitoring instruments. Exercise activities will be related to: - Calculation of thermos-hygrometric and energy performance of building elements (windows, walls) and connection nodes (thermal bridges). - Calculation of the energy performance of case-study building envelope configurations. - Calculation of the energy performance of case-study building HVAC configurations / artificial lighting systems. Intended Learning Outcomes (ILO): Knowledge and understanding 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. Applying knowledge and understanding 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. Making judgements 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. Communication skills 4. The student will be able to discuss the learned knowledge with vocabulary and technical terms of the discipline. Ability to learn 5. Lifelong learning capability through the acquisition of critical tools and critical evaluation of product specifications.
Specific Educational Objectives and Learning Outcomes (additional info.)	

Assessment	No exam is required. Students are either marked as "Passed" or "Failed". Attendance is strongly recommended, even if it is not mandatory.
Evaluation Criteria	No exam is required. Students are either marked as "Passed" or "Failed". Attendance is strongly recommended, even if it is not mandatory.
Required Readings	Lessons and slides of the course
Supplementary Readings	Technical standards and, in particular: - UNI EN ISO 6946:2018 - UNI EN ISO 52016-1:2018 - UNI/TS 11300-1:2014 - UNI EN ISO 10211:2018 - UNI EN ISO 10077-1:2018 and -2:2018 - EN 16798-1:2019 - EN 12464-1:2021
Further Information	Software used: Main tools used during the course: • Berkeley Lab THERM (freeware, https://windows.lbl.gov/therm-software-downloads) • Berkeley Lab WINDOW (freeware, https://windows.lbl.gov/window-software-downloads) • DIALux evo (freeware, https://www.dialux.com/en-GB/dialux)
Sustainable Development Goals (SDGs)	Good health and well-being, Sustainable cities and communities, Affordable and clean energy