Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	High-Performance Buildings: Comfort, Energy Efficiency
Course code	42324
Scientific sector	ING-IND/11
Degree	Bachelor in Wood Engineering
Semester	2
Year	2
Academic Year	2019-2020
Credits	6
Modular	No

Total lecturing hours	36
Total lab hours	-
Total exercise hours	24
Attendance	Not mandatory
Prerequisites	Heat and mass transfer (preferably)
Course page	

Specific educational objectives	The course provides description and applicative examples of the calculation methods proposed by the current technical standards for the design of high-performance buildings. Particular focus is put on the building envelope and on its architectural details, with the aim of assessing the impact of different technological solutions on both building energy performance and quality of the built environment. In this framework, the occupants' perception of the built environment is characterized in terms of multi-domain comfort, including aspects related to thermal comfort, indoor lighting, acoustic performance and indoor air quality, providing both theoretical background and design applications.

Lecturer	Dr. Federica Morandi, Dr. Giovanni Pernigotto
Scientific sector of the lecturer	ING-IND/11
Teaching language	English
Office hours	Appointment by email
Teaching assistant (if any)	-
Office hours	-
List of topics covered	• Framework of main laws and technical standards currently in force regarding building energy efficiency and the energy performance of building envelope components. • Calculation tools and implementation of reference cases. • Diagnosis of building energy performance and analysis of different solutions, for improvement and optimization –

	in particular, for the what concerns geometrical and material thermal bridges, windows and window-wall nodes. • Multi-domain comfort analysis: assessment of thermal, visual, acoustic comfort and indoor air quality. • Indoor lighting: artificial lighting system design and control. • Acoustics: sound insulation of building elements, indoor acoustic quality.
Teaching format	The course is divided into theoretical teaching activities in classroom regarding the current methodologies and regulations, exercises, i.e., computer numerical implementation of the described methods, and in-situ activities (in laboratory / meetings with companies and visits to construction sites) for the verification of the practical aspects.

Learning outcomes (ILOs)	The learning outcomes need to refer to the Dublin Descriptors: <u>Knowledge and understanding</u> 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. <u>Applying knowledge and understanding</u> 2. Capability to implement the procedures described by the technical standards; capability to develop design and diagnostic skills related to energy efficiency, comfort, acoustics and indoor lighting; capability to improve the energy performance of a real case-study. <u>Making judgements</u> 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. <u>Communication skills</u> 4. The student will be able to discuss the learned knowledge with vocabulary and technical terms of the discipline. <u>Ability to learn</u> 5. Lifelong learning capability through the acquisition of critical tools and critical evaluation of product specifications.

Assessment

Oral examination with questions aimed at verifying the knowledge and the capability to understand the topics of the course and the mastery of the technical language. The capability to transfer these competences to applicative cases and the developed autonomy of judgment will be evaluated through the discussion of the design work assigned during the course.

Formative assessment

Form	Length /duration	ILOs assessed
Development of the assigned design work	During the course	(2), (3), (5)

Summative assessment

Form	%	Length /duration	ILOs assessed
Oral examination, including discussion of the design work	100	About 45 minutes	All except (5).

Assessment language

English

Evaluation criteria and criteria for awarding marks

A single final vote will take into account of the knowledge of the course content (max 15 points), of the ability of applying the learnt topic (max 5 points), of the ability to synthesize information, correctness of the technical terms and clarity (max 5 points). With reference to the developed design work, the capability to analyze the proposed problem and to formulate a cost-effective and technically advantageous solution will be taken into account (max 5 points). During the development of the project, the ability to learn will be assessed through the ability of consult autonomously further references in the technical literature (max 2 points).

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 e -2:2018;
- EN 16798-1:2019;
- EN 12464-1:2011.