Fakultät für Ingenieurwesen
Facoltà di Ingegneria
Faculty of Engineering

COURSE DESCRIPTION – ACADEMIC YEAR 2025/2026

Course title	**Energy Efficiency in Wood Production and Final use**
Course code	42626
Scientific sector	ING/IND 10
Degree	Bachelor in Wood Engineering (L-P03)
Semester	1
Year	3
Credits	6
Modular	No

Total lecturing hours	40
Total exercise hours	-
Attendance	Strongly recommended
Prerequisites	none
Course page	• https://www.unibz.it/en/faculties/engineering/bachelor-wood-technology/ • Microsoft Teams Community (the professor will provide the link during the first lectures).

Specific educational objectives	The present course deals with the fundamental concept of energy efficiency with a special focus on the wood engineering sector. The course consists of 36 hours of frontal lectures dealing with the more theoretical aspects regarding energy efficiency. At first, a general overview on energy resources, vectors and global demand, sustainability and circular economy is presented. Then, the theory behind the concept of efficiency is discussed. Particularly, thermodynamics principles are considered. A key objective of the course is to support the development of a project specifically addressing energy efficiency within the wood engineering sector, thereby complementing theoretical knowledge with practical application.

Lecturers	(1) Maja DANOVSKA (2) Prof. Francesco PATUZZI
Contacts	(1) maja.danovska@unitn.it (2) Francesco.Patuzzi@unibz.it
Scientific sector of lecturer	ING-IND/10
Teaching language	English
Office hours	Arranged beforehand by email
Lecturing Assistant (if any)	-
Contact LA	-
Office hours LA	-

List of topics	The course will cover the following topics: • Energy resources, vectors and global demand. • Thermodynamics principles. • Energy management systems (ISO 50001). • Sustainability and circular economy concepts. • Energy efficiency analysis and evaluation of processes from forests to wood industry. • Energy efficiency analysis and evaluation in wood industry. • Energy efficiency analysis and evaluation of wood residues valorisation and final use.
Teaching format	The course consists of lectures in which the topics are presented by the professor. Both theoretical topics and applicative examples (exercises) will be presented. Topics will be presented at the blackboard and using electronic slides. Teaching material and additional materials will be provided during the semester.

Learning outcomes	The learning outcomes need to refer to the Dublin Descriptors: <u>Knowledge and understanding</u> 1. Knowledge and understanding of the fundamentals of energy efficiency and sustainability, especially in the wood industry. <u>Applying knowledge and understanding</u> 2. Applying knowledge and understanding to the solution of problems in the field of energy efficiency and, in particular, to efficiency improvement projects. <u>Making judgements</u> 3. Ability to make autonomous judgements in the assessment of suitable energy scenarios and ability to understand and propose improvement projects, to be applied to the wood industry. <u>Communication skills</u> 4. Communication skills to correctly and properly present the concepts acquired in the course and to solve simple numerical applications regarding energy systems in the wood industry. Ability to communicate issues related to energy efficiency and management. <u>Ability to learn</u> Ability to learn skills and acquire tools in the field of energy, sustainability, circular economy to be applied not only in the wood sector, but also in other industrial sectors.

Assessment	**Formative assessment** Form: In class exercises and discussion — Length / duration: 24 hours — ILOs assessed: 1, 2, 3, 4, 5 Form: Project work — Length / duration: > 4 hours — ILOs assessed: 1, 2, 3, 5

Formative assessment

Form	Length / duration	ILOs assessed
In class exercises and discussion	24 hours	1, 2, 3, 4, 5
Project work	> 4 hours	1, 2, 3, 5

Summative assessment

Examination of the course is carried out by means of an oral exam which will cover both the theoretical part and the project work. The oral examination includes questions to assess the knowledge and understanding of the course topics and questions designed to assess the ability to transfer these skills to case studies and practical applications.
Questions on practical applications also assess the ability of the student to apply the knowledge and understanding of the course topics, the ability to make judgments and finally, the student communication skills.

The exam consists in three parts:
- part 1: Theory assessment (40% of the grade);
- part 2: Project presentation (to be held at the end of the course) (30% of the grade);
- part 3: Questions on the project (30% of the grade).

Form	%	Length / duration	ILOs assessed
Oral exam	100	30 minutes	1,2,3,4,5

Assessment language	English
Assessment Typology	Monocratic
Evaluation criteria and criteria for awarding marks	It is relevant for the oral exam to: master the specific language (also with respect to the teaching language); prove the understanding of the topics and learning skills; evaluate and establish relationships between topics; grow specific skills in critical thinking. Regarding the practical applications, it is relevant to clearly describe suitable technical solutions and be able to make critical judgments and apply the theoretical concepts.

Required readings	Çengel, Y. A., & Boles, M. A. (2021). Thermodynamics: An engineering approach (9th ed.). McGraw-Hill Education. Çengel, Y. A., & Ghajar, A. J. (2020). Heat and mass transfer: Fundamentals and applications (6th ed.). McGraw-Hill Education.
Supplementary readings	Learning material will be provided by the professor during the course.
Software used	In case, information will be provided at the beginning of the course.