Syllabus

Course Description

Course Title	Energy efficiency in wood production and final use
Course Code	42626
Course Title Additional	
Scientific-Disciplinary Sector	IIND-07/A
Language	English
Degree Course	Professional Bachelor in Wood Technology
Other Degree Courses (Loaned)	
Lecturers	Dott. Maja Danovska, Maja.Danovska@unibz.it Prof. Francesco Patuzzi, Francesco.Patuzzi@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/30127
Teaching Assistant	
Semester	First semester
Course Year/s	3
CP	4
Teaching Hours	40
Lab Hours	0
Individual Study Hours	60
Planned Office Hours	12
Contents Summary	• 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.
Course 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.
Keywords	Wood, energy efficiency, thermochemical conversion processes, circular economy, sustainability.
Recommended Prerequisites	None.
Propaedeutic Courses	
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.
Mandatory Attendance	Strongly recommended.
Specific Educational Objectives and Learning Outcomes	The present course deals with the fundamental concept of energy efficiency with a special focus on the wood engineering sector. The course consists of 40 hours of frontal lectures dealing with the more theoretical aspects regarding energy efficiency. A general overview on energy resources, vectors and global demand, sustainability and circular economy is presented. In addition, the theory behind the concept of efficiency is discussed. Particularly, thermodynamics principles are considered. Concepts regarding energy efficiency within the wood engineering sector are discussed and case studies are analyzed, thereby complementing theoretical knowledge with practical applications. The learning outcomes need to refer to the Dublin Descriptors: Knowledge and understanding

	1. Knowledge and understanding of the fundamentals of energy efficiency and sustainability, especially in the wood industry. Applying knowledge and understanding 2. Applying knowledge and understanding to the solution of problems in the field of energy efficiency and, in particular, to efficiency improvements in real study cases. Making judgements 3. Ability to make autonomous judgements in the assessment of suitable energy scenarios and ability to understand and propose improvement solutions, to be applied to the wood industry. Communication skills 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. Ability to learn 5. 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.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Examination of the course is carried out by means of an oral exam which will cover the theoretical part. 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. Oral exam: 100%; length/duration: 30 minutes; ILOs assessed: 1,2,3,4,5.

Evaluation Criteria	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	Software used: in case, information will be provided at the beginning of the course.
Further Information	
Sustainable Development Goals (SDGs)	Industry, innovation and infrastructure, Affordable and clean energy