Syllabus

Course Description

Course Title	Mechatronics and Process Automation
Course Code	42628
Course Title Additional	
Scientific-Disciplinary Sector	IIND-02/A
Language	German
Degree Course	Professional Bachelor in Wood Technology
Other Degree Courses (Loaned)	
Lecturers	dr. Veit Gufler, Veit.Gufler@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/38756
Teaching Assistant	
Semester	First semester
Course Year/s	3
CP	3
Teaching Hours	30
Lab Hours	0
Individual Study Hours	45
Planned Office Hours	9
Contents Summary	• Introduction to mechatronic and automation systems • Data acquisition and sensing • Electrical actuators • Motor-transmission-load coupling • Power transmission systems • Hydraulics and pneumatics • Introduction to mechanics of robots.
Course Topics	Understanding and knowledge of the fundamentals of mechatronic systems and automated processes, covering both theoretical and practical aspects. This includes modeling and analysis of

	mechatronic components and their interactions, the use of sensors and actuators for data acquisition and control, and the integration of mechanical, electrical, and fluidic systems.
Keywords	mechatronics, sensing, drives, power transmission
Recommended Prerequisites	Students should be familiar with the basic knowledge of physics and mathematical analysis.
Propaedeutic Courses	
Teaching Format	Frontal lectures, exercises.
Mandatory Attendance	Strongly recommended.
Specific Educational Objectives and Learning Outcomes	The course aims at giving the fundamentals of mechatronics and process automation relevant to wood engineering. These include data acquisition and sensors, modeling and selection of electrically driven actuating elements, power transmission systems, hydraulic and pneumatic components, automatic machines, and robotics. Criteria and methods to analyze and design electro-mechanical systems, power transmission systems, hydraulic and pneumatic systems, and their integration in an industrial production line will be addressed. Learning outcomes Knowledge and understanding: • Know and understand the fundamentals of mechatronic systems and process automation • Know and understand the fundamentals of data acquisition and sensors, electrical actuators, and the fundamentals of motor-transmission-load coupling • Know and understand the operating principles and the sizing procedures of rigid and flexible power transmission systems, and the main concepts of pneumatic and hydraulic systems for automation • Know and understand the fundamentals of the mechanics of robots and the main robotic systems and characteristics as well as their application fields Applying knowledge and understanding: • Evaluate and understand different sensors and data acquisition systems for process automation and electrical actuators • Evaluate the properties of mechanisms, machines and transmission systems and apply knowledge to size mechanical transmission components or select them

	• Evaluate and understand the functioning of pneumatic and hydraulic systems • Apply knowledge and understanding to analyse and evaluate mechanical components and mechatronic/robotic systems Making judgments • Choose suitable and proper sensors, mechanical, hydraulic and pneumatic components, and robotic systems for mechatronic systems and industrial applications • Transfer the theoretical knowledge and methods to real-world practical applications Communication skills • Discuss technical documentation and case studies as well as communicate with technical language Learning skills • Ability to independently extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	- Formative Assessment The exercises in the classroom as well as discussions with the professor during the lectures enables to assess and evaluate the student's ability to apply their knowledge and understanding of the topics covered during the course. - Summative Assessment The final exam consists of a written test on the main topics explained by the lecturer. Each section consists of exercises as well as theory questions about all the topics covered in the course.
Evaluation Criteria	The evaluation criterion of the exercises is the correctness of the solution. The evaluation criteria of the theory questions are based on the knowledge of the topics of the course, the clarity of the response and the properties of language of the student (in relation to the language of the course), the pertinence and the relevance of the response, and the autonomy of judgment. The relative score of each exercise and theory question will be specified on the final exam (written test).
Required Readings	The course material is collected from various textbooks, lecture

	notes and research papers. The student can mainly refer to the lecture notes, research papers and readings provided by the professors.
Supplementary Readings	
Further Information	
Sustainable Development Goals (SDGs)	Quality education, Industry, innovation and infrastructure, Affordable and clean energy