

COURSE DESCRIPTION – ACADEMIC YEAR 2023/2024

Course title	Mechatronics and Process Automation
Course code	42311
Scientific sector	ING-IND/13
Degree	Bachelor in Wood Engineering (L-9)
Semester	1
Year	3
Credits	6
Modular	No
Total lecturing hours	36
Total lab hours	24
Attendance	Strongly recommended
Prerequisites	Students should be familiar with the basic knowledge of physics and mathematical analysis.
Course page	Microsoft Teams and https://ole.unibz.it/
Specific educational objectives	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. Further, the students will gain practical experience of mechanical laboratory equipment pertaining to robotics.
Lecturers	Dr. Veit Gufler Dr. Lorenzo Maccioni Prof. Renato Vidoni
Contact	Veit.Gufler@unibz.it Lorenzo.Maccioni@unibz.it Renato.Vidoni@unibz.it
Scientific sector of lecturer	ING-IND/13
Teaching language	English
Office hours	See timetable online: www.unibz.it/en/timetable/ and by appointment
Lecturing Assistant	
Contact LA	
Office hours LA	
List of topics	<ul style="list-style-type: none"> • 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 • Process automation through robotics

Teaching format	Frontal lectures, exercises, laboratory activity
Learning outcomes	<p>Knowledge and understanding:</p> <ul style="list-style-type: none"> • 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 <p>Applying knowledge and understanding:</p> <ul style="list-style-type: none"> • 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 <p>Making judgments</p> <ul style="list-style-type: none"> • 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 <p>Communication skills</p> <ul style="list-style-type: none"> • Discuss technical documentation and case studies as well as communicate with technical language <p>Learning skills</p> <ul style="list-style-type: none"> • Ability to independently extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation
Assessment	<p><u>Formative Assessment</u> The exercises in the classroom and in the laboratory, as well as discussions with the professor during the lectures would allow to assess and evaluate the student's ability to apply their knowledge and understanding of the topics covered during the course</p> <p><u>Summative Assessment</u> The final exam consists of a written test composed of three sections based on the main topics explained by the three course lecturers. Each</p>

	section consists of exercises addressed in the exercise lectures and lab activity as well as theory questions about all the topics covered in the course (both during the frontal and exercise lectures).
Assessment language	English
Assessment Typology	
Evaluation criteria and criteria for awarding marks	<p>The relative score of each exercise and theory question will be specified on the final exam (written test).</p> <p>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.</p>
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	
Software used	