

## COURSE DESCRIPTION – ACADEMIC YEAR 2023/2024

<b>Course title</b>	<b>Hydraulic and Pneumatic Automation Technologies; Fundamentals of hydraulics and pneumatics</b>
<b>Course code</b>	47573-42187
<b>Scientific sector</b>	ING-IND/08
<b>Degree</b>	Bachelor in Industrial and Mechanical (L-09) Engineering; Master in Industrial Mechanical Engineering (LM-33)
<b>Semester</b>	1
<b>Year</b>	
<b>Credits</b>	6
<b>Modular</b>	No
<b>Total lecturing hours</b>	36
<b>Total exercise hours</b>	24
<b>Attendance</b>	Strongly recommended
<b>Prerequisites</b>	
<b>Course page</b>	<a href="https://www.unibz.it/en/faculties/engineering/master-industrial-mechanical-engineering/course-offering/">https://www.unibz.it/en/faculties/engineering/master-industrial-mechanical-engineering/course-offering/</a>
<b>Specific educational objectives</b>	<p>The course is the scientific sector of fluid machines and it consists of 36 hours of frontal lectures and 24 hours of exercises.</p> <p>The lectures introduce the fundamental concepts and the working principles of the main hydraulic and pneumatic components. The specific educational objectives consist in showing the specific function of each component and valve, to give the correct interpretation of Iso schemes of hydraulic or pneumatic circuits and to help in choosing components suited to their required use.</p> <p>The exercises are intended to present practical problems with the aim to give the students the adequate knowledge to project real working circuits.</p>
<b>Lecturer</b>	Carlo Maria Rozzi de Hieronymis (exercises); Paolo Cusano (lectures)
<b>Contact</b>	paolo.cusano@unibz.it
<b>Scientific sector of lecturer</b>	
<b>Teaching language</b>	English
<b>Office hours</b>	18 (possibility to schedule with teachers)
<b>Lecturing Assistant (if any)</b>	
<b>List of topics</b>	<p>The course will deal with the following topics.          General principles. Hydraulic energy transmission. Head and fluid loss. Hydraulic fluid classification. Graphic</p>

	<p>symbols and standardisation. Hydraulic open and closed circuits. Pumps and motors with pistons, vane, gears. Hydraulic jacks. Geometrical displacement. Formulas for performances computation. Pressure regulation valves. Pressure reduction valves. Sequential valves. Flow regulation valves. Flow limitation valves. Pressure regulation valves.</p> <p>Pressure reduction valves. Sequential valves. Flow regulation valves. Flow limitation valves. Flow dividers. Oper-centre valves. Direction regulation valves. Non-reversal valves. Rotary and case distributors. Feeding groups. Utilizing groups. Parallel, in series and mixed circuits. Circuits for sequences.</p> <p>Load sensing systems.</p> <p>circuits and valves. Fitting elements for circuits. Compressors. Compressor and tank choice. Pneumatic jacks and hammers. Pressure, flow, direction regulation valves. Analytical and graphic computation examples.</p>
<p><b>Teaching format</b></p>	<p>The course consists of classroom lectures in which the topics are presented by the lecturer. There are also practical lessons that will give practical examples of the application of the theoretical topics. Course topics will be presented through presentations. Teaching material will be given to the students; required additional material will be provided by the Professor.</p>
<p><b>Learning outcomes</b></p>	<p>The learning outcomes referred to the Dublin Descriptors:</p> <p><b>Knowledge and understanding:</b>      The course allows the students to acquire advanced knowledge on the main hydraulic and pneumatic components and their specific function and application. The topics discussed will provide the basis for a thorough understanding of the main phenomena of mechanical transmission through fluid-dynamic circuits.</p> <p><b>Applying knowledge and understanding:</b>      The student will be able to interpret the operation and the potential of a hydraulic or pneumatic circuit and to acquire the know-how to determine the convenience of using a component or an entire plant in relation to end uses. Professional capabilities will be obtained through the ability to model and design hydraulic or pneumatic circuits.</p> <p><b>Making judgments:</b>      The student should acquire the ability to evaluate the functionality of a hydraulic or pneumatic circuit and the</p>

	<p>capacity to choose the type of components of a hydraulic or pneumatic circuit based on the application sector. Communication skills:</p> <p>Learning skills          The student should acquire lifelong learning skills through the possession of the tools for the acquisition of technical information on hydraulics and pneumatics and to update knowledge.</p>
<p><b>Assessment</b></p>	<p>The assessment for the final mark consists of two tests:          - Written exam containing questions related to the topics covered during the lessons.          During the last part of the course some projects will be proposed. The students will develop in group or individually one of the proposed projects in order to discuss it during the oral examination. This project will be considered as written parts of the exam          - Oral examination and / or deepening of the written test themes</p>
<p><b>Assessment language</b></p>	<p>English</p>
<p><b>Evaluation criteria and criteria for awarding marks</b></p>	<p>The student must demonstrate to have acquired the physical principles and theoretical-evaluation considerations underlying the configurations and operation of components and systems in the hydraulic and pneumatic technical field.          In order to get a positive final mark, the student must demonstrate that there are no gaps in the basic knowledge presented in the course. The maximum evaluation is achieved by demonstrating in-depth knowledge of course content. The written and the oral exam have the same weight in the final mark calculation.</p>
<p><b>Required readings</b></p>	<ul style="list-style-type: none"> <li>- L'OLEODRAULICA nell'ambito industriale e mobile (ASSOFLUID)</li> <li>- Slides and documentation shared on teams</li> </ul>
<p><b>Supplementary readings</b></p>	<ul style="list-style-type: none"> <li>- Passi nell'oleodinamica: vol1; vol2. (Nervegna, Rundò)</li> <li>- MANUALE DELL'OLEODINAMICA (Speich, Bucciarelli)</li> </ul>