

Course code																																	
Type and description	EC																																
ECTS credit	1																																
Course name	Metrology and control in mechanical engineering																																
Course name in Polish	Metrologia i sterowanie w inżynierii mechanicznej																																
Language of instruction	English																																
Course level	8 PRK																																
Course coordinator	dr hab. inż. Damian Batory, prof. uczelni																																
Course instructors	dr hab. inż. Damian Batory, prof. uczelni dr hab. inż. Pawel Olejnik, prof. uczelni																																
Delivery methods and course duration	<table border="1"> <thead> <tr> <th></th> <th>Lecture</th> <th>Tutorials</th> <th>Laboratory</th> <th>Project</th> <th>Seminar</th> <th>Other</th> <th>Total of teaching hours during semester</th> </tr> </thead> <tbody> <tr> <td>Contact hours</td> <td>0</td> <td>0</td> <td>0</td> <td>15</td> <td></td> <td>0</td> <td>15</td> </tr> <tr> <td>E-learning</td> <td>No</td> <td>No</td> <td>No</td> <td>No</td> <td>No</td> <td>No</td> <td></td> </tr> <tr> <td>Assessment criteria (weightage)</td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Lecture	Tutorials	Laboratory	Project	Seminar	Other	Total of teaching hours during semester	Contact hours	0	0	0	15		0	15	E-learning	No	No	No	No	No	No		Assessment criteria (weightage)				1			
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Course objective	<ol style="list-style-type: none"> 1. Transfer of basic knowledge in the field of metrology and control in mechatronic systems. 2. Acquiring the ability to analyze and build measuring lines. 3. Acquiring skills in the field of open and closed automatic control systems. 4. Acquiring skills in data acquisition and treatment 																																
Learning outcomes	<p>After completing the course the PhD student:</p> <ol style="list-style-type: none"> 1. Knows the theoretical basics and the principles of using sensors, measuring cards and actuators in mechanical engineering – effects W4, U4, K1; 2. Assess the validity of the implementation of selected measuring lines in mechatronic systems – effects W4, U4, K1 3. Interprets phenomena that accompany experimental measurement – effects W4, U4, K1; 4. Analyze selected systems of digital control – effects W4, U4, K1. 5. Evaluates the obtained measurement data in terms of accuracy, reliability and repeatability – effects – W4, U4, K1 																																
Assessment methods	<p>Effects W4, U4, K1 – exam and projects' reports</p> <p>The final evaluation is based on:</p> <p>Written exam – 50%</p> <p>Participation and report on project classes – 50%</p>																																
Prerequisites	Basics of mechatronics																																

Course content with delivery methods	<p>PROJECT</p> <ol style="list-style-type: none"> 1. Sources of measurement signal interference and methods of their elimination 2. Angle measurement using a potentiometric transducer (differentiation of the measurement signal). 3. Acceleration measurement using a three-axis micromechanical accelerometer with voltage output. 4. Multi-channel temperature measurement using digital and analog sensors. 5. Control of water level in a two-tank system. 6. Precise control of rotational velocity of a belt pulley subject to disturbances. 7. PID control of a gimbal driven by BLDC motors.
Basic reference materials	<ol style="list-style-type: none"> 1. S. Morris, R. Langari: Measurement and Instrumentation. Theory and Application, Butterworth-Heinemann, 2012. 2. ni.com 3. W.H. Roadstrum, D.H. Wolaver: Electrical Engineering For All Engineers, John Willey and Sons, Inc. 1987
Other reference materials	<ol style="list-style-type: none"> 1. LabView Measurements Manual, National Instruments, 2003 2. Handbook of Measurements: Benchmarks for Systems Accuracy and Precision, Adedeji B. Badiru and L. Racz (Eds), CRC Press, 2015
Average student workload outside classroom	10 h
Comments	
Last update	17 March 2023