COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Mechatronics</td><td colspan="2">Degree level and programme type</td><td>Bachelor's degree/Master's degree/Doctoral degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Control of mechatronic systems</td><td colspan="2">Course code</td><td>IS-FME-002010W</td></tr>
<tr><td colspan="2">Course type</td><td>obligatory/elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>winter</td></tr>
<tr><td>15</td><td></td><td></td><td>30</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>4</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Feedback control theory, signal processing basics, computer programming</td></tr>
<tr><td>Course objectives</td><td colspan="9">Getting familiar with advanced mechatronic control systems. Presentation and practical implementation of control systems taking into account microprocessor platforms, sensors and actuators (e.g. motors with encoders, servomechanisms, etc.). Overview of implementation methods of the control algorithms.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Structures of control systems. Mechatronic control objects in theory and practice (e.g. motors with encoders, servos, etc.). Actuators and sensors in control systems. Control algorithms and their implementation. Simulation of mechatronic systems using the MATLAB/Simulink, GNU Octave and Scilab/Xcos environments. Analog and digital signals in control systems. Programming of control algorithms and their integration with mechatronic objects. Project: Using MATLAB/Simulink, GNU Octave or Scilab/Xcos software for modelling, programming testing of control systems. Control system design and programming for mechatronic plant.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Information and case-studies lecture; Practical design exercises</td></tr>
<tr><td>Assessment method</td><td colspan="9">Lecture: exam, Project: assessment of completed projects, current progress at work, discussions and activity in the classroom</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="7">knows the structures of control systems; knows the principle of mechatronic synergy and understands its practical application.</td><td colspan="2"></td></tr>
<tr><td>LO2</td><td colspan="7">understands the principle of operation of continuous</td><td colspan="2"></td></tr>
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	and discrete controllers; Has knowledge of the practical use of analog and digital control signals; knows the simulation methods of control systems.	
LO3	is able to simulate a control system of mechatronic plant with the use of MATLAB/Simulink/GNU Octave/Scilab/Xcos software.	
LO4	can implement a control algorithm on a selected microprocessor platform using a dedicated programming language or MATLAB/Simulink/GNU Octave/Scilab/Xcos software software	
LO5	is able to work independently and in a team and expand his knowledge in the field of mechatronic control systems	
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	Lecture: exam	L
LO2	Lecture: exam	L
LO3	Project: assessment of completed projects, current progress at work, discussions and activity in the classroom	P
LO4	Project: assessment of completed projects, current progress at work, discussions and activity in the classroom	P
LO5	Project: assessment of completed projects, current progress at work, discussions and activity in the classroom	P
Student workload (in hours)		No. of hours
Calculation	Participation in lectures	15
	Participation in project classes	30
	Preparation for the lecture exam; attendance at the exam	17
	Preparation for project classes	19
	Performing design tasks (including preparation of a presentation)	10
	Participation in consultations	6
	TOTAL:	100
Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	50	2
Student workload – practical activities	67	2,7
Basic references	R. Iserman, Mechatronic systems: Fundamentals, Springer, New York, 2005 K. Ogata, Modern Control Engineering, 5th edition, 2009 N. S. Nise, Control System Engineering, John Wiley & Sons, 2011	

Supplementary references	**J. Graf, PID Control Fundamentals, CreateSpace Independent Publishing Platform, 2016**	
Organisational unit conducting the course	**Department of Robotics and Mechatronics**	**Date of issuing the programme**
Author of the programme	**Leszek Ambroziak, PhD**	**20.03.2021**

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar