COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td colspan="2">Degree level and programme type</td><td>Bachelor's/ /Master's 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 THEORY</td><td colspan="2">Course code</td><td>IS-FME-00207S</td></tr>
<tr><td colspan="2">Course type</td><td></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>summer</td></tr>
<tr><td>30</td><td>30</td><td></td><td></td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Calculus I (Mathematics I)</td></tr>
<tr><td>Course objectives</td><td colspan="9">To familiarize students with the basic concepts and problems of the control theory as controllability and observability of linear systems, transfer function, dynamical terms of a linear control system.</td></tr>
<tr><td>Course content</td><td colspan="9">Systems' description in the state space. Continuous- and discrete-time systems.
Reachability and controllability of time-invariant and time-varying systems.
Basic observability notation of time-invariant and time-varying systems.
Kalman's decomposition.
Transfer function. Transfer function and system's state space description.
Dynamical terms of the linear control system.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Lecture, classes</td></tr>
<tr><td>Assessment method</td><td colspan="9">Writing tests, exam</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="8">Learning outcomes</td><td>Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="8">Student can describe the control system in state space</td><td></td></tr>
<tr><td>LO2</td><td colspan="8">Student knows Kalman's conditions of controllability and observability of a linear control system and knows how to use them.</td><td></td></tr>
<tr><td>LO3</td><td colspan="8">Student knows relations between transfer function and 's description and can use this knowledge in practice</td><td></td></tr>
<tr><td>LO4</td><td colspan="8">Student can search needed information from different</td><td></td></tr>
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	sources.	
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	Test, exam	L, C
LO2	Test, exam	L, C
LO3	Test, exam	L, C
LO4	Test, exam	L, C
LO5	Test, exam	L, C
LO6	Test, exam	L, C
Student workload (in hours)		No. of hours
Calculation	lecture attendance	30
	participation in classes	30
	preparation for classes	28+2
	participation in student-teacher sessions related to the classes	10
	preparation for and participation in exams/tests	30
	TOTAL:	125

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation 30+30+2+10	72	2,5
Student workload – practical activities 15+28+10+30	73	3

Basic references	1. S.P.Bhattacharyya, A.Datta, L.H.Keel, Linear control theory, CRC/Taylor & Francis, 2009.	
Supplementary references	1. V.Jurdajevic, Geometrical control theory, Cambridge: Cambridge University Press, 2008. 2. E.Sontag, Mathematical control theory, Springer, 1990	
Organisational unit conducting the course	Depertment of Robotics and Mechatronics	Date of issuing the programme
Author of the programme	Ewa Pawłuszewicz, DSc, Assoc. Prof.	27.03.2020

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