COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">ERASMUS+</td><td>Degree level and programme type</td><td>Bachelor's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">Intelligent structures</td><td>Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Optimization of mechatronic structures</td><td>Course code</td><td>IS-FME-00254S</td></tr>
<tr><td>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></td><td></td><td>15</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">Mathematics I, Fundamentals of electrical engineering and electronics, Measurement and control signals, Fundamentals of machine construction</td></tr>
<tr><td>Course objectives</td><td colspan="9">The aim of the course is to teach students to integrate mechanical, electronic and automation systems into one coherent whole. To acquaint students with the possibilities of replacing components
mechanical electrotechnical components. The use of microcontrollers in the control of mechanical components. Acquainting with methods of optimization of mechanical structures</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Construction of assemblies and subassemblies of machine parts cooperating with DC and AC motors, used to drive subassemblies. Selection and use of elements of linear mechanics as actuators. Processes of controlling elements of machine parts. Selection of mechanical and electrotechnical components depending on the working conditions. Determination of limit loads. Selection of components depending on the working environment. Use of DC links,
alternating, servo drives in mechanical constructions. The use of numerical tools to optimize the design of machine parts. Optimization methods with and without constraints. Equality and inequality constraints. Statistical methods in optimization. Methods of searching for the minimum of a function.
Project: The student optimizes the selected mechanical subassembly on the basis of the assumed criterion</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Information and problematic lecture; Design classes;</td></tr>
<tr><td>Assessment method</td><td colspan="9">Lecture: exam
Project: evaluation of completed projects, current work progress, 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>
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LO1	knows and understands the essence of the selected technological process	MK1_W02 MK1_W03
LO2	can calculate loads in a selected node of a machine or device	MK1_W02 MK1_U08 MK1_W03 MK1_U07
LO3	knows how to choose a DC or AC motor	MK1_W02 MK1_U07 MK1_W03 MK1_U05
LO4	knows how to select elements of linear mechanics and knows how to calculate their loads	MK1_U05
LO5	is able to design a mechatronic system replacing structures mechanical	MK1_U06 MK1_U07
LO6	can program the microcontroller controlling the device mechatronic	MK1_U11
LO7	knows how to optimize machine parts	MK1_U05 MK1_U07
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; Project: assessment of completed projects, current work progress, discussions and activity in the classroom;	L, P
LO3	Lecture: exam; Project: assessment of completed projects, current work progress, discussions and activity in the classroom;	L, P
LO4	Project: assessment of completed projects, current work progress, discussions and activity in the classroom;	P
LO5	Project: assessment of completed projects, current work progress, discussions and activity in the classroom;	P
LO6	Project: assessment of completed projects, current work progress, discussions and activity in the classroom;	P
LO7	Project: assessment of completed projects, current work progress, discussions and activity in the classroom;	P
Student workload (in hours)		No. of hours
Calculation	Participation in lectures	30
	Participation in project activities	15
	Preparation for the lecture exam; attendance at the exam	33
	Preparation for design tasks	9
	Performing design tasks (including preparation of a presentation)	6
	Preparing to pass design tasks	12
	Participation in consultations	3
	TOTAL:	138
Quantitative indicators		HOURS / No. of ECTS credits
Student workload – activities that require direct teacher participation		50 / 2

Student workload – practical activities		**73**	**2,5**
Basic references	**1. Stocki R., Analiza niezawodności i optymalizacja odpornościowa złożonych konstrukcji i procesów technologicznych, IPPT PAN, Warszawa 2010** **2. Kutyłowski R., Optymalizacja topologii kontinuum materialnego. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2004** **3. Tarnowski W., Bartkiewicz S., Modelowanie matematycznej symulacja komputerowa dynamicznych procesów ciągłych. Politechnika Koszalińska, Koszalin 2000**		
Supplementary references	**1. Linear Motion Systems - General Catalog: Technical Descriptions of the Products & Product Specifications, THK CO., LTD, Japan 2015** **2. Pokojski.J., Systemy doradcze w projektowaniu maszyn, Wyd.Naukowo-Techniczne, Warszawa 2005.**		
Organisational unit conducting the course	**Department of Machine Construction and Maintenance**	**Date of issuing the programme**	
Author of the programme	**Piotr Tarasiuk, PhD**	**19-03-2021**	

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