COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Electrical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Automatic Control and Robotics</td><td colspan="2">Degree level and programme type</td><td>Bachelor's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">general</td><td colspan="2">Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Computer Methods in Automatics</td><td colspan="2">Course code</td><td>IS-FEE-10065S</td></tr>
<tr><td colspan="2">Course type</td><td>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>summer</td></tr>
<tr><td>30</td><td></td><td></td><td>30</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>6</td></tr>
<tr><td>Entry requirements</td><td colspan="9">-</td></tr>
<tr><td>Course objectives</td><td colspan="9">This course deals with the study of engineering principles and methodologies used main computer programs to solve fundamental problems in control plants and control systems. Major course topics include knowledge of Matlab/Simulink software used to computing, modelling, analysing and plotting of dynamical systems and linear control systems. Before attendance of this course, students should have basic knowledge of computer programming and description of control plants.</td></tr>
<tr><td>Course content</td><td colspan="9">Descriptions of the main computer programs used in automatics. Introduction and fundamentals of Matlab. System functions and configuration of Matlab environment. Matrix and operations. Numerical computations. M-files and function scripts. Graphics, plotting and visualization in 2D and 3D. Modelling of dynamical systems with Control Toolbox. Design of complex dynamical systems by using Control Toolbox. Analysing dynamical systems in time and frequency domains in Matlab. Design linear control systems in Matlab. Introduction and fundamentals of Simulink. Setup and simulation parameters in Simulink. Modelling and simulations of dynamical systems in Simulink. Design and analysing of the complex control systems in Simulink. Group subsystems and map blocks in Simulink. Modelling and investigations of dynamical systems in Matlab Control Toolbox. Design and simulations of dynamical systems in Simulink. Design of linear control system with structurally unstable control plant in Matlab/Simulink. PID and LQR control design. Descriptions of the main computer programs used in automatics. Introduction and fundamentals of Matlab. System functions and configuration of Matlab environment. Matrix and operations. Numerical computations. M-files and function scripts. Graphics, plotting and visualization in 2D and 3D. Modelling of dynamical systems with Control Toolbox. Design of complex dynamical systems by using Control Toolbox. Analysing dynamical systems in time and frequency domains in Matlab. Design linear control systems in Matlab. Introduction and fundamentals of Simulink. Setup and simulation parameters in Simulink. Modelling and simulations of dynamical systems in Simulink. Design and analysing of the complex control systems in</td></tr>
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	Simulink. Group subsystems and map blocks in Simulink. Modelling and investigations of dynamical systems in Matlab Control Toolbox. Design and simulations of dynamical systems in Simulink. Design of linear control system with structurally unstable control plant in Matlab/Simulink. PID and LQR control design.	
Teaching methods	power-point presentations, Matlab/Simulink software, Matlab/Simulink Toolboxes, project examples, MathWorks help, text books, other documents given by the teacher	
Assessment method	lecture – written exam, project – project completion, presentation and discussion, performance of the project	
Symbol of learning outcome	Learning outcomes	Reference to the learning outcomes for the field of study
LO1	knowledge and solving of differential equations with using Matlab/Simulink	K_W01
LO2	modelling and solving of linear dynamic systems with Matlab/Simulink	K_W05 K_W13
LO3	knowledge of methods of designing control plants in the Matlab/Simulink program	K_W05 K_W13
LO4	practical skills needed to develop and calculate the modelling and control design problems with support of Matlab/Simulink	K_U05 K_U13
LO5	skills and knowledge acquired to a practical, hands-on project, linear control design methods with Matlab/Simulink	K_U05 K_U13
LO6	demand for cooperation with other student within group, as well as an increased awareness of its vital importance for development	K_U02
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	written exam, project evaluation, activity on project classes	L, P
LO2	written exam, project evaluation, activity on project classes	L, P
LO3	written exam, project evaluation, activity on project classes	L, P
LO4	written exam, project evaluation, activity on project classes	L, P
LO5	written exam, project evaluation, activity on project classes	L, P
LO6	student activity on project classes	P
Student workload (in hours)		No. of hours
Calculation	lecture attendance	30
	participation in classes, laboratory classes, etc.	30
	preparation for classes, laboratory classes, projects, seminars, etc.	42
	working on projects, reports, etc.	12
	participation in student-teacher sessions related to the classes/seminar/project	4
	implementation of project tasks and preparation for and participation in exams/tests	48
	TOTAL:	166
Quantitative indicators	HOURS	No. of ECTS credits

Student workload – activities that require direct teacher participation		**66**	**2.5**
Student workload – practical activities		**99**	**3.5**
Basic references	**1. Matlab on-line courses and certificates.** **2. Matlab grader.** **3. William H. Kersting, Robert Kerestes, Distribution System Modeling and Analysis with MATLAB and WindMil, 5th edition, CRC Press, Inc., 2022, ISBN: 9781032198361.** **4. Richard C. Dorf, Robert H. Bishop, Modern Control Systems, 14th edition, Pearson Education Inc, 2022. ISBN: 9780137307258.**		
Supplementary references	**1. Teacher's materials and instructions.** **2. www.mathworks.com.**		
Organisational unit conducting the course	**Department of Automatic Control and Robotics**	**Date of issuing the programme**	
Author of the programme	**Assoc Prof. Arkadiusz Mystkowski, PhD, DSc, Eng**	**27.01.2023**	

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