COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Bialystok University of Technology</td></tr>
<tr><td>Field of study</td><td colspan="6">Electrical and Electronic Engineering</td><td>Degree level and programme type</td><td>Bachelor’s degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">-</td><td>Study profile</td><td>General-academic</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Digital Systems</td><td>Course code</td><td>IS-FEE-10040W</td></tr>
<tr><td>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>winter</td></tr>
<tr><td>15</td><td></td><td>30</td><td></td><td>15</td><td></td><td></td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">-</td></tr>
<tr><td>Course objectives</td><td colspan="9">Teaching a variety of problems related to contemporary digital systems based on micro-controllers and FPGA devices. Student will explain principles of operation of a variety of digital subsystems related to industrial digital systems and design simple digital subsystems.</td></tr>
<tr><td>Course content</td><td colspan="9"><u>Lecture</u>: Topics address electrical principles, semiconductor and integrated circuits, digital fundamentals, microcomputer systems based on microcontrollers and FPGA devices, serial interfaces for local communication.
<u>Laboratory classes</u>: Practical exercises in programming and designing digital systems based on microcontrollers and FPGA and softcore processors.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Lecture, laboratory classes, individual consultations, mini projects</td></tr>
<tr><td>Assessment method</td><td colspan="9">Lecture – set of reports
Laboratory classes– set of exercises and reports, SW – project evaluation</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 recognizes and understands wiring diagrams related to digital systems</td><td></td></tr>
<tr><td>LO2</td><td colspan="8">Student identifies various data buses and interfaces from the wiring diagrams</td><td></td></tr>
<tr><td>LO3</td><td colspan="8">Student determines function and operation of the various modules and sensors and has a good knowledge of how they are used in the management of the digital system</td><td></td></tr>
<tr><td>LO4</td><td colspan="8">Student distinguishes between various functions that are part of an industrial digital system</td><td></td></tr>
<tr><td>LO5</td><td colspan="8">Student uses suitable programming tools</td><td></td></tr>
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L06	**Student uses application notes and data sheets**	
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	**written report on lecture content**	**L**
LO2	**written report on lecture content**	**L**
LO3	**written report on lecture content**	**L**
LO4	**written report on lecture content**	**L**
LO5	**evaluating the student's laboratory reports**	**LC, SW**
LO6	**evaluating the student's laboratory reports**	**LC, SW**
Student workload (in hours)		**No. of hours**
Calculation	lecture attendance	**15**
	participation in classes, laboratory classes, etc.	**30**
	preparation for a written test related to the lecture	**25**
	preparation for a written test related to the classes, laboratory classes etc.	**15**
	reports preparation related to the lecture, laboratory classes, project etc.	**30**
	participation in student-teacher sessions related to the lecture, classes, laboratory classes, project etc.	**10**
	TOTAL:	**125**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	**55**	**2**
Student workload – practical activities	**85**	**3**

Basic references	**1. Ronald J. Tocci: Digital Systems: Principles and Applications, 2014.** **2. William J. Dally: Digital Design: A Systems Approach, 2012.** **3. Elliot Williams: AVR Programming: Learning to Write Software for Hardware, 2014.** **4. Donzellini, G., Oneto, L., Ponta, D., Anguita, D.: Introduction to Digital Systems Design, Springer, 2019.** **5. Joseph Yiu: The Definitive Guide to ARM® Cortex®-M3 and Cortex®-M4 Processors, 2014.**
Supplementary references	**1. Barrett S.: Embedded Systems Design with the Atmel AVR Microcontroller, Morgan & Claypool Publishers, 2009.** **2. Barrett S.: Atmel AVR Microcontroller Primer: Programming and Interfacing, Morgan & Claypool Publishers, 2007.** **3. AgusKurniawan: Getting Started With STM32 Nucleo Development, 2015.**

Organisational unit conducting the course	**Department of Automatic Control and Robotics**	**Date of issuing the programme**
Author of the programme	**Wojciech Wojtkowski, Ph.D.**	**2021-03-02**

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