COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="5">Biomedical Engineering</td><td colspan="2">Degree level and programme type</td><td>Bachelor's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="5"></td><td colspan="2">Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="5" rowspan="2">Digital Image Processing</td><td colspan="2">Course code</td><td>IS-FME-00152W</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>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">Basic knowledge of Matlab</td></tr>
<tr><td>Course objectives</td><td colspan="9">The purpose of the course is to introduce students to the basic techniques of digital image processing and the application of various methods of image analysis.</td></tr>
<tr><td>Course content</td><td colspan="9">Acquisition of digital images – equipment, sampling, quantization, colour representation. Improving image quality. Methods of digital image processing: arithmetic operations; filtration and interference suppression; edge detection; operations on binary images; logical operations. Image processing in the frequency domain. Morphological methods: erosion, dilatation, opening, closing. Examples of application of image processing methods. Image analysis: segmentation techniques, background generation, foreground object detection, labelling and shape coefficients.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">presentation and self-learning</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture – written test; project – project completion, presentation and discussion</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 and can describe the basic models of digital images</td><td colspan="2">IBK_W14</td></tr>
<tr><td>LO2</td><td colspan="7">can name and describe the basic methods of digital image processing</td><td colspan="2">IBK_W14, IBK_W15</td></tr>
<tr><td>LO3</td><td colspan="7">can accurately analyse the image and formulate appropriate conclusions</td><td colspan="2">IBK_U08, IBK_U10, IBK_U18, IBK_U19</td></tr>
<tr><td>LO4</td><td colspan="7">has the ability to implement image processing methods in Matlab</td><td colspan="2">IBK_U08, IBK_U10, IBK_U18, IBK_U19</td></tr>
<tr><td>LO5</td><td colspan="7">can properly organize work to solve image processing</td><td colspan="2">IBK_U08, IBK_U10,</td></tr>
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	problems	IBK_U18, IBK_U19
LO6	systematically complements its image processing expertise	IBK_U01, IBK_U05, IBK_K01
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	exam	L
LO2	exam	L
LO3	reports of project	P
LO4	reports of project	P
LO5	evaluation of reports, presentation and discussion	P
LO6	evaluation of reports, presentation and discussion	P
Student workload (in hours)		No. of hours
Calculation	lecture attendance	15
	participation in projects	30
	preparation for projects	20
	working on projects, reports, etc.	15
	participation in student-teacher sessions related to the project	5
	implementation of project tasks	5
	TOTAL:	100

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	50h	2
Student workload – practical activities	50h	2

Basic references	1. Digital image processing. Rafael C Gonzalez, Richard E Woods.Upper Saddle River : Pearson Prentice Hall. 2010. 2. A computational introduction to digital image processing. Alasdair McAndrew. Boca Raton : CRC/Taylor & Francis. 2016. 3. Digital image processing. Kenneth R Castelman. Upper Saddle River : Prentice-Hall. 1996.
Supplementary references	1. Digital image processing with application to digital cinema. K.S Thyagarajan. Amsterdam : Elsevier. 2006.
Organisational unit conducting the course	Institute of Biomedical Engineering — Date of issuing the programme
Author of the programme	Marta Borowska, PhD Eng. — 16.03.2021

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