Software Engineering Institute			Semester 1. of the curriculum 2026-27-1			
Name of the subject:	Code of the subject:	Credits:	Weekly hours:			
				lec	sem	lab
Image processing and computer graphics LAB	**NSXIP1EMNF, NSXIPCEMNF**	5	full-time	2	0	2
Responsible person for the subject: Dr. Zoltán Vámossy						
Subject lecturer(s): Kaziwa Saleh						
Prerequisites:	none	none				
Way of the assessment:	Exam					

Course description	
Goal:	Introduce digital image processing in practice.
Course description:	Students will learn, and obtain practical techniques used in digital image processing using MATLAB. The course starts with a short introduction to digital imaging with MATLAB, and low-level transformations such as binarizing, thresholding, grayscaling and gamma correction. Techniques based on the sliding window are introduced later for blurring and sharpening, as well as noise reduction. For noise removal, frequency-based solutions are introduced as well. The course concludes with a practical introduction to basic segmentation methods.

Lecture schedule	
Education week	Topic
1.	Introduction to MATLAB
2.	Digital imaging in MATLAB. Pixelwise transformations
3.	Negative image, Thresholding, Binary image.
4.	Grayscaling, Gamma correction.
5.	Calculation of the histogram.
6.	Histogram stretching, Histogram equalization.
7.	Sliding window technique, Mean filter.
8.	The gaussian and the median filter.
9.	Noise removal, Frequency domain filtering.
10.	Edge detection, Sharpening.
11.	Color based segmentation.
12.	*Break*
13.	Practical exam
14.	Retake of the practical exam
Mid-term requirements	
Conditions for obtaining a mid-term grade/signature	Attendance of the laboratory sessions at the scheduled times is mandatory. Students are required to complete a midterm exam.
Assessment schedule	
Education week	**Topic**
13	Midterm exam
14	Retake
Method used to calculate the *mid-term grade*	
The final grade is calculated as the average of the theoretical exam and the lab exam.	

<table>
<tr><th colspan="2">Type of the replacement</th></tr>
<tr><td>Type of the replacement of written test/mid-term grade/signature</td><td>In case of a missed midterm exam, a retake exam is available on the 14th week. The exam can also be retaken as part of the signature (or grade replacement) exam.</td></tr>
<tr><th colspan="2">Calculation of the exam mark</th></tr>
<tr><td colspan="2">The final grade is calculated based on the student's total score as follows:

<table><tr><th>average of midterm grade and written test</th><th>final mark</th></tr><tr><td>0-49%</td><td>1</td></tr><tr><td>50-61%</td><td>2</td></tr><tr><td>62-73%</td><td>3</td></tr><tr><td>74-85%</td><td>4</td></tr><tr><td>86-100%</td><td>5</td></tr></table></td></tr>
<tr><th colspan="2">References</th></tr>
<tr><td>Obligatory:</td><td>Lab materials, presentations available on the course’s page on Moodle.
Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Digital Image Processing Using MATLAB, Gatesmark, 2020</td></tr>
<tr><td>Recommended:</td><td></td></tr>
<tr><td>Other references:</td><td></td></tr>
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