COURSE SYLLABUS AND COMPLETION REQUIREMENTS
2025/2026 SPRING SEMESTER

Title	*Advanced Image Processing*
Course code	IVM202ANMI
Weekly contact hours (lecture/seminar/lab):	2/0/2
Credits	6
Programme / type:	MSc in Computer Engineering
Mode of study	*full-time*
Course requirement	term mark
Semester	Spring
Prerequisites	-
Department responsible for the course:	Department of Technical Informatics
Course coordinator	*Dr. Ádám Schiffer*
Lecturer	*Bence Sebők-Tornai*

COURSE DESCRIPTION

The aim of the course is to acquire the foundations of image processing. The coursework is carried out in the Python programming language, starting from the most basic instructions and programming structures and gradually progressing towards more complex problems. During the semester, students become familiar with basic image processing procedures, binary image processing, convolution, brightness and contrast adjustments, and basic classification methods. In addition to mastering the theoretical material, students solve tasks of increasing difficulty throughout the course, thereby developing engineering thinking and learning how to apply it to real-world problems.

SUBJECT TEMATICS

1. COURSE OBJECTIVES

During the semester, students become familiar with basic image processing procedures, binary image processing, convolution, brightness and contrast adjustments, and basic classification methods.

2. COURSE CONTENT

The course is delivered in face-to-face form and includes project assignments. For these, during dedicated project weeks, students work in small groups to solve a complex problem.

	TOPICS
LECTURE	1. *Python basics* 2. *Colour channels* 3. *Histograms* 4. *Brightness and contrast* 5. *Binary image processing* 6. *Convolution, edge detection, filtering* 7. *Higher-level edge detection, image processing in the frequency domain* 8. *Classification* 9. *Image compression* 10. *CNN-based solutions*
LAB	1. *Python basics* 2. *Colour channels* 3. *Histograms* 4. *Brightness and contrast* 5. *Binary image processing* 6. *Convolution, edge detection, filtering* 7. *Higher-level edge detection, image processing in the frequency domain* 8. *Classification* 9. *Image compression* **10.** *CNN-based solutions*

RÉSZLETES TANTÁRGYI PROGRAM ÉS A KÖVETELMÉNYEK ÜTEMEZÉSE

LECTURE

week	**Topic**	**Literature**	**Task to complete**	**Deadline**
1.	Python basics	[1.] 1. notebook		
2.	Colour channels, Histograms	[1.] 2. notebook		
3.	First project week		First project	4th week Tuesday 23:59
4.	Presentation of the first projects, contrast and brightness	[1.] 3. notebook		
5.	Convolution, edge detection	[1.] 4. notebook		
6.	Second project week		Second project	7th week Tuesday 23:59
7.	Presentation of second projects, Binary Image processing	[1.] 5. notebook		
8.	Hough transform	[1.] 6. notebook		
9.	*Spring break*			
10.	Third project week		Third project	11th week Tuesday 23:59
11.	Presentation of the third projects, classification	[1.] 7. notebook		
12.	Image compression, CNN-based solutions	[1.] 8. notebook		
13.	*Fourth project week*		Fourth project	14th week Tuesday 23:59
14.	*Presentation of the fourth projects*			
15.	***First week of exam period: Improvements***		**Improvement of project marks**	

LAB

week	**Topic**	**Literature**	**Task to complete**	**Deadline**
1.	Python basics	[1.] 1. notebook		
2.	Colour channels, Histograms	[1.] 2. notebook		
3.	First project week		First project	4th week Tuesday 23:59
4.	Presentation of the first projects, contrast and brightness	[1.] 3. notebook		
5.	Convolution, edge detection	[1.] 4. notebook		
6.	Second project week		Second project	7th week Tuesday 23:59
7.	Presentation of second projects, Binary Image processing	[1.] 5. notebook		
8.	Hough transform	[1.] 6. notebook		
9.	*Spring break*			
10.	Third project week		Third project	11th week Tuesday 23:59
11.	Presentation of the third projects, classification	[1.] 7. notebook		
12.	Image compression, CNN-based solutions	[1.] 8. notebook		
13.	*Fourth project week*		Fourth project	14th week Tuesday 23:59
14.	*Presentation of the fourth projects*			
15.	***First week of exam period: Improvements***		**Improvement of project marks**	

3. ASSESSMENT AND GRADING SYSTEM

ATTENDANCE AND PARTICIPATION REQUIREMENTS

According to Section 45 (2) and Annex 9, Section 3 of the PTE Code of Studies and Examinations (TVSz), a student may only be refused a grade or assessment due to absences if, in full-time programmes, they have been absent from more than 30% of the scheduled classes specified in the course syllabus for a given subject.

Method of monitoring attendance (e.g. attendance sheet / online test / minutes, etc.):

Attendance at at least 70% of the classes is compulsory. The attendance rate does not influence the grade, but absence exceeding 30% results in refusal of the subject. Attendance is monitored on the basis of random attendance sheets.

ASSESSMENTS

The course is completed with a term mark *(PTE TVSz 40§(3))*

Mid-semester assessments, performance evaluations and their weight in the final grade:

Type	Assessment	Weight in the final grade
First Project	*max. 100%*	*25%*
Second Project	*max. 100%*	*25%*
Third Project	*max. 100%*	*25%*
Fourth Project	*max. 100%*	*25%*

Determination of the semester grade (taking into account the percentage result of each task):

$$\frac{P1+P2+p3+p4}{4},$$

provided that all projects achieve at least a pass result. If either result is below 40%, the corresponding project(s) must be improved during the retake opportunity in order to obtain a grade.

Retake options (method, type) (PTE TVSz 47§(4))

The projects may be retaken in the first week of the exam period.

Method of determining the grade in percentage bands:

Grade	Performance expressed in %
excellent (5)	85 % …
good (4)	70 % ... 85 %
average (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

The lower bound specified for each grade already belongs to that grade.

4. LITERATURE

KÖTELEZŐ IRODALOM ELÉRHETŐSÉGE

[1.] Advanced image processing notebooks, Teams