



Course title	Advanced Computer Image Processing (Master)
Institute/Division	Faculty of Computer Science and Mathematics/ Department of Computer Science
Course code	F-1.IP
Erasmus subject code*	11.3
Number of contact hours**	45 lecture hours (45h)
Course duration	1 semester (Fall)
ECTS credits	6
Course description (max 100 words)	This course covers fundamental image processing concepts and key algorithms to advance techniques using Python, OpenCV, TensorFlow, and PyTorch. Students will apply object recognition, data extraction, and enhancement in real-world applications like autonomous navigation or medical imaging. The curriculum includes introduction to convolutional neural networks (CNNs), vision transformers, and diffusion models for pattern recognition and image segmentation. Through hands-on projects, students will develop practical image analysis solutions, gaining essential skills for research and industry applications in computer vision.
Literature	Introduction to digital image processing / William K. Pratt. Digital image processing / Rafael C. Gonzalez, Paul Wintz.
Course type/organization	<ul style="list-style-type: none">• Lectures (15h),• Computer labs (15h),• Projects (15h).
Assessment method	attendance at lectures, performance of practical exercises in the laboratory, application of image processing in the project
Prerequisites	proficiency in Python (NumPy, Pandas, basic machine learning libraries), basic knowledge of image processing (e.g., filtering, transformations, histograms), understanding of linear algebra
Primary target group	at least 3-rd year computer science students
Contact person	Adrian Widłak (MSc Eng.)
Remarks	N/A

*please insert one of the following codes:

- 11.0 Mathematics, Informatics
- 11.1 Mathematics
- 11.2 Statistics
- 11.3 Informatics, Computer Science
- 11.4 Artificial Intelligence
- 11.5 Actuarial Science
- 11.9 Others Mathematics, Informatics

**1 lecture hour=45 minutes