

## Description of course

Code of course	1150-00000-ISA-0306	
Name of course	Image Processing and Analysis	
Version of course	Wersja 2	
<b>A. Place of the course in system of studies</b>		
Level of education	First cycle studies	
Form and mode of studies	full-time	
Profile of studies	General academic profile	
Specialisation	-	
Place of teaching of course	Faculty of Automotive and Construction Machinery Engineering	
Place of realization of course	Faculty of Automotive and Construction Machinery Engineering	
Coordinator of course	Jacek Dybała, Ph.D., D.Sc., University Professor	
<b>B. General characteristic of the course</b>		
Block of courses	Directional	
Group of courses	Mandatory	
Type of course	Compulsory	
Language of course	angielski	
Nominal semester	6 (r.a. 2019/2020)	
Time of completion in the academic year	summer semester	
Preliminary requirements	Basic knowledge of image processing. Computer skills, basic knowledge in programming.	
Limit of students	According to University Regulations	
<b>C. Effects of education and manner of teaching</b>		
Purpose of course	Familiarizing students with advanced methods of image processing and basic methods of image analysis. Teaching students to create programs for image processing and analysis.	
Effects of education	See Table 1.	
Form of didactic studies and number of hours per semester	Lecture	15h
	Exercise type of course	0h
	Laboratory	30h
	Project type of course	0h
	Computer lessons	0h
Contents of education	Lecture: Fourier transformation of digital images. Contextual image filtering. Linear and non-linear contextual filters. Basic and complex morphological transformations of images. Morphological transformations of binary images. Detection of contour lines using Hough transform. Image segmentation. Image labeling. Determination of global features of images. Determining the features of objects visible in images. Lab: Image acquisition. Data structure used to represent digital images and methods of their conversion. Geometrical, arithmetic and logical transformations of images. Point transformations of images. Fourier transformation of digital images. Image filtering in the spatial domain. Morphological image processing. Detection of contour lines using Hough transform. Image segmentation. Image analysis. Determining	

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	the features of objects visible in images.
Methods of evaluation	Lecture: Completion of the lecture part of the subject takes place on the basis of a written colloquium. A necessary condition for completing the lecture part of the subject is to obtain at least a sufficient grade from the colloquium. Laboratory: A necessary condition for completing the laboratory part of the subject is the performance in the given semester of all the laboratory exercises provided for in the program and passing each exercise to at least a satisfactory grade. Each exercise is counted by the person conducting the exercise based on checking the correctness of this laboratory exercise. The necessary condition for completing the course is to pass the lecture and laboratory parts of the subject. The total mark from the subject is the weighted average of the grades from the lecture and laboratory parts of the subject.
Methods of verification of effects of education	See Table 1.
Exam	no
Literature	[1] A. Bovik (Editor), Handbook of Image & Video Processing. Academic Press, 2000. [2] R.C. Gonzalez, R.E. Woods, Digital Image Processing. Prentice Hall, 2002. [3] R.C. Gonzalez, R.E. Woods, S. L. Eddins, Digital Image Processing using Matlab. Prentice Hall, 2004. [4] M.S. Nixon, A.S. Aguado, Feature Extraction and Image Processing, Academic Press, 2008. [5] O. Marques, Practical Image and Video Processing Using Matlab. John Wiley & Sons, 2011.
Website of the course	
<b>D. Student's activity</b>	
Number of ECTS credits	3
Number of hours of student's work to achieve effects of education	1) Number of contact hours/ - 47 hours, including: a) lecture - 15 hours; b) lab - 30 hours; c) consultations - 2 hours. 2) Student's own work - 35 hours, including: a) literature studies - 10 hours; b) preparing student for the test - 5 hours ;c) preparing student for laboratory exercises - 20 hours. 3) TOTAL - 82 hours.
Number of ECTS credits on the course with direct participation of academic teacher	1.9 points ECTS - number of contact hours - 47 hours, including: a) lecture - 15 hours; b) lab - 30 hours; c) consultations - 2 hours.
Number of ECTS credits on practical activities on the course	2 points ECTS - 50 hours, including: a) lab - 30 hours; b) preparing student for laboratory exercises - 20 hours.
<b>E. Additional information</b>	
Notes	-
Date of last edition	2020-05-10 00:38:51

Table 1. Learning outcomes

**General academic profile - knowledge**

Code of effect:	<b>1150-00000-ISA-0306_W1</b>
Description:	A student who has passed the course possesses detailed knowledge of image processing and analysis methods.
Verification:	Test
Field of study related learning outcomes	K_W07
Area of study related learning outcomes	

**General academic profile - skills**

Code of effect:	<b>1150-00000-ISA-0306_U1</b>
Description:	A student who has passed the course can gain information from context-sensitive help systems in the development environment (in English); A student can integrate obtained information, interpret it and use it in software development.
Verification:	Quality control of self-written software
Field of study related learning outcomes	K_U01, K_U24
Area of study related learning outcomes	

Code of effect:	<b>1150-00000-ISA-0306_U2</b>
Description:	A student who has passed the course can build programs for image processing and analysis.
Verification:	Quality control of performing laboratory exercises
Field of study related learning outcomes	K_U08, K_U18
Area of study related learning outcomes	

**General academic profile - social competences**

Code of effect:	<b>1150-00000-ISA-0306_K1</b>
Description:	A student who has passed the course can properly determine the priorities for the performance of the task determined by other people.
Verification:	Quality control of performing laboratory exercises
Field of study related learning outcomes	K_K04
Area of study related learning outcomes	