

POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

KARTA PRZEDMIOTU

obowiązuje studentów rozpoczynających studia w roku akademickim 2019/2020

Wydział Inżynierii Materiałowej i Fizyki

Kierunek studiów: Fizyka Techniczna w Języku Angielskim

Profil: Ogólnoakademicki

Forma studiów: stacjonarne

Kod kierunku: FTja

Stopień studiów: II

Specjalności: Computer modelling (modelowanie komputerowe w języku angielskim)

1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	Digital image processing
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Digital image processing
KOD PRZEDMIOTU	WIMiF FTJA oIIS D3 19/20
KATEGORIA PRZEDMIOTU	Przedmioty specjalnościowe
LICZBA PUNKTÓW ECTS	3.00
SEMESTRY	1

2 RODZAJ ZAJĘĆ, LICZBA GODZIN W PLANIE STUDIÓW

SEMESTR	WYKŁAD	ĆWICZENIA	LABORATORIUM	LABORATORIUM KOMPUTERO- WE	SEMINARIUM	PROJEKT
1	30	0	0	30	0	0

3 CELE PRZEDMIOTU

Cel 1 Providing students with knowledge regarding algorithms used in digital image processing.

Cel 2 Development of digital image processing skills in a chosen programming environment.

Cel 3 Developing the ability to perform digital image analysis and extraction of information it contains.

4 WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

- 1 Knowledge of the basics of computer graphics.
- 2 Ability to program in C and C ++.

5 EFEKTY KSZTAŁCENIA

EK1 Wiedza Knowledge of algorithms used in the digital image processing.

EK2 Umiejętności The ability to apply image processing algorithms in practice.

EK3 Umiejętności The ability to prepare the image for analysis and to perform it.

EK4 Umiejętności The ability to create programs intended for image processing and analysis.

EK5 Kompetencje społeczne The ability to communicate with people involved in image processing and analysis.

6 TREŚCI PROGRAMOWE

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W1	Image processing and recognition, fields of application.	2
W2	Physiology of vision. Acquisition of a raster image. Image classes in Matlab.	2
W3	Geometric transformations of raster images. Interpolation methods used in resizing images.	2
W4	Arithmetic transformations of raster images. Brightness normalization.	2
W5	Digital color models. Algorithms for conversion between models.	4
W6	Histogram and information about the image. Operations on the histogram.	2
W7	Image binarization. Methods of global and local thresholding.	2
W8	Operations on two images. Boolean operations on binary and monochrome images.	2
W9	Image segmentation methods. Binary mask. Regions of interest.	2
W10	Digital filters - linear, logical, statistical and adaptive filters.	4
W11	Mathematical morphology in image processing. Morphological operations.	2
W12	Skeletonization algorithms. Shape coefficients.	2
W13	Digital forgeries.	2

LABORATORIUM KOMPUTEROWE		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
K1	Introduction to Matlab Image Processing Toolbox.	2
K2	Geometric transformations of raster images.	2
K3	Arithmetic transformations of raster images.	2
K4	Image classes. Color modes and conversions between them.	4
K5	Histogram and its transformations.	4
K6	Operations on two or multiple images.	2
K7	Digital filters: linear, logical, statistical, adaptive.	4
K8	Morphological operations.	4
K9	Skeletonization.	2
K10	Image analysis and recognition.	4

7 NARZĘDZIA DYDAKTYCZNE

N1 Laboratory exercises

N2 Projects

N3 Consultations

N4 Multimedia presentations

N5 Lectures

N6 Discussion

8 OBCIĄŻENIE PRACĄ STUDENTA

FORMA AKTYWNOŚCI	ŚREDNIA LICZBA GODZIN NA ZREALIZOWANIE AKTYWNOŚCI
Godziny kontaktowe z nauczycielem akademickim, w tym:	
Godziny wynikające z planu studiów	60
Konsultacje przedmiotowe	5
Egzaminy i zaliczenia w sesji	5
Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	30
Opracowanie wyników	30
Przygotowanie raportu, projektu, prezentacji, dyskusji	10
SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA	140
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	3.00

9 SPOSOBY OCENY

OCENA FORMUJĄCA

F1 Practical exercises

F2 Test

F3 Individual project

F4 Oral answer

OCENA PODSUMOWUJĄCA

P1 Written test

P2 Weighted average of forming grades

WARUNKI ZALICZENIA PRZEDMIOTU

W1 The average of two tests above 3,0

W2 Passing the theoretical test

KRYTERIA OCENY

EFEKT KSZTAŁCENIA 1

NA OCENĘ 2.0	The student does not know the basic algorithms used in the raster images processing.
NA OCENĘ 3.0	The student has a basic knowledge of algorithms used in the raster images processing. He does not always understand in what situations they apply.
NA OCENĘ 3.5	The student has a basic knowledge of algorithms used in the raster images processing. He understands in what situations they apply.
NA OCENĘ 4.0	The student knows the algorithms used in the raster images processing and knows in what situations they apply.
NA OCENĘ 4.5	The student knows advanced algorithms used in the raster images processing and knows in what situations they apply.
NA OCENĘ 5.0	The student knows advanced algorithms used in the raster images processing and knows in what situations they apply. He can conclude about the possibility of modifying them for specific purposes.
EFEKT KSZTALCENIA 2	
NA OCENĘ 2.0	The student is not able to implement the known image processing algorithms in the Matlab environment.
NA OCENĘ 3.0	The student has limited skills in implementing the known algorithms image processing in the Matlab environment.
NA OCENĘ 3.5	The student has an ability to implement the known algorithms image processing in the Matlab environment.
NA OCENĘ 4.0	The student has an ability to implement the known algorithms image processing in the Matlab environment. He can make simple modifications for specific purposes.
NA OCENĘ 4.5	The student has an ability to implement the known algorithms image processing in the Matlab environment. He can modify them for specific purposes.
NA OCENĘ 5.0	The student has an ability to implement the known algorithms image processing in the Matlab environment. He can modify them for specific purposes. He presents creativity in solving non-standard problems.
EFEKT KSZTALCENIA 3	
NA OCENĘ 2.0	The student is not able to prepare the image for analysis or carry it out.
NA OCENĘ 3.0	The student has limited skills in preparing the image for analysis and carrying it out. He works under the guidance of a lecturer.
NA OCENĘ 3.5	The student has an ability to prepare the image for analysis and carrying it out. He works under the guidance of a lecturer.
NA OCENĘ 4.0	The student has the ability to prepare the image for analysis and carrying it out by himself. Sometimes he makes mistakes.
NA OCENĘ 4.5	The student has the ability to prepare the image for analysis and carrying it out by himself.

NA OCENĘ 5.0	The student has the ability to prepare the image for analysis and carrying it out by himself. He presents creativity in solving non-standard problems.
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 2.0	The student is not able to create programs intended for image processing and analysis.
NA OCENĘ 3.0	The student is able to create simple programs intended for image processing and analysis, according to the lecturer's instructions.
NA OCENĘ 3.5	The student is able to create programs intended for image processing and analysis, according to the lecturer's instructions.
NA OCENĘ 4.0	The student is able to create programs intended for image processing and analysis by himself.
NA OCENĘ 4.5	The student is able to create programs intended for image processing and analysis by himself and presents creativity. He can develop a simple interface for the application.
NA OCENĘ 5.0	The student is able to create programs intended for image processing and analysis by himself and presents creativity. He can develop a GUI for the application. He proposes original solutions.
EFEKT KSZTAŁCENIA 5	
NA OCENĘ 2.0	The student does not know the specialized terminology related to the processing and analysis of images and the algorithms used in this process.
NA OCENĘ 3.0	The student has a basic knowledge of specialized terminology related to the processing and analysis of images and algorithms used in this process.
NA OCENĘ 3.5	The student has an average knowledge of specialized terminology related to the processing and analysis of images and algorithms used in this process.
NA OCENĘ 4.0	The student has a good knowledge of specialized terminology related to the processing and analysis of images and algorithms used in this process.
NA OCENĘ 4.5	The student has a widened knowledge of specialized terminology related to the processing and analysis of images and algorithms used in this process.
NA OCENĘ 5.0	The student has an extensive knowledge of specialized terminology related to the processing and analysis of images and algorithms used in this process.

10 MACIERZ REALIZACJI PRZEDMIOTU

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓLOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK1	K_W02b K_W05	Cel 1	W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13	N3 N4 N5 N6	F2 F4 P1 P2
EK2	K_U01b K_U03b K_U07b K_U08b K_U13	Cel 2	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10	N1 N2 N3 N6	F1 F3 P2
EK3	K_U01b K_U03b K_U07b K_U08b K_U14	Cel 3	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10	N1 N2 N3 N6	F1 F3 F4 P2
EK4	K_U01b K_U03b K_U07b K_U08b K_U13	Cel 2 Cel 3	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10	N1 N2	F1 F2 F3 P2
EK5	K_K01 K_K03	Cel 1 Cel 2 Cel 3	W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12	N4 N5 N6	F1 F4 P1

11 WYKAZ LITERATURY

LITERATURA PODSTAWOWA

- [1] **Rafael C. Gonzalez, Richard E. Woods** — *Digital Image Processing*, , 2017, Pearson
- [2] **Maria M. P. Petrou, Costas Petrou** — *Image Processing: The Fundamentals*, , 2010, Wiley
- [3] **Rafael C. Gonzalez, Richard Eugene Woods, Steven L. Eddins** — *Digital Image Processing Using MATLAB*, , 2013, McGraw Hill Education

LITERATURA UZUPEŁNIAJĄCA

- [1] **Amos Gilat** — *MATLAB: An Introduction with Applications*, , 2014, Wiley
- [2] **Alasdair McAndrew** — *Introduction to Digital Image Processing with MATLAB*, , 2004, Course Technology

12 INFORMACJE O NAUCZYCIELACH AKADEMICKICH

OSOBA ODPOWIEDZIALNA ZA KARTĘ

dr inż. Piotr Łabędź (kontakt: plabedz@pk.edu.pl)

13 ZATWIERDZENIE KARTY PRZEDMIOTU DO REALIZACJI

(miejsowość, data)

(odpowiedzialny za przedmiot)

(dziekan)