GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Problems and Applications of Information Technology, PG_00047726		
Field of study	Informatics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Intelligent Interactive Systems -> Faculty of Electronics Telecommunications and Informatics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Mariusz Szwoch	
	Teachers	dr inż. Mariusz Szwoch mgr inż. Krystyna Dziubich	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	18.0	0.0	12.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	10.0	85.0	125

Subject objectives

To familiarize students with: methods of acquiring, representing and compressing multimedia data, image processing and recognition methods, issues of 2D and 3D image analysis, augmented and mixed reality, affective computing, advanced user interfaces, business process automation.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U03] can design, according to required specifications, and make a complex device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	The student designs and develops applications for image processing and analysis, video games, augmented and mixed reality, etc. Student is able to model the process in BPMN notation using appropriate process editors and to simulate the operation of such a process	[SU1] Assessment of task fulfilment
[K7_W01] knows and understands, to an increased extent, mathematics to the extent necessary to formulate and solve complex issues related to the field of study	The student classifies and explains algorithms for: image processing and image quality improvement, image recognition, scene depth acquisition, as well as augmented reality marker detection.	[SW1] Assessment of factual knowledge

Subject contents

- Multimedia: human perception, multimedia data acquisition, quantization and digitization.
- Image processing: goals and methods, filters, tools (OpenCV library).
- Affective informatics: models, methods and applications.
- Image recognition: methods, character recognition (OCR) and music notation (OMR) systems.
- Detection and recognition of depth images: algorithms, sensors, stereophotogrammetry.
- Virtual and mixed reality: methods, hardware, libraries, applications.
- BPM concept, BPMN modeling notation, business process automation environment

Prerequisites and co-requisites

No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Practical exercise	51.0%	50.0%
Written exam	51.0%	50.0%

Recommended reading

Basic literature

1. B.SteinBrink: Multimedia u progu technologii XXI wieku, Wydawnictwo Robomatic, Wrocław 1993.
2. R.Tadeusiewicz, P.Korohoda: Komputerowa analiza i przetwarzanie obrazów, Kraków 1997.
3. R.Tadeusiewicz, M.Flasiński: Rozpoznawanie obrazów, PWN, W-wa, 1991.
4. K.Skarbek (red.): Multimedia Algorytmy i standardy kompresji, Akademicka Oficyna Wydawnicza, Warszawa 1998.
5. Van der Aalst, W.M.P., ter Hofstede, A.H.M. and Weske, M.: "Business Process Management: A Survey", in Business Process Management, Proceedings of the First International Conference. Springer Verlag, 2003.
6. A. Realini: G2G E-government: The big challange for Europe, 2004 8. M. Ader: Workflow Comparative Study, 2004, http:// www.waria.com/books/study-2004.htm
7. A. Jordan: Business Process Management, http:// www.alanjordan.com/BPM.htm

Supplementary literature

1. J.Howse, J.Minichino: Learning OpenCV 5 Computer Vision with Python - Fourth Edition, Packt Publishing 2023.
2. J. Linowes: Augmented Reality with Unity AR Foundation, Packt Publishing 2021.
3. oS.Dey: Python Image Processing Cookbook, Packt Publishing 2020. oL.Venturi, K.Korda: Hands-On Vision and Behavior for Self-Driving Cars, Packt Publishing 2020.
4. A.Sharma, V.R.Shrimali, M.Beyeler: Machine Learning for OpenCV 4 - Second Edition, Packt Publishing 2020.
5. D.M.Escrivá, R.Laganiere: OpenCV 4 Computer Vision Application Programming Cookbook - Fourth Edition, PACKT Publishing, 2019.
6. J.R.López Benito, E.Artetxe González: Enterprise Augmented Reality Projects, PACKT Publishing, 2019.
7. Z.Qingliang: Qt 5 and OpenCV 4 Computer Vision Projects, PACKT Publishing, 2019.
8. P.Bansal: Extended Reality (XR) - Building AR | VR | MR Projects [Video], PACKT Publishing, 2019.
9. Workflow Magement Coalition, http://www.wfmc.org Wofkflow Patterns, http://www.workflowpatterns.com/ 3. N. Ritter: Business Porcess Magement and Workflow Mangement, http://vsis-www.informatik.uni-hamburg.de/teaching/ss-05/wfws/K2.pdf
10. A. Sharp, P. McDermott: Workflow Modeling - Tools for Process Improvement and Application Development, Artech House 2001

eResources addresses

Example issues/ example questions/ tasks being completed

- Image processing algorithms: point operations, filters, geometric transformations
- Types of augmented reality markers
- Types of technology/depth sensors
- Stages of scanning 3D objects using stereophotogrammetry
- Emotion models - advantages and disadvantages
- Digitization of multimedia data

Work placement

Not applicable

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