GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electronic Infosystems, PG_00047489						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	February 2022		Academic year of realisation of subject		2021/2022		
Education level	second-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		English		
Semester of study	1		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Metrology and Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Michał Kowalewski				
	Teachers		dr inż. Michał Kowalewski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		8.0		32.0	100
Subject objectives	Learning principle of operation of different electronic infosystems, covering various industrial and comercial applications of electronics.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems	The student critically analyzes the content presented in the course of the subject and is ready to argue over the ways of implementing technical solutions used in electronic infosystems.	[SK5] Assessment of ability to solve problems that arise in practice
[K7_W03] Knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum.	Student describes and explains the principle of operation of micro electro-mechanical systems: acceleration and angular rate sensors, implantable blood preasure sensors, digital compass. Student describes and explains the principle of operation of selected electronic infosystems: automatted teller machines, digital autofocus camera, cash registers and fiscal systems and alarm systems. Student demonstates methods of labeling products with EAN and UPC barcodes. Student analyses the limitations of popular ID techniques. Student explains the basic idea of impedance spectroscopy method and how it is evaluated.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
[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	Student describes and explains the principle of operation of various person and goods identification techniques. Student describes some categories of electronic infosystems, covering various industrial and comercial applications of electronics. Student explains how devices are controlled in a Smart Home. Student describes and explains the principle of operation of neural networks and examples of their hardware implementation.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents

1. Introduction: course outline, course grading.
2. Mechatronic systems, basic microsensors and actuators, acceleration and angular rate measurements with use MEMS sensors.
3. Biomedical applications of MEMS (implantable blood preasure sensors).
4. Digital compass (magnetic field sensors, signal conditioning circuits, construction and usage of digital compass).
5. Construction and theory of operation of digital autofocus camera (basic concepts, methods of image recording, construction of camera.
6. Automatted Teller Machines (Architectures and functional blocks of ATMs (construction of ATM, software, security of ATM systems).
7. Fiscal Systems (bar code system, functional modules : bar code scanners, cash registers, sale systems).
8. Systems for identification of persons and goods (constant and variable code systems with RF and IR transmission, radio-frequency identification RFID).
9. Remote Control System in a Smart Home (Z-Wave Standard, OpenZWave library).
10. Control of model railways (H0 standard).
11. Touristic navigation systems.
12. Usage of neural networks for diagnosis of analog electronic circuits.
13. Hardware implementation of neural networks.
14. Impedance spectroscopy methods.
15. Alarm and fire alarm systems.

Prerequisites and co-requisites

No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test 1	50.0%	35.0%
Laboratory execises	50.0%	30.0%
Test 2	50.0%	35.0%

Recommended reading

Basic literature	Robert H. Bishop: The Mechatronics Handbook, CRC Press LLC 2002.
Supplementary literature	No requirements
eResources addresses	

Example issues/ example questions/ tasks being completed	1. List and shortly discuss functional blocks of a mechatronic system. 2. Describe error sources in azimuth calculation in an electronic compass, and how they can be compensated? 3. What cryptographic algorithms are used in ATMs, what are their features and how they are combined in PIN encryption and decryption processes? 4. How image is captured in CCD and CMOS sensors? Compare properties of both sensors. 5. What is the purpose of a barcode scanner? Describe principle of operation of pen, CCD and laser scanners. What are their advantages and disadvantages? 6. Draw functional block diagram explaining transmission of code from remote control via RF or IR medium. Describe briefly usage of each block.
Work placement	Not applicable