GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Intelligent sensor systems, PG_00068773		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Optional subject group Specialty 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	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Grzegorz Jasiński	
	Teachers	dr inż. Grzegorz Jasiński	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	0.0	30

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 5460 Inteligentne systemy sensorowe [2025/2026]
https://enauczanie.pg.edu.pl/2025/course/view.php?id=5460

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	3.0	17.0	50

Subject objectives

The aim of the course is to present the most important issues related to sensor technology, which has been dynamically developed recently. Participants of the course will be familiarized with the basic parameters describing the operation of sensors and how to determine them, types of sensors ranging from simple sensors, through intelligent sensors, and intelligent sensor systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it	Znajomość wyboru, wykorzystania i zastosowania	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
[K7_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study by: - appropriate selection of source information and its critical analysis, synthesis, creative interpretation and presentation, - application of appropriate methods and tools	Ability to determine the basic parameters of sensors.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[K7_W02] knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	Knowledge of the features and properties of smart sensors	[SW1] Assessment of factual knowledge
[K7_W101] is able to make an in-depth identification of key objects and phenomena related to the field of study, as well as theories that describe them and applicable analytical and design methods	Knowledge about the use of intelligent sensors to build measurement systems	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture
Lecture content:

The importance of sensors in the modern world. Introduction to the subject of sensors. Basic static and dynamic parameters of sensors. Temperature and humidity sensors. Construction and properties of simple sensors, sensors with 4-20 mA transducers, analog-digital sensors and smart sensors. ADC transducers. Intelligent sensor systems: sensor networks and data fusion (electronic nos, electronic language). Introduction to wired and wireless sensor networks, issues and challenges. Technologies used in modern sensors, miniaturization and integration (MEMS, LTCC). Examples of smart sensors. Standards for smart sensors. Energy harvesting in sensors.

Laboratory content:

Determination of static parameters of sensors. Determination of dynamic parameters of sensors. Use of sensors with 4-20mA converters. Sensors with digital interfaces. Intelligent sensor systems and sensor array data fusion.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	50.0%	70.0%
Lab	50.0%	30.0%

Recommended reading	Basic literature	T. Sidor, Elektroniczne przetworniki pomiarowe, UWN-D, Kraków 2006 I.Kurytnik, M. Karpiński, Bezprzewodowa transmisja informacji, Wydawnictwo PAK, 2008 W. Nawrocki, Rozproszone systemy pomiarowe, WKŁ Warszawa 2006
	Supplementary literature	J. Fraden, Handbook of modern sensors, Springer 2010 Gerard C. M. Meijer, Smart Sensor Systems, Wiley 2014
	eResources addresses	
Example issues/ example questions/ tasks being completed	Give the characteristics of quasi-digital sensors	
Practical activites within the subject	Not applicable	

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