Subject card

Subject name and code	, PG_00056132					
Field of study	Mechatronics					
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024	
Education level	first-cycle studies		Subject group			
Mode of study	Full-time studies		Mode of delivery		at the university	
Year of study	3		Language of instruction		Polish	
Semester of study	6		ECTS credits		2.0	
Learning profile	general academic profile		Assessment form		assessment	
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology					
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Wiktor Sieklicki				
	Teachers					

Lesson types and methods of instruction	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						

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	0.0	0.0	30

Subject objectives	Providing students with knowledge about various types of transducers of physical quantities (sensors) used in mechatronic systems, methods of processing physical quantities, possibilities and limitations of sample sensors, and possibilities of using sensors for specific purposes.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W11] has a basic knowledge about the life cycle of mechatronic systems and objects	Student presents phases of design and developement of measurement systems	[SW1] Assessment of factual knowledge
	[K6_U05] is able to use properly choosen tools to compare design solutions of elements and mechatronics systems according to given application and economic crtierions (e.g. power demand, speed, costs)	Student chooses suitable types of sensors according to the given measurement task	[SU1] Assessment of task fulfilment
	[K6_W10] has a basic knowledge about development trends in terms of engineering and technical sciences and scientific disciplines: Mechanical Engineering, Automation, Electronics and Electrical Engineering, adequate for Mechatronics curse	Student presents types of sensors utilized in modern mechatronics systems	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U06] is able to identify and formulate specification of simple, practical engineering tasks, distinctive for mechatronics	Student formulates specification of simple measurement system	[SU3] Assessment of ability to use knowledge gained from the subject
	[K6_W08] knows and understands design and production processes of elements and simple mechatronic devices	Student describes process of elements selections and conditions that must be met by measurement systems dedicated to a given task	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	Presentation of the principles of operation, construction and application of the most important types of transducers/sensors, including: displacements, velocities, accelerations, distances, stresses, temperatures. Introductory discussion of signal processing methods for data acquisition from sensors. Laboratory: Discussion of the types of sensors, typical parameters of selected sensors, power supply systems for digital and analog sensors, applications of selected sensors, limitations of the use of sensors.
Prerequisites and co-requisites	Knolwedge of topics form "Metrology and measurement systems", "Basics of digital signal processing" and "Elements of mechatonic systems" courses

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Finishing task given during laboratory classes	56.0%	35.0%
	Written test	55.0%	65.0%

Recommended reading	Basic literature	J. Fraden, Handbook of Modern Sensors: Physics, Designs, and Applications, Springer, 2016
	Supplementary literature	Technical documentation of various types of sensors
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	For a given physical parameters (distance, humidity, temperature, flow, acceleration, position, orientation):- determine the features of the physical quantity such as: range of values, expected characteristics of the variability of the measured value over time, influence of other factors on the measured value, required measurement resolution, possibility of potential change of the measured value as a result of the measurement- determine the type of sensor most suitable for carrying out measurements- determine the sensor parameters necessary to perform the measurement- select the rest of the components of the measuring system necessary to carry out the measurements (electrical system, power supply, communication of digital sensors, mounting elements, etc.)- prepare software that allows you to receive information from the selected sensor- prepare a method for collecting measurement data- take the measurements- describe the measurement results- interpret the measurement results- describe the methodology of the measurement in the report

Work placement	Not applicable