

## 。 GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

Subject name and code	Mechatronics for transporttion systems, PG_00064984							
Field of study	Transport and Logistics							
Date of commencement of studies	February 2025		Academic year of realisation of subject		2024/2025			
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	Full-time studies		Mode of delivery		at the university			
Year of study	1		Language of instruction		Polish			
Semester of study	1		ECTS credits		3.0			
Learning profile	general academic profile		Assessment form		assessment			
Conducting unit	Division Of Hydromechanics And Ship Design -> Institute Of Naval Architecture -> Faculty Of Mechanical Engineering And Ship Technology -> Wydziały Politechniki Gdańskiej							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Wiesław Tarełko					
	Teachers		prof. dr hab. inż. Wiesław Tarełko					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0 0.0		45
	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	45		10.0		20.0		75
Subject objectives	<ul> <li>The objective of this s</li> <li>to provide stude</li> <li>to prepare stude units</li> </ul>	subject is: nts with basic k nts for the desi	nowledge of n gn of specializ	nodern mechati zed mechatronio	onic sys c system	stems u is used	sed in transp in various ty	oort pes of transport

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U04] creatively designs or modifies, either entirely or at least in part, a transport system or process according to a given specification, considering both technical and non-technical aspects, estimating costs and utilizing design techniques appropriate for tasks within the scope of Transport and Logistics	The student: creates a basic block diagram of a mechatronic system selects a physical phenomenon that enables a sensor to perform a specified function in a mechatronic system selects a physical phenomenon that enables an actuator to perform a specified function in a mechatronic system selects appropriate sensors to perform a specified function in a mechatronic system selects appropriate actuators to perform a specified function in a mechatronic system designs a mechatronic system to perform a specified function	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	[K7_U15] evaluates the feasibility of advanced methods and tools for solving complex engineering tasks of a practical nature, characteristic of the field of study, and selects and applies appropriate methods and tools for this purpose	The student: explains the essential reasons for integrating mechanical, electronic, and informatics components to create a mechatronic system identifies the basic components of a mechatronic system describes the fundamental types of mechatronic systems presents a general overview, manufacturing processes, and application examples of microelectromechanical systems (MEMS) presents a general overview, manufacturing processes, and application examples of nanoelectromechanical systems (NEMS)	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K7_W04] demonstrates knowledge encompassing selected issues in the field of advanced detailed knowledge, particularly in the scope of methods, techniques and tools specific to Transport and Logistics	The student: presents examples of sensor and actuator applications in mechatronic systems used in transportation and other fields enumerates the physical phenomena utilized in sensors and actuators of mechatronic systems defines sensors and actuators and classifies them according to preferred criteria	[SW1] Assessment of factual knowledge

Subject contents	Introduction to Mechatronics  Definition and scope of mechatronics What qualifies as a mechatronic unit? Does mechatronization always make sense? (Cost-benefit analysis, feasibility) Mechatronic Systems Classification of mechatronic systems Classification of mechatronic systems Microelectromechanical systems (MEMS): Ceneral characteristics Manufacturing technology Examples of applications Sensors and Actuators in Mechatronic Systems Physical phenomena used in sensors and actuators Classification of mechatronic sensors Mechatronic actuators: types and applications Applications in Industry and Bio-Inspired Design Selected mechatronic systems in the transport industry Nature-inspired mechatronic design (biomimicry in engineering)					
Prerequisites and co-requisites						
Assessment methods and criteria	Subject passing criteria laboratory	Passing threshold 66.0% 66.0%	Percentage of the final grade 49.0% 51.0%			
Recommended reading	Basic literature	<ul> <li>Robert Munnig Schmidt, Georg Schitter, Adrian Rankers, and Jan van Eijk, <i>The Design of High Performance Mechatronics</i>, 2nd revised edition, IOS Press, 2014.</li> <li>Bishop, Robert H., <i>Mechatronics: An Introduction</i>, CRC Press, 2006.</li> <li>De Silva, Clarence W., <i>Mechatronics: An Integrated Approach</i>, CRC Press, 2005.</li> <li>Onwubolu, Godfrey C., <i>Mechatronics: Principles and Applications</i>, Butterworth-Heinemann, 2005.</li> <li>Bolton, William, <i>Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering</i>, 6th edition, Pearson, 2018.</li> <li>Shetty, Devdas, and Richard A. Kolk, <i>Mechatronics System Design</i>, 2nd edition, Cengage Learning, 2010.</li> </ul>				
	Supplementary literature	Fukuda, Toshio (Ed.), <i>Mechatronics Recent Technological and Scientific Advances</i> , Springer, 2012.				
	eResources addresses	Uzupełniające Adresy na platformie eNauczanie: Mechatronika w transporcie, W/L, TiL, IIst, sem I., stacjonarne, lato 2024/25 - Moodle ID: 37730 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37730				
Example issues/ example questions/ tasks being completed	At the beginning of the semester, the instructor provides students with a list of all topics that will be covered in the course. Students are aware that their knowledge will be assessed in three thematic areas. The student will have 20 minutes to prepare the topics for discussion. Next, the student presents the assigned topics and answers questions from the examiners, e.g. "In systems used to measure stress in a ship's hull, fiber optic sensors with Bragg gratings (FBG sensors) can be used. What is the principle of their operation?"					
Work placement	Not applicable					

Document generated electronically. Does not require a seal or signature.