



## Subject card

Subject name and code	Mechatronics in transport, PG_00057112						
Field of study	Transport and Logistics						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
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	Department of Ship Manufacturing Technology, Quality Systems and Materials Science -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Wiesław Tarełko					
	Teachers	prof. dr hab. inż. Wiesław Tarełko dr hab. inż. Jerzy Kowalski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	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	9.0		21.0		75
Subject objectives	<b>The objective of the subject is:</b>  - to educate students with the basic knowledge regarding the modern mechatronic systems used in transport  - to prepare students for design of specialized mechatronic systems used in a wide variety of transport units						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U02] The student is able to plan and carry out research experiments in selected transport issues using various research methods	Student draws up a basic block scheme of the mechatronic system Student selects a physical phenomenon assured realizing the specified function by the mechatronic system sensor Student selects a physical phenomenon assured realizing the specified function by the mechatronic system actuator Student selects sensors assured realizing the specified function in the mechatronic system Student selects actuators assured realizing the specified function in the mechatronic system Student designs the mechatronic system realizing the 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_W02] The student has an extensive knowledge of modeling transport processes, including the knowledge necessary to describe and evaluate the functioning of selected elements of the transport system	Student presents examples of sensors and actuators application in the mechatronic systems used in means of transport etc. Student enumerates physical phenomena used in sensors and actuators of the mechatronic systems Student defines a sensor/an actuator and presents their taxonomy according to the preferred criteria	[SW1] Assessment of factual knowledge
	[K7_W04] The student has basic knowledge of IT and telecommunication systems in transport and in the area of control in transport systems	Student mentions essential reasons for integration of mechanical, electronic and informatics components in order to obtain the mechatronic system Student mentions basic components of the mechatronic system Student mentions fundamental types of the mechatronic systems Student presents a general characteristic, manufacture processes, and application examples of the microelectromechanical systems MEMS Student presents a general characteristic, manufacture processes, and application examples of the nanoelectromechanical systems NEMS	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents	<p>Introduction to Mechatronics</p> <p>Which devices can be considered as a mechatronic unit?</p> <p>Do always mechatronization have a sense?</p> <p>Mechatronic System</p> <p>Classification of mechatronic systems</p> <p>MEMS systems (general characteristics; technology; examples of applications)</p> <p>NEMS systems (general characteristics; technology; examples of applications)</p> <p>Physical phenomena used in sensors and actuators of mechatronic systems</p> <p>Mechatronic sensors - classification systems</p> <p>Mechatronic sensors used to measure mechanical, thermal and biochemical parameters</p> <p>Mechatronic actuators</p> <p>Selected systems of transport industry</p> <p>Mechatronic design inspired by nature</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 1191 794 1218">Subject passing criteria</th> <th data-bbox="799 1191 1137 1218">Passing threshold</th> <th data-bbox="1142 1191 1481 1218">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1225 794 1252">lectures - test</td> <td data-bbox="799 1225 1137 1252">66.0%</td> <td data-bbox="1142 1225 1481 1252">51.0%</td> </tr> <tr> <td data-bbox="456 1258 794 1285">laboratory</td> <td data-bbox="799 1258 1137 1285">51.0%</td> <td data-bbox="1142 1258 1481 1285">49.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	lectures - test	66.0%	51.0%	laboratory	51.0%	49.0%
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lectures - test	66.0%	51.0%										
laboratory	51.0%	49.0%										
Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>Robert Munnig Schmidt, Georg Schitter, Adrian Rankers and Jan van Eijk, The Design of High Performance Mechatronics 2nd revised edition. IOS Press, 2014.</p> <p>Bishop, Robert H., Mechatronics: an introduction. CRC Press, 2006.</p> <p>De Silva, Clarence W., Mechatronics: an integrated approach. CRC Press, 2005</p> <p>Onwubolu, Godfrey C., Mechatronics: principles and applications. Butterworth-Heinemann, 2005.</p> <p>Rankers, Adrian M., Machine Dynamics in Mechatronic Systems. University Twente, 1997</p> <p>Adresy na platformie eNauczanie:  Mechatronika w transporcie - Moodle ID: 37730  <a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=37730">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=37730</a></p>										
Example issues/ example questions/ tasks being completed												
Work placement	Not applicable											