GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Automatics of Transportation Systems, PG_00070255		
Field of study	Electrical Engineering, Automation, Robotics and Control Systems		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Electrified Transportation -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Skibicki	
	Teachers		

Lesson types

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	5.0	25.0	75

Subject objectives

The aim of the subject is to master the knowledge of widely understood automation in transport systems. The student learns the rules, systems and devices for controlling the railway traffic, urban transport and road traffic, as well as the possibilities of their automation. In addition, basic issues related to the automation of electric vehicle operation will be presented.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W06] has an extended knowledge of the design of automation components and devices, control and decision support systems control and decision support systems and complex mechatronic systems		
[K7_U03] is able to prepare and deliver a presentation on the results of an engineering task and own research		
[K7_U04] has the ability for self-directed learning in order to improve his/her professional qualifications, and is able to identify directions for further learning		
[K7_U07] is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems in the field of automation and robotics		

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Traffic and railway traffic control devices: railway signaling. Techniques of railway traffic protection, track occupation control systems. Railway traffic management, the concept of linear and semi-automatic interlocking, transmission of information between the track and the vehicle. European rail traffic control system ETCS, definition, standards, technical equipment. Railway radio systems. Composition continuity control systems. Methods of traffic control on low-loaded lines. Railway crossing protection systems, categories of railway line intersections with vehicular roads, automatic crossing signaling, computer control, methods of detecting the presence of vehicles at the crossing. Automation of marshalling yards, goals and rules of timing, track brakes, steering. Motion control in metro systems. Full automation of rail transport, unmanned and unmanned systems, automatic freight transport, Cargomover system. Automatic systems used in urban transport. Methods of controlling traffic lights. Variable traffic signs and signaling devices, traffic detectors. Methods of vehicle location, automatic reading of license plates, dynamic traffic control systems. Traffic control in large urban agglomerations. Control of pedestrians movements. Full automation of traffic. Control of power supply and vehicle operation. Controlling transport behaviors and habits. Unconventional transportations systems

Course content – laboratory

Track occupancy control systems; SHP sensor; Traffic control between stations; Traffic control at stations; Marshalling yard.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of the basics of electrical engineering and electronics.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Exam from the lecture</td><td>60.0%</td><td>60.0%</td></tr>
<tr><td>Reports from laboratory exercises</td><td>60.0%</td><td>40.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Vuhic V.: Urban transit, systems and technology. Viley 2007.
2. Rojek A.: Tabor i trakcja kolejowa. Warszawa: KOW 2010.
3. Bergiel K., Karbowiak H.: Automatyzacja prowadzenia pociągu. Łódź, EMI-PRESS 2005.
4. Dyduch J., Pawlik M.: Systemy automatycznej kontroli jazdy pociągu. Radom, Wyd. PR 2002.
5. Dyduch J., Kornaszewski M.: Systemy sterowania ruchem kolejowym. Radom, Wyd. PR 2004.
6. Dąbrowa-Bajon M.: Podstawy sterowania ruchem kolejowym. Warszawa, OWPW 2002.
7. Leślo M., Guzik J.: Sterowanie ruchem drogowym cz. I i II. Gliwice, WPS 2000.
8. Praca zbiorowa: Interoperacyjność systemu kolei Unii Europejskiej. Warszawa: KOW 2015.
9. Pawlik M.: Europejski system zarządzania ruchem kolejowym. Warszawa: KOW 2015.
10. Chromański W., Grabarek I., Kozłowski M., Czerepicki A., Marczuk K.: Pojazdy autonomiczne i systemy transportu autonomicznego. Warszawa: PWN 2020.
11. Modelewski K.: Inteligentny transport. Brzezia Łąka: Poligraf 2018.
12. Mężyk A., Zamkowska S.: Problemy transportowe miast, stan i kierunki rozwiązań. Warszawa: PWN 2019.
13. Wesołowski J.: Miasto w ruchu, dobre praktyki w organizowaniu transportu miejskiego. Łódź: Instytut Spraw Obywatelskich 2008.
14. Żurkowski A., Pawlik M.: Ruch i przewozy kolejowe, sterowanie ruchem. Warszawa: KOW 2010.
15. Dyduch J., Kornaszewski M.: Komputerowe systemy sterowania ruchem kolejowym. Radom: UTH 2014.
16. Barański S., Karbowiak H.: Teoria i aplikacje systemów bezpiecznego prowadzenia pociągu. Łódź: WPŁ 2016.</td></tr>
<tr><td>Supplementary literature</td><td>Periodics: Technika Transportu Szynowego; Transport Miejski i Regionalny</td></tr>
<tr><td>eResources addresses</td><td>Basic

https://www.rynek-kolejowy.pl/ - Current information about rail transport.</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Traffic control in cities;
Control of traffic on railway lines;
Work of an autonomous vehicle;</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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