GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Cintrol in Transport, PG_00060665						
Field of study	Transport and Logistics						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2026/2027			
Education level	first-cycle studies		Subject group	Optional 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	3		Language of instruction	Polish			
Semester of study	5		ECTS credits	5.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Transport and Logistics -> Institute of Naval Architecture -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Agnieszka Maczyszyn				
	Teachers		dr inż. Agnieszka Maczyszyn				

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	30.0	0.0	60

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 6716 Sterowanie w transporcie, WiP, TiL (PG_00060665), sem.5, zimowy 26/27
https://enauczanie.pg.edu.pl/2025/course/view.php?id=6716

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	60	5.0	60.0	125

Subject objectives

Preparation of students to formulate and specify simple engineering tasks related to the control of transportation systems, based on knowledge of control principles, transportation system modelling, feedback mechanisms, traffic control methods, and system performance evaluation and optimization criteria, as well as fostering an attitude of responsible continuous improvement of their own competencies in the context of the design and operation of transport control systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U02] can work individually and in a team, communicate using various techniques in a professional environment, as well as document, analyze and present the results of his work; can estimate the time needed to complete a given task	Copilot said: Is able to document, analyze, and present the results of work on a transportation control task, using appropriate technical terminology and planning the time required for the completion of individual stages of the task.	[SU5] Assessment of ability to present the results of task
[K6_W04] has well established knowledge in the field of computer science, electronics, automation and control, information technology and computer graphics, useful for understanding the possibilities of applying them in transport	Knows and understands the principles of transportation systems control, including the concepts of a control object, state, inputs, outputs, disturbances, and feedback, as well as traffic control methods in the context of automation and control applications in transportation.	[SW3] Assessment of knowledge contained in written work and projects
[K6_K01] is aware of the need for continuous improvement in the field of the profession and knows the possibilities of further education	Is prepared to continuously develop competencies related to the control of transportation systems, particularly by identifying personal learning and development needs and indicating methods for updating and expanding knowledge in this field.	[SK3] Assessment of ability to organize work [SK2] Assessment of progress of work
[K6_U05] can formulate a simple engineering task and its specification in the field of design, maintenance and operation of transport means and systems	Is able to formulate a simple engineering task and develop its specification concerning the control of a selected transportation system by identifying the controlled object, inputs, outputs, disturbances, control objectives, and basic criteria for evaluating system performance.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Course content – lecture

Transportation system as a control object: dynamic and cyber-physical system.
Control, regulation, management, and supervision in transportation systems.
Identification of the control object: state variables, inputs, outputs, disturbances, and parameters.
Feedback and the role of measurement and detection in control systems.
Control objectives and performance criteria in transportation.
Road traffic control: principles and applications.
Fixed-time, reactive, and adaptive control strategies.
Predictive and optimization-based control.
Modelling of transportation processes and identification of mathematical models.
Control algorithms and management of transportation systems.
System performance evaluation criteria, including time and cost considerations.
Examples of control applications in various transportation systems.

Course content – project

Selection of a transportation system as the object of the planned control task.
Identification of the controlled object: definition of the objective, inputs, outputs, states, and disturbances.
Formulation of a simple engineering problem.
Development of the control task specification.
Determination of the method for acquiring information about the system state.
Selection of an appropriate control strategy for the specified operating conditions of the system.
Definition of performance evaluation criteria for the control system.
Development of a conceptual or mathematical model appropriate to the scope of the task.
Development of an algorithm or operational scheme for the control system.
Analysis of the proposed solution and its limitations.
Documentation of the solution.
Presentation of project results.

Prerequisites and co-requisites	Fundamentals of Transportation Systems Transportation Infrastructure Safety Assessment Methods in Transportation Systems Fundamentals of Control Engineering Transportation Systems Engineering Material Handling and Short-Distance Transport Systems

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm Tests	60.0%	40.0%
Project Work	60.0%	50.0%
Additional assignment agreed upon with the lecturer	50.0%	10.0%

Recommended reading

Basic literature	NISE's Control Systems Engineering, Dr. Ranjeev Gupta Box G.E.P., Draper N.R., *Empirical Model-Building and Response Surfaces*, Wiley. Lighthill M.J., Whitham G.B., *On kinematic waves II: A theory of traffic flow on long crowded roads*, Proc. Royal Society.
Supplementary literature	Ljung L., *System Identification: Theory for the User*, Prentice Hall.
eResources addresses	

Example issues/ example questions/ tasks being completed	Identification of the control object for a selected transportation system. Definition of inputs, outputs, states, and disturbances for a road intersection. Explanation of the differences between control, regulation, management, and supervision. Selection of an appropriate control strategy for a specified transportation scenario. Comparison of fixed-time, reactive, adaptive, predictive, and optimization-based control approaches. Determination of the role of detection systems and feedback mechanisms. Formulation of a control objective for a selected transportation system. Definition of system performance evaluation criteria.
Practical activites within the subject	Not applicable

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