GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Safety and risk in transportation systems, PG_00064985		
Field of study	Transport and Logistics		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
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	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
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	prof. dr hab. inż. Jakub Montewka	
	Teachers	mgr inż. Filip Zarzycki dr inż. Ewa Kozłowska	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	30.0	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	45.0	100

Subject objectives

The aim of this course is to familiarise students with methods used for risk assessment and safety assurance in complex socio-technical systems, with particular emphasis on maritime transport systems.

In topics related to risk analysis, the Formal Safety Assessment (FSA) methodology and its extension, the risk-based design methodology, will be presented.
In topics concerning safety, methods from the Safety I and Safety II groups will be discussed, including basic theories of accident analysis and selected methods for human reliability assessment (HRA).
The theoretical material will be supplemented with appropriate examples of practical applications.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W02] demonstrates structured and theory supported knowledge encompassing key issues in the field of Transport and Logistics, enabling modeling and analysis of transport systems and processes	The student possesses knowledge of methods used for risk assessment, estimation, and ensuring safety in human-technical systems.	[SW1] Assessment of factual knowledge
[K7_U01] utilizes acquired methods, tools and mathematical models for analysis and evaluation of transport systems and processes	The student is able to apply in practice the knowledge gained during the course. The student knows and can use a tool for quantitative risk assessment.	[SU4] Assessment of ability to use methods and tools
[K7_U02] formulates and tests hypotheses concerning problems od transport systems and processes, as well as simple research problems	The student is able to formulate a research problem related to a simple issue concerning a transport system and can construct a simple mathematical model to solve this problem.	[SU5] Assessment of ability to present the results of task
[K7_W01] explains and describes, based on general knowledge in the field of scientific disciplines forming the theoretical foundations of Transport and Logistics, the construction and principles of operation of transport systems, processes and their components, as well as methods and means of their integration	The student is able to identify the area of applicability for the methods presented in the classes and point out the significant differences between the methods.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

1. Theoretical foundations related to the concept and definition of risk, adopted scientific approaches, and the presentation of risk analysis as a tool facilitating the decision-making process.
2. Presentation of an exemplary methodological framework for quantitative risk assessment, along with examples.
3. The Formal Safety Assessment methodology.
4. Methods for safety assessment belonging to the Safety II group (STAMP, FRAM).
5. The NARA method for assessing human reliability.

Course content – exercises

Bayesian networks as a tool for mathematically modeling cause-and-effect relationships in systems subject to uncertainty.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	55.0%	50.0%
	55.0%	50.0%

Recommended reading

Basic literature	Rausand, Marvin, and Stein Haugen. Risk Assessment - Theory, Methods, and Applications (2nd Edition). 2nd edition. Hoboken, NJ: John Wiley & Sons, 2020. Web.
Supplementary literature	Erik, Hollnagel. FRAM: The Functional Resonance Analysis Method: Modelling Complex Socio-Technical Systems. 1st ed. Farnham: Routledge, 2012. Web.
eResources addresses	

Example issues/ example questions/ tasks being completed

Practical activites within the subject	Not applicable

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