GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Safety and risk in transportation systems, PG_00057094		
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	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Zakład Projektowania Okrętu -> Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Przemysław Krata	
	Teachers	dr inż. Roman Liberacki dr Ievgen Medvediev	

Lesson types and methods of instruction	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	9.0	46.0	100

Subject objectives	The objective of this course is to get the students acquainted with the foundations of risk analysis as a scientific discipline, along with the practical approaches to risk analysis as a task in a context of risk-informed decision making process. The students will be acquainted with the Quantitative Risk Assessment (QRA), HazId tools, risk-informed decision making, human reliability analysis techniques (HRA), basic tools for QRA such as Bayesian Belief Network, Fault Tree or Event Tree.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W03] The student has extensive knowledge of: reliability and safety of transport systems and environmental protection in transport	The student knows the issues related to risk analysis. He is able to formulate a scientific problem related to risk analysis and propose its solution at a certain level of generality. The student is able to carry out a risk analysis for a simple anthropotechnic system.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K7_U04] The student is able to use the known methods and mathematical models, as well as computer simulations to analyze, design and evaluate the functioning of transport systems or their components	The student is able to determine the scope of knowledge necessary to carry out the risk analysis of a simplified anthropotechnical system and indicate the source of this data, including mathematical mathematical models and computer simulations.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
[K7_K82] is equipped to participate actively in lectures, seminars and laboratory classes conducted in foreign language	The student demonstrates language proficiency to understand the content discussed and is able to formulate questions and answers on the topics covered.	[SK1] Assessment of group work skills
[K7_W06] The student has an extensive knowledge of transport systems and the principles of transport systems integration	The student is able to discuss the functioning of transportation systems and the principles of integration of transportation systems.	[SW1] Assessment of factual knowledge
[K7_W05] The student has extensive knowledge of law, economics and transport management	The student demonstrates knowledge of law, economics and management in transportation that enables understanding of typical processes occurring in the TSL industry.	[SW1] Assessment of factual knowledge

Subject contents

1. Teoretical foundations of risk analysis.
2. Quantitative risk analysis, Hazard identification.
3. Human Reliability Assessment techniques.
4. Bayesian Networks, Fault Tree, Event Tree.
5. Safety assessment methods.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture pass	50.0%	50.0%
Assignment pass	50.0%	50.0%

Recommended reading

Basic literature

1. Aven T. "Quantitative risk assessment. The scientific platform". Cambridge, 2011.
2. Aven T., Risk assessment and risk management: Review of recent advances on their foundation, European Journal of Operational Research, Volume 253, Issue 1, 2016, Pages 1-13, https://doi.org/10.1016/j.ejor.2015.12.023
3. Goerlandt F., Montewka J., Maritime transportation risk analysis: Review and analysis in light of some foundational issues, Reliability Engineering & System Safety, Volume 138, 2015, Pages 115-134, https://doi.org/10.1016/j.ress.2015.01.025.
4. MSC-MEPC.2-Circ.12-Rev.2 - Revised Guidelines For Formal Safety Assessment (Fsa)For Use In The Imo Rule-Making Proces... (Secretariat).pdf

Supplementary literature

1. Galavotti, M.C. The Interpretation of Probability: Still an Open Issue? *Philosophies* 2017, *2*, 20. https://doi.org/10.3390/philosophies2030020
2. Aven T, The risk concepthistorical and recent development trends, Reliability Engineering & System Safety, Volume 99, 2012, Pages 33-44, https://doi.org/10.1016/j.ress.2011.11.006.
3. http://c4tx.org/ctx/pub/fsa.pdf
4. Wróbel K., Montewka J., Kujala P., System-theoretic approach to safety of remotely-controlled merchant vessel, Ocean Engineering, Volume 152, 2018, Pages 334-345, https://doi.org/10.1016/j.oceaneng.2018.01.020.

eResources addresses

Adresy na platformie eNauczanie:

Safety and risk in transportation systems - summer semester 2023/2024 - Moodle ID: 36024
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36024

Safety and risk in transportation systems - summer semester 2023/2024 - Moodle ID: 36024
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36024

Example issues/ example questions/ tasks being completed	1. Definition of risk and scientific approaches to risk analysis. 2. Application of Bayesian Networks in the risk analysis process. 3. Risk analysis process - elements, data sources, methods and models.
Work placement	Not applicable