GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Risk and reliability of systems, PG_00065498		
Field of study	Naval Architecture and Offshore Structures		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
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	Part-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	Division Of Hydromechanics And Ship Design -> Institute Of Naval Architecture -> Faculty Of Mechanical Engineering And Ship Technology -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jakub Montewka	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	18.0	0.0	0.0	18.0	0.0	36

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	36	9.0	55.0	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_U03] identifies and formulates task specifications in the scope of shipborne and offshore systems/ processes design, including non-standard problems also accounting for their non-technical aspects	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.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject
[K7_K11] is aware of importance of professional acting, the need for critical verification of acquired knowledge and consulting experts opinion in case of facing difficulties with individual problem solving	The student is aware of the importance for the design process of the correct presentation of results obtained from risk analysis, proper communication accompanying the analysis of uncertainty and the importance of the process of verification and validation of the developed models.	[SK2] Assessment of progress of work
[K7_W11] interprets social, economic, legal (including industrial and intellectual property laws), and other non-technical aspects of engineering activities, and includes them into engineering practice	The student skillfully uses data resources necessary to conduct risk analysis and is able to refer to the appropriate source while respecting copyright.	[SW2] Assessment of knowledge contained in presentation
[K7_K12] is ready for fullfiling social commitement and initation of actions for public interest including entrepreneurial thinking and acting	Risk analysis is forward-looking, proactive, and can therefore be an action that initiates entrepreneurial thinking.	[SK5] Assessment of ability to solve problems that arise in practice

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

None

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Project pass	51.0%	50.0%
Lecture test	51.0%	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. https://wwwcdn.imo.org/localresources/en/OurWork/HumanElement/Documents/MSC-MEPC.2-Circ.12-Rev.2%20-%20Revised%20Guidelines%20For%20Formal%20Safety%20Asse Making%20Proces...%20(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, http://c4tx.org/ctx/pub/fsa.pdf
3. 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:

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

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