GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Risk and Reliability of Systems, PG_00070349		
Field of study	Naval Architecture and Offshore Structures		
Date of commencement of studies	February 2027	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	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Division of Marine Power Plants -> 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. Roman Liberacki	
	Teachers	dr inż. Roman Liberacki	

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

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	35.0	100

Subject objectives

Introducing students to methods of reliability assessment and risk analysis of technical systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 understands and can perform a professional risk analysis related to technical systems. He/she can critically verify the acquired knowledge and utilize expert opinions in case of difficulties in independently solving a problem.	[SK5] Assessment of ability to solve problems that arise in practice
[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 identifies and formulates tasks and solves them in the context of system design, taking into account their safety. He/she also considers atypical aspects such as the human factor.	[SU1] Assessment of task fulfilment
[K7_K12] is ready for fullfiling social commitement and initation of actions for public interest including entrepreneurial thinking and acting	The student understands the social role and the necessity of striving to minimize risks while maintaining a reasonable approach to the associated costs and benefits.	[SK5] Assessment of ability to solve problems that arise in practice
[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 interprets the economic and legal conditions for safety assessment and incorporates them into engineering practice.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture
LECTURES: Concept of reliability, reliability indicators, mathematical models for assessing the reliability of elements and systems. Statistical hypothesis testing. Maintainability and availability of technical systems. Human factors. Methods for assessing the probability of human errors. Concept of risk, risk measures, mathematical models for risk assessment. ALARP criterion. Formal Safety Assessment (FSA) method in shipping. Safety management.

PROJECT: Risk analysis of a selected technical object.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of the construction and operation of machines and devices.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
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<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written test</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Project</td><td>100.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Girtler J., Kuszmider S., Plewiński L.: Wybrane zagadnienia eksploatacji statków morskich w aspekcie bezpieczeństwa żeglugi. WSM, Szczecin 2003.
2. Gołąbek A.: Wybrane zagadnienia bezpieczeństwa maszyn. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2002.
3. Guidelines for Formal Safety Assessment (FSA) for Use in The Imo Rule-Making Process, International Maritime Organization 2002.
4. Radkowski S.: Podstawy bezpiecznej techniki. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2003.
5. Brandowski A., Metodyka formalnej oceny bezpieczeństwa statku (FSA), I-sza Międzynarodowa Szkoła Letnia Bezpieczeństwo na Morzu, Politechnika Gdańska, Gdańsk 2001.
6. ISM CODE
7. SPIS CODE</td></tr>
<tr><td>Supplementary literature</td><td>1. Modarres M., What every engineer should know about Reliability and Risk Analysis, Center for Reliability Engineering, University of Maryland, College Park, Maryland, Marcel Dekker, Inc., New York, Basel, Hong Kong, 1993.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Define reliability from a probabilistic perspective.2. Explain the ALARP risk criterion and its significance.3. List the stages of the FSA method.4. Conduct a risk analysis of a selected technical object.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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