



## Subject card

Subject name and code	Safety and risk analysis in technology , PG_00025522						
Field of study	Mathematics						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
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		exam		
Conducting unit	Zakład Równań Różniczkowych i Zastosowań Matematyki -> Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr inż. Katarzyna Tessmer				
	Teachers		mgr inż. Katarzyna Tessmer				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	15.0	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		60.0	125
Subject objectives	Introduction to basic mathematical problems related to risk and safety of the human activity in technology. Developing and improving competences in building mathematical models of real objects, with application of probability and statistics.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_K04		The student draws conclusions at each stage of the project based on the results of statistical tests.		[SK2] Assessment of progress of work		
	K6_U05		The student understands mathematical theorems and uses them to solve problems.		[SU4] Assessment of ability to use methods and tools		
	K6_K02		The student appreciates the importance of self-expanding knowledge. Performs exercises to consolidate knowledge by himself.		[SK5] Assessment of ability to solve problems that arise in practice		
	K6_U12		The student carries out a project in the R environment, in which he analyzes the risk of a given model.		[SU2] Assessment of ability to analyse information		
	K6_W03		The student is able to analyze the given model. Performs statistical tests, analyzes the results.		[SW1] Assessment of factual knowledge		

Subject contents	Elements of reliability theory.		
	Systems without replacement.		
	The reliability importance measures of system components.		
	Laplace transform.		
	Elements of renewal theorem. Counting process and the Poisson process.		
Prerequisites and co-requisites	Courses completed: Probability Theory term IV (MAT1013/1)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	50.0%	40.0%
	Colloquiums	50.0%	30.0%
	Projects	50.0%	30.0%
Recommended reading	Basic literature	A. Załęska-Fornal, Miary niezawodnościowej i strukturalnej istotności elementów, Zeszyty Naukowe Akademii Marynarki Wojennej, Gdynia, 2006.	
		B. Kopociński, Zarys teorii odnowy i niezawodności, PWN, Warszawa, 1973.	
		M. Gągolewski, Programowanie w języku R, PWN, Warszawa, 2016.	
	Supplementary literature	T. Aven, U. Jensen, Stochastic Models in Reliability, Springer, New York, 1999.	
		H. Mohanty, P. Bhuyan, D. Chenthati, Big Data, Springer, New York, 2015.	
		R. Wieczorkowski, R. Zieliński, Komputerowe generatory liczb losowych, WNT, Warszawa, 1997.	
	eResources addresses	Adresy na platformie eNauczanie: Analiza ryzyka i bezpieczeństwa w technice 2023/24 - Moodle ID: 30942 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30942">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30942</a>	
Example issues/ example questions/ tasks being completed	On exercises students solve problems which are provided by the lecturer, while others give their comments and suggest improvements.		
	A component has TTF density given by $f(t)=kt^4e^{-5t}$ , $t>0$ . Find: a) $k$ , b) $R(t)$ , c) $h(t)$ , d) MTTF.		
Work placement	Not applicable		