GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	RELIABILITY OF ENGINEERING STRUCTURES, PG_00041318
Field of study	Civil Engineering

Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Structural Mechanics Department -> Faculty of Civil and Environmental Engineering
Name and surname of lecturer (lecturers)	Subject supervisor: prof. dr hab. inż. Jarosław Górski
	Teachers:

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	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	5.0	25.0	75

Subject objectives	General information on uncertainty modelling in engineering analysis and design Distinction of three levels of reliability assessment, their domain and relevant operational methods

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W04] has knowledge on advanced strength of materials, modeling and optimisation of materials and constructions; has knowledge of fundamentals of Finite Element Method and general nonlinear analysis of engineering constructions and systems	The student adjusts a relevant reliability assessment method to the specified engineering task	[SW1] Assessment of factual knowledge
[K7_W16] knows methods of diagnostics of engineering objects, has knowledge about different kinds of defects in constructions and its reasons; knows means of fixing and reinforcing of constructions.	The student recognizes basic uncertainty sources decisive for structural reliability	[SW1] Assessment of factual knowledge
[K7_U03] can perform classic statical and dynamical analysis of rod structures stability (trusses, frames and ties), both statically determined and undetermined as well as surface structures (plates, membranes and shells)	The student performs numerical reliability assessment on a prescribed level	[SU5] Assessment of ability to present the results of task
[K7_W15] has deep and adequate knowlege of civil engineering, within offered specialization and profile	The student recognizes the uncertainty origins in the process of engineering analysis and design	[SW1] Assessment of factual knowledge

Subject contents	Probability theory - preliminaries. Probabilistic models for load and resistance variables. Basic definitions - reliability, failure probability. Random modelling of load and resistance variables. Reliability of structural systems. Levels of reliability methods – classification. Level I methods - application to standards and codes, partial safety factors. Level II methods – safety indices. Level III method - numerical procedures. Monte Carlo simulation, engineering examples. Random load combination. Time-variant reliability analysis.

Prerequisites and co-requisites	Structural mechanics, strength of materials, mathematics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	presentations	0.0%	100.0%
Recommended reading	Basic literature	1. Ang A. H-S., Tang W.H. Probability concepts in engineering. Wiley Chichester 2007 2. Hart G. Uncertainty analysis of loads and safety in structural engineering. Prentice Hall Englewood Cliffs 1982 3. Madsen H.O., Krenk S., Lind N.C. Methods of structural safety. Prentice Hall Englewood Cliffs 1986 4. Nowak A. Collins K. Reliability of structures. McGraw Hill New York 2000.	
	Supplementary literature	1. Augusti G., Baratta A., Casciati F. Probabilistic methods in structural engineering. Chapman & Hall, London 1984 2. Ditlevsen O., Madsen H. Structural reliability methods. Wiley Chichester 1996, www.mek/dtu.dk/staff.od/books.htm 3. Thoft-Christensen P., Baker M.J. Structural reliability theory and its applications. Springer Berlin 1982 4. Thoft-Christensen P., Murotsu Y. Application of structural system reliability theory. Springer Berlin 1986 5. Melchers R. Structural reliability Analysis and prediction. John Wiley Chichester 1999.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Three levels of reliability assessment, short description Basic Monte Carlo simulation algorithm adjusted to engineering problems		
Work placement	Not applicable		