COURSE DESCRIPTION CARD

Course name	**Diagnostics methodology of buildings and structures in the operational stage**				
Course type	**optional**	**Course code**	**SDPB0025**	**ECTS credits**	**1**
Forms and number of hours	**Lecture: 4 h** **Laboratory: 6 h**	**Scientific discipline**	**civil engineering and transportation**		
Course objectives	**Knowledge**: teaching doctoral students the knowledge of the selection of methods for diagnosis and analysis of the condition of operating building structures. **Skills**: teaching doctoral students the ability to carry out research independently, that allows for the formulation of an assessment of the operated structures safety. **Competences**: teaching doctoral students the competences to fulfill social obligations in the field of ensuring the safety of buildings and their users.				
Course content	1. Classification methods of construction failures and disasters. Acting loads' characteristics - Lecture 2h 2. Diagnostic methods of operated building structures - Lecture 2h 3. Diagnostics of steel structures. Repair and reinforcement - Lab 2h 4. Diagnostics of concrete structures. Repair and reinforcement - Lab 2h 5. Diagnostics of masonry and wooden structures. Repair and reinforcement - Lab 2h				
Teaching methods	**Lecture** on the methods of diagnostics and analysis of operating structures, enriched with a discussion with the audience and short presentations of the audience on the case study of construction failures or disasters; students' own studies based on the indicated sources. **Laboratory** - presentation of characteristic cases of construction failures and disasters in terms of the implementation of modern research equipment to assess the current condition of facilities and methods of their repair and strengthening.				
Assessment method	Lecture: written test Laboratory: written test				
Symbol of learning outcome	**Learning outcomes**		**Reference to thelearning outcomes forthe field of study for the 8th levelof Polish Qualification Framework (PRK)**		**Methods of assessing the learning outcomes**
LO1	knows and understands the methodology of technical tests in terms of condition assessment, as well as repairs and reinforcements of buildings in operation.		SD_W3		Written test
LO2	knows and understands the rules of disseminating the results of diagnostic tests and analyzes in the form of scientific and professional publications as well as during scientific conferences and engineering trainings.		SD_W4		Written test

LO3	can make a critical analysis and evaluation of the results of diagnostic tests, the activities of experts and other works and publications of a scientific and research nature influencing the development of knowledge.	SD_U2	Written test
LO4	is able to transfer the results of scientific activity to the economic and social sphere in terms of their use during the work of experts in the aspect of testing damaged or endangered structures.	SD_U3	Written test
LO5	is prepared: for a critical evaluation of the recognized achievements within the scientific discipline; to critically evaluate own contribution to the development of scientific discipline and research into real objects; to recognize the importance of recognized and own knowledge in solving hypothetical cognitive problems and practical problems of operated objects.	SD_K1	Written test

Student workload (in hours)	
Lecture / laboratory	4 /6
Consultations	1
The unassisted studentwork	10
Implementation of project tasks and preparation for and participation in exams/tests	5
Total	**26**
ECTS credits	**1**

Basic references	1. Douglas J, Ransom B. Understanding building failures. 4th ed. New York: Routledge; 2007. 2. Antony J. Design of experiments for engineers and scientists. Butterworth-Heinemann; 2003. 3. Bosela PA, Brady PA, Delatte NJ, Parfitt MK, editors. Failure case studies in civil engineering: structures, foundations, and the geoenvironment. Virginia: American Society of Civil Engineers; 2013.
Supplementary references	1. Hani M. Tawancy, Anwar Ul-Hamid, Nureddin M. Abbas*, Practical engineering failure analysis*,CRC PRESS, 2004. 2. Failure Analysis: A Practical Guide for Manufacturers of Electronic Components and Systems, Marius Bazu, Titu Bajenescu, Wiley, 2011. 1. Bjerketvedt D, Bakke JR, van Wingerden K. Gas explosion handbook. J Hazard Mater 1997; 52.

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