Szkoła Doktorska
Politechniki Białostockiej
15-351 Białystok, ul. Wiejska 45a
tel. +48 85 746 92 14
www.pb.edu.pl

COURSE DESCRIPTION CARD

Course name	**Fracture mechanics and durability of structures**				
Course type	**optional**	**Course code**	**SDPB0023**	**ECTS credits**	**1**
Forms and number of hours	**lecture: 10 h**	**Scientificdiscipline**	**civil engineering and transport**		
Course objectives	Acquainting with the issues of fracture mechanics and their application in the analysis and design of structures. Explanation of the interdisciplinary nature of fracture mechanics. Teaching the basics of prediction of the durability of structures.				
Course content	Lecture: 1. Basic elements of fracture mechanics. Linear-elastic and nonlinear fracture mechanics of materials. 2. Theories and models of fracture. Fracture mechanics parameters. 3. Research of fracture toughness in the linear-elastic and nonlinear range. Areas and examples of the application of fracture mechanics parameters. 4. Durability of structural members in conditions of various physical interactions. Accumulation of damage and cracking of structural members. 5. Probabilistic approach to structure design due to durability.				
Teaching methods	The lecture with a discussion with the audience and short presentations delivered by PhD students.				
Assessment method	Written credit and presentation of a self-prepared issue.				

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study for the 8th level of Polish Qualification Framework (PRK)**	**Methods of assessing the learning outcomes**
LO1	identifies and describes issues related to the behavior of elastic-plastic and brittle materials in structure	SD_W1	Written credit
LO2	knows the basics of predicting and assessing the durability of structure	SD_W3	Written credit
LO3	is able to formulate the complex problems that require analysis of the behavior of the material in structure using fracture mechanics	SD_U1	Written credit
LO4	is aware of the current trends in the development of fracture mechanics and the issues of assessing the durability of structures	SD_U6, SD_K1	Credit for prepared presentation

Student workload (in hours)	
Lecture	10
Consultations	1
The unassisted student work	7
Implementation of project tasks and preparation for and participation in exams/tests	7
Total	**25**
ECTS credits	**1**

Basic references	1. S.P. Shah, S.E. Swartz, Ch. Ouyang, *Fracture mechanics of concrete: applications of fracture mechanics to concrete, rocks, and other quasi-brittle materials*, John Wiley & Sons, 1995. 2. G.C. Sih, A. DiTommaso, *Fracture mechanics of concrete: Structural application and numerical calculation,* Martinus Nijhoff Publisher 1985. 3. R.P. Wei, *Integration of mechanics, materials science, and chemistry*, Cambridge University Press, 2010. 4. *Model Code for Service Life Design*. Comite Euro-International du Beton FIB (CEB-FIP).
Supplementary references	1. D. Taylor*, The theory of critical distances,* Elsevier, 2007. 2. Z.P. Bazant, *Concrete fracture models: testing and practice*. Engineering Fracture Mechanics 69 (2002), p. 165-205.
Author of the programme	dr hab. inż. Marta Kosior-Kazberuk, prof. PB
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