COURSE DESCRIPTION CARD

Course name	**Fundamentals of nonlocal continuum mechanics**				
Course type	**optional**	**Course code**	**SDPB0036**	**ECTS credits**	**1**
Forms and number of hours	**lecture: 10 h**	**Scientific discipline**	**mechanical engineering**		
Course objectives	Gaining fundamental knowledge regarding diverse nonlocal theories applied to modelling of mechanical structures at micro and nano scale.				
Course content	The classical and modified couple stress theories. Eringen's nonlocal theory. The strain gradient theory. The nonlocal strain gradient theory. Explanation of nonlocal parameters. Hardening and softening effects. Constitutive relations for diverse nonlocal theories. Nonlocal forces and moments.				
Teaching methods	lecture, presentation, discussion				
Assessment method	written exam, oral exam or test				

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	Students know the fundamentals of diverse nonlocal theories.	SD_W1, SD_W2	exam
LO2	Students know stiffness softening and hardening effects in small-scaled structures	SD_W1, SD_W2	exam
LO3	Students are able to define constitutive relations for structures at ultrasmall scale.	SD_W3	exam
LO4	Students are able to derive nonlocal forces and moments.	SD_W3	exam

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

Basic references	1. A.C. Eringen: Nonlocal continuum field theories, Springer, 2002. 2. J. Awrejcewicz, A. Krysko, M.V. Zhigalov, V.A. Krysko: Mathematical modelling and numerical analysis of size-dependent structural members in temperature fields, Springer, 2021. 3. G.Z. Voyiadjis: Handbook of nonlocal continuum mechanics for materials and structures, Springer, 2019.
Supplementary references	1. W. Nowacki: Theory of asymmetric elasticity, Pergamon, 1985. 2. W. Nowacki: Theory of Micropolar Elasticity, Springer, 1970.
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Date of issuing the programme	02.03.2021