COURSE DESCRIPTION CARD

Course name	**Dynamics and stability of structural members**				
Course type	**optional**	**Course code**	**SDPB0030**	**ECTS credits**	**2**
Forms and number of hours	**lecture: 20 h**	**Scientific discipline**	**mechanical engineering**		
Course objectives	Formulating and solving a fundamental vibration and stability problem s for selected structural elements				
Course content	Continuous and discrete mechanical systems. D'Alembert's and Hamilton's principles. Euler-Lagrange equations of motion. Boundary conditions. Governing equations for a structural members. Natural frequencies and modes of structural vibration. Forced vibration and damping. Stability of structures under compressive forces. Critical buckling load. Examples of an eigenvalue problems of a structural members. Examples of analytical and numerical methods of solution to formulated eigenvalue problems.				
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 methods applying to formulation of the vibration and stability problems for diverse structural elements.	SD_W1, SD_U1, SD_K1	exam
LO2	Students know the methods of solution to an eigenvalue problems for diverse structural elements.	SD_W3, SD_U1	exam
LO3	Students are able to formulate an eigenvalue problems for the simplest structural members.	SD_W3, SD_U1, SD_U8	exam
LO4	Students are able to solve selected basic eigenvalue problems for simplest structural members.	SD_W3, SD_U1, SD_U8	exam

Student workload (in hours)	
Lecture	20
Consultations	2
The unassisted student work	20
Implementation of project tasks and preparation for and participation in exams/tests	8
Total	**50**
ECTS credits	**2**

Basic references	1. C.Y. Wang, C.M. Wang: Structural Vibration: Exact Solutions for Strings, Membranes, Beams, and Plates, CRC Press, Boca Raton, 2013. 2. J.N. Reddy: Energy Principles and Variational Methods in Applied Mechanics, 3rd Edition, John Wiley & Sons, 2017. 3. A.W. Leissa, M.S. Qatu: Vibrations of Continuous Systems, McGraw-Hill Companies, 2011. 4. C.M. Wang, C.Y. Wang, J. N Reddy: Exact Solutions for Buckling of Structural Members, CRC PRESS, 2005.
Supplementary references	1. S.S. Rao: Vibration of Continuous Systems, John Wiley & Sons, New Jersey, 2007. 2. J.N. Reddy: Theory and Analysis of Elastic Plates and Shells, CRC Press, Boca Raton, 2007.
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