



Subject card

Subject name and code	STABILITY AND LOAD CARRYING CAPACITY OF BAR STRUCTURES, PG_00044260						
Field of study	Civil Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Optional subject group		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	4	Language of instruction			Polish		
Semester of study	7	ECTS credits			2.0		
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	prof. dr hab. inż. Jarosław Górski dr inż. Mateusz Sondej					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	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	30	5.0		15.0		50
Subject objectives	The ability to assess load-carrying capacity and stability of bar structures						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W05] knows laws of mechanics used in rod constructions in scope of statics and stability, has an elementary knowledge on dynamics	The student is able to make use of a broad background of building engineering disciplines.			[SW1] Assessment of factual knowledge		
	[K6_U17] has specialized skills in civil engineering within offered specialization	.The student formulates and solves the problem in the joint field of engineering statics, stability and dynamics, with the ability to define a specified engineering problem due to a considered case			[SU1] Assessment of task fulfilment		
	[K6_K05] can work on his own and in a team to solve a problem	The student works out a selected topic covered by the subject programme, individually or in a group, to be presented during the classes.			[SK2] Assessment of progress of work		
[K6_U03] can analyze simple rod constructions in scope of: calculations of constructions statically determined and undetermined; determining of modal frequencies; calculations of linear stability and bearing capacity in critical and boundary states	The student analyses structures in the field of linear stability and post-critical structural behaviour, ranging to a structural limit state analysis			[SU1] Assessment of task fulfilment			
Subject contents	Plasticity theory - preliminaries. Constitutive laws for materials. Limit load-carrying capacity of cross-sections and bar structures. Cross-sectional force interaction. Limit states of beams and frames. Upper and lower limit load theorems. Limit load determination. Stability theory - preliminaries. Kinematic and static stability criteria. Global and local stability loss. Energetic method. Approximate methods: Rayleigh, Timoshenko, Rayleigh-Ritz, Galerkin methods. Imperfections vs stability loss. Stability of bar structures. Codes of practice related to stability and limit loads of bar structures.						
Prerequisites and co-requisites	Structural Mechanics Strength of Materials						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		two tests	60.0%
Recommended reading	Basic literature	Skrzypek J.: Plastyczność i pełzanie. Teoria, zastosowania, zadania. PWN Warszawa 1986. Thompson J. M. T., Hunt G. W.: A General Theory of Elastic Stability. Wiley&Sons, 1973 Timoshenko S. P., Gere J. M.: Teoria stateczności sprężystej. Arkady, 1963 Waszczyszyn Z., Cichoń C., Radwańska M.: Stability of structures by finite element methods. Elsevier, Amsterdam, 1994 Weiss G., Giżejowski M., Stateczność konstrukcji metalowych układy prętowe. Warszawa Arkady 1991 Pignataro M, Rizzi N., Luongo A., Stability, bifurcation and postcritical behaviour of elastic structures, Elsevier 1991	
	Supplementary literature	no items	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Determination of limit loads for given bar structures, pre-assuming dominant cross-sectional forces and their impact. Determine and analyse equilibrium paths for given single-DOF systems. Determine buckling loads and modes for given 2DOF systems.		
Work placement	Not applicable		