



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 2021		Academic year of realisation of subject		2024/2025		
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						
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_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		
	[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_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_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		
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%		100.0%		

Recommended reading	Basic literature	<p>Skrzypek J.: Plastyczność i pełzanie. Teoria, zastosowania, zadania. PWN Warszawa 1986.</p> <p>Thompson J. M. T., Hunt G. W.: A General Theory of Elastic Stability. Wiley&Sons, 1973</p> <p>Timoshenko S. P., Gere J. M.: Teoria stateczności sprężystej. Arkady, 1963</p> <p>Waszczyszyn Z., Cichoń C., Radwańska M.: Stability of structures by finite element methods. Elsevier, Amsterdam, 1994</p> <p>Weiss G., Giżejowski M., Stateczność konstrukcji metalowych układy prętowe. Warszawa Arkady 1991</p> <p>Pignataro M, Rizzi N., Luongo A., Stability, bifurcation and postcritical behaviour of elastic structures, Elsevier 1991</p>
	Supplementary literature	no items
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>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.</p>	
Work placement	Not applicable	

Document generated electronically. Does not require a seal or signature.