

## 表 GDAŃSK UNIVERSITY OF TECHNOLOGY

## 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	Subject supervisor		prof. dr hab. inż. Jarosław Górski						
of lecturer (lecturers)	Teachers		prof. dr hab. inż. Jarosław Górski						
			dr inż. Mateusz Sondej						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	boratory Project		Seminar	SUM	
of instruction	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 classes includ plan	n didactic ed in study	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 knowlege 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	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	two tests	60.0%	100.0%			
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					