



Subject card

Subject name and code	, PG_00069723						
Field of study	Stateczność i nośność graniczna konstrukcji prętowych B						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2025/2026		
Education level	first-cycle studies		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		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Structural Mechanics -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Mateusz Sondej				
	Teachers		prof. dr hab. inż. Jarosław Górski				
			dr inż. Mateusz Sondej				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	5.0	0.0	10.0	0.0	0.0	15
	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	15		0.0		0.0	15
Subject objectives	The ability to assess load-carrying capacity and stability of bar structures						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_K01] Is aware of the key aspects of professional, ethical and social responsibility related to management, business operation, decision making and opinion formulation in civil engineering.		The student understands the risks associated with the loss of structural stability.		[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce		
	[K6_U07] Design and build engineering structures in a sustainable manner, with care for the natural environment and a minimum carbon footprint		The student is able to economically design building structures while respecting the principles of sustainable construction.		[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu		
	[K6_U06] Conduct engineering activities in civil engineering subject area, using and applying practical knowledge and understanding of materials, equipment and tools, processes and technologies.		The student performs tasks related to the stability of structures during laboratory classes.		[SU4] Ocena umiejętności korzystania z metod i narzędzi		
	[K6_W07] Understand the investment's impact on the environment and the interrelationships and dependencies between the building structure and the natural environment		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		[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym		
	[K6_W06] Demonstrates practical knowledge and understanding of materials, devices and tools, processes and technologies in the field of civil engineering (and their limitations).		The student is able to make use of a broad background of building engineering disciplines.		[SW1] Ocena wiedzy faktograficznej		

Subject contents	Course content – lecture Course content lecture 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. Course content – laboratory Linear buckling analysis. Calculation of critical force and buckling length. Determination of static equilibrium paths. Determination of the system's ultimate load. Design of compression members according to PN-EN 1993-1-1.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		50.0%	50.0%
		50.0%	50.0%
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	
	Supplementary literature	Pignataro M, Rizzi N., Luongo A., Stability, bifurcation and postcritical behaviour of elastic structures, Elsevier 1991	
	eResources addresses		
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. For a given beam (column), draw diagrams of compressed bars that allow for a quick estimation of the critical force range using Euler's formulas.		
Practical activities within the subject	Not applicable		

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