GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00069721		
Field of study	Stateczność i nośność graniczna konstrukcji prętowych A		
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	2.0
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	20.0	0.0	0.0	25

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30735

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	25	0.0	0.0	25

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

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Plasticity theory - preliminaries. Constitutive laws for materials. Limit load-carrying capacity of cross-sectionsand bar structures. Cross-sectional force interaction. Limit states of beams and frames. Upper and lowerlimit load theorems. Limit load determination. Stability theory - preliminaries. Kinematic and static stabilitycriteria. 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 practicerelated 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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory colloquium</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Colloquium from the lecture</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Pignataro M, Rizzi N., Luongo A., Stability, bifurcation and postcritical behaviour of elastic structures, Elsevier 1991</td></tr>
<tr><td>Supplementary literature</td><td>Pignataro M, Rizzi N., Luongo A., Stability, bifurcation and postcritical behaviour of elastic structures, Elsevier 1991</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>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.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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