GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00071234		
Field of study	Civil Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	8.0
Learning profile	general academic profile	Assessment form	exam
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 hab. inż. Agnieszka Tomaszewska	
	Teachers	dr inż. Katarzyna Szepietowska mgr inż. Łukasz Żmuda-Trzebiatowski dr inż. Marek Skowronek dr inż. Magdalena Oziębło dr inż. Anna Pestka dr hab. inż. Agnieszka Tomaszewska	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	58.0	0.0	2.0	0.0	90
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=47605						

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	90	10.0	100.0	200

Subject objectives	
	Understanding the behaviour of statically determinate bar structures and preparing their static diagrams; identifying statically determinate and indeterminate structures. The ability to determine internal forces in statically determinate bar systems and to construct influence lines and envelopes for their static quantities. Using influence lines in the design of building structures.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] Demonstrate knowledge and understanding of the processes and established methods of analysis / solution of engineering issues & problems in the field of civil engineering and of their limitations.	Acquiring and mastering, at a basic level, the concepts and principles of classical mechanics. Understanding the principles of creating static diagrams. Examining static determinacy and geometric stability. Determining the degree of structural redundancy.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U01] Apply knowledge and understanding of mathematics as well as sciences and engineering disciplines underlying civil engineering to solve engineering problems and issues.	Formulating equilibrium equations and determining support reactions. Ability to derive equations and diagrams of internal forces, as well as influence lines and envelopes, for planar statically determinate frame and truss systems. Using influence lines to analyse extreme loading conditions in structural systems.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K6_U02] Analyse & solve engineering issues & problems in the field of civil engineering by applying appropriate and relevant established analytical, numerical and experimental methods.	The student is able to perform a static analysis of a given statically determinate system under a specified load. The student can draw influence lines for selected static quantities in the system and use them to identify the most unfavorable combination of a given type of load	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K6_U05] Conducts research (obtaining information, simulations, experimental methods) in the field of construction in order to solve specific tasks and report research results.	Experimental investigations using simple physical models of structural systems. Improving skills in structural analysis with the use of the computer application “In Search of Balance”.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K6_W06] Demonstrates practical knowledge and understanding of materials, devices and tools, processes and technologies in the field of civil engineering (and their limitations).	Analysis of the structural configuration of constructions, support schemes, and the types of loads acting on building structures.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

Basic concepts. Statics of material systems: degrees of freedom and internal forces, the role of structural mechanics in structural analysis, classical assumptions of structural mechanics, classification of structural systems, types of actions, static determinacy and kinematic configuration of planar bar systems. Reactions and internal forces in simple beams. Differential relationships. Hinged continuous beams. Indirect loads. Frames. Internal forces in curved beams. Differential relationships. Arches. Threehinged systems. Lines of thrust. Trusses. Compound systems. Influence lines for simple beams. Loading of influence lines. Influence lines for hinged continuous beams, frames, and arches. Influence lines for trusses, compound, and mixed systems. Extreme loading of influence lines. Envelopes of bending moments. Planar broken girders. Spatial trusses. Grillage structures.

Course content – exercises

Tasks include determining reactions and internal forces in simple beams, hinged continuous beams, frames, arches, trusses, compound and mixed structural systems, planar broken girders, grillage structures, and spatial trusses. The course covers the construction of influence lines for simple beams, hinged continuous beams, frames, trusses, and compound systems, as well as the analysis of extreme loading of influence lines and the development of internal force envelopes.

Course content – project

Independent creation of planar beam and frame systems with the use of appropriately selected structural elements, along with the analysis of their mechanical performance.

Prerequisites and co-requisites

Basic elements of algebra and vector analysis, differential relationships, and integral calculus.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written examination	60.0%	100.0%

Recommended reading	Basic literature	1. Branicki C. (red.) Zadania z mechaniki budowli. t.1, skrypt PG (dostępny jako zbiór w formacie PDF na portalu e-nauczanie PG). 2. Chudzikiewicz A.: Statyka budowli. t.1 Układy statycznie wyznaczalne. PWN Warszawa 1976. 3. Cywiński Z., Mechanika budowli w zadaniach. t. I. PWN Warszawa 1999. 4. Lubowiecka I., Skowronek M.: Zadania z Mechaniki Budowli. Gdańsk 2000 (dostępny jako zbiór w formacie PDF na portalu e-nauczanie PG). 5. Przewłócki J., Górski J.: Podstawy mechaniki budowli, Arkady Warszawa 2009 6. Skowronek M., Górski J., Kreja I., Smakosz Ł: Zbiór zadań egzaminacyjnych z mechaniki ogólnej - statycznie wyznaczalne układy prętowe, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2022.
	Supplementary literature	*Konopińska-Zmysłowska V., Mleczek A., Oziębło M., Tomaszewska A., Wybrane problemy mechaniki układów prętowych. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2016*
	eResources addresses	
Example issues/ example questions/ tasks being completed	Determining the degree of static indeterminacy of a structural system. Determining support reactions in a given statically determinate system. Constructing internal force diagrams for a given statically determinate system. Constructing the influence line of a selected static quantity for a given statically determinate system.	
Practical activites within the subject	Not applicable	

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