GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Structural Design and Mechanics II, PG_00061520		
Field of study	Architecture		
Date of commencement of studies	October 2024	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	2	Language of instruction	English
Semester of study	3	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department Of Technical Fundamentals Of Architectural Design -> Faculty Of Architecture -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	mgr inż. Tomasz Zybała	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	30.0	0.0	0.0	0.0	45

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	45	6.0	24.0	75

Subject objectives

Deepening the student's knowledge in the field of structural mechanics necessary to understand the subjectsscope of building construction. Ability to identify strength cases. Dimensioningcross-sections of bars due to strength and stiffness conditions.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] knows and understands construction problems, building and engineering issues related to building design; principles, solutions, constructions and building materials used in simple engineering tasks in the field of architectural and urban design	knows and understands the mechanics and statics of buildings to the extent necessary to formulate and solve tasks in the area of architectural design; understands the principles of designing architectural objects depending on the static scheme of the structure and the method of loading it; acquires knowledge necessary to understand others technical subjects, such like general construction or lined construction installations in subsequent semesters, needed to be independent application within the scope of powers received by the architect.	[SW1] Assessment of factual knowledge
[K6_U01] is able to use the experience gained during studies to critically analyze the conditions and formulate conclusions for design in an interdisciplinary context	is able to develop solutions for individual structures and building elements in terms of construction; understands the rules object design architectural depending from the static diagram structure and its method load. Student determines cross-sections and spans structural elements for design needs architectural.	[SU4] Assessment of ability to use methods and tools

Subject contents	LECTURES: State of stress, extreme stress values, Mohr's circle. Relationships between stresses andinternal forces. Deformation state. Relationships between stresses and strains. Dimensioningstructures: dimensioning conditions, structure design methods. Axial tension and compression.Connections of structural elements, technical shear. Geometric characteristics of plane figures:static moments and center of gravity, moments of inertia of plane figures, main axes and momentsinertia. Straight bending, diagonal bending, shear bending, complex beams. Free turning.Compression - eccentric tension, core section. Deflection line of bending beams - Euler's equation.Stability of rod systems. Ultimate load capacity of rod systems (axial tension-compressionbars, bent bars). Static and kinematic analysis of bar systems. The principle of virtual work.Displacements of bar systems. Statically indeterminate rod systems - force method. Layoutsrods with a symmetrical structure: symmetrical and asymmetrical loads. EXERCISES: Stretching,axial compression. Connections of structural elements. Technical shearing. Static moments iinertia, strength index. Straight bending. Diagonal bending. Bending with shear. Squeezingeccentric. Cross section core. Euler's method. Displacements (principle of virtual work). Method of forces insimple statically indeterminate systems. Ultimate load capacity.
Prerequisites and co-requisites	Basic elements of algebra and vector analysis, differential relations and integral calculus.Ability to determine internal forces in simple, statically determinate bar systems.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Two tests (1.5 hours each) and a written exam of 1 hour, written exam (1 hour)	55.0%	100.0%

Recommended reading

Basic literature	Kolendowicz T.: Mechanika budowli dla architektów. Arkady,Warszawa, 1993.Przewłócki J., Górski J.: Podstawy mechaniki budowli. Arkady,Warszawa, 2012.
Supplementary literature	Bielewicz E.: Wytrzymałość materiałów. Wyd. P.G., Gdańsk, 2006.Pyrak S., Szulborski K.: Mechanika konstrukcji. Przykłady obliczeń.Arkady, Warszawa, 2001.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Determine normal and tangential stress graphs in the most unfavorable cross-section.Determine the ultimate load (in the plastic range) for the simply supported beam.Sketch the distribution of normal stresses in the base of a column compressed eccentrically by force P.
Work placement	Not applicable