



Subject card

Subject name and code		Structural Design and Mechanics II, PG_00061520						
Field of study		Architecture						
Date of commencement of studies		October 2026	Academic year of realisation of subject			2027/2028		
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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)		Subject supervisor		mgr inż. Tomasz Zybala				
		Teachers						
Lesson types		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_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		
		[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		

Subject contents	<p>Course content – lecture</p> <p>LECTURES: State of stress, extreme stress values, Mohr's circle. Relationships between stresses and internal forces. Deformation state. Relationships between stresses and strains. Dimensioning structures: 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 moments of inertia. 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-compression bars, bent bars). Static and kinematic analysis of bar systems. The principle of virtual work. Displacements of bar systems. Statically indeterminate rod systems - force method. Layouts of rods with a symmetrical structure: symmetrical and asymmetrical loads. EXERCISES: Stretching, axial compression. Connections of structural elements. Technical shearing. Static moments of inertia, strength index. Straight bending. Diagonal bending. Bending with shear. Squeezing eccentric. Cross section core. Euler's method. Displacements (principle of virtual work). Method of forces in simple statically indeterminate systems. Ultimate load capacity.</p>								
Prerequisites and co-requisites	<p>Basic elements of algebra and vector analysis, differential relations and integral calculus. Ability to determine internal forces in simple, statically determinate bar systems.</p>								
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 916 794 943">Subject passing criteria</th> <th data-bbox="799 916 1141 943">Passing threshold</th> <th data-bbox="1145 916 1493 943">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 949 794 1019">Two tests (1.5 hours each) and a written exam of 1 hour, written exam (1 hour)</td> <td data-bbox="799 949 1141 1019">55.0%</td> <td data-bbox="1145 949 1493 1019">100.0%</td> </tr> </tbody> </table>			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%
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Recommended reading	<p>Basic literature</p>	<p>Kolendowicz T.: Mechanika budowlania dla architektów. Arkady, Warszawa, 1993. Przewłócki J., Górski J.: Podstawy mechaniki budowlania. Arkady, Warszawa, 2012.</p>							
	<p>Supplementary literature</p>	<p>Bielewicz E.: Wytrzymałość materiałów. Wyd. P.G., Gdańsk, 2006. Pyrak S., Szulborski K.: Mechanika konstrukcji. Przykłady obliczeń. Arkady, Warszawa, 2001.</p>							
	<p>eResources addresses</p>								
Example issues/ example questions/ tasks being completed	<p>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.</p>								
Practical activities within the subject	<p>Not applicable</p>								