



Subject card

Subject name and code	Structural Design and Mechanics II, PG_00061520						
Field of study	Architecture						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2024/2025		
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 Architecture Design -> Faculty of Architecture						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr inż. Tomasz Zybala				
	Teachers		mgr inż. Tomasz Zybala				
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		The student 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		The student 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 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.		
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. Przewłocki 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 eNauczenie:	
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		