GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Structural Design And Mechanics II, PG_00055581		
Field of study	Architecture		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
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	prof. dr hab. inż. Jarosław Przewłócki	
	Teachers	prof. dr hab. inż. Jarosław Przewłócki mgr inż. Tomasz Zybała dr inż. arch. Michał Kwasek	

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

Expanding the student's knowledge of building mechanics necessary to understand objects in the field of building construction. The ability to identify cases of material strength. Dimensioning of bar cross-sections in terms of 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 understands the principles of designing architectural objects depending on the static scheme of the structure and the way it is loaded. The student determines the cross-sections and spans of structural elements for the needs of architectural design.	[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 acquires the knowledge necessary to understand other technical subjects, such as general construction or construction installations, needed for independent use in the field of qualifications obtained by an architect.	[SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>LECTURES: Stress state, extreme stress values, Mohr's circle. Relationships between stresses and internal forces. State of deformation. Relations between stresses and strains. Dimensioning construction: dimensioning conditions, construction design methods. Axial stretching and compression. Connections of structural elements, technical shear. Geometric characteristics of flat figures: static moments and center of gravity, moments of inertia of plane figures, principal axes and moments inertia. Simple bending, diagonal bending, bending with shear, complex beams. Free twisting. Compression - eccentric tension, cross-section core. Deflection line of bending beams - Euler's equation. Stability of bar systems. Limit load capacity of bar systems (axial tension-compression bars, bent bars). Static and kinematic analysis of bar systems. The principle of virtual work. Displacements of rod systems. Statically indeterminate bar systems - force method. Layouts bar with symmetrical structure: symmetrical and asymmetrical load.

CLASSES: Stretching, axial compression. Connections of structural elements. Technical shear. Static moments and inertia, strength index. Simple bending. Diagonal bending. Shear bending. Squeezing eccentric. Cross section core. Euler's method. Displacements (the principle of virtual work). Force method in simple statically indeterminate systems. Ultimate load capacity.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic elements of algebra and vector analysis, differential dependence and calculus.The ability to determine internal forces in simple, statically determinate bar systems.</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></td><td>55.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>Kolendowicz T.: Mechanika budowli dla architektów. Arkady, Warszawa, 1993.
Przewłócki J., Górski J.: Podstawy mechaniki budowli. Arkady, Warszawa, 2012.</td></tr><tr><td>Supplementary literature</td><td>Bielewicz E.: Wytrzymałość materiałów. Wyd. P.G., Gdańsk, 2006.
Pyrak S., Szulborski K.: Mechanika konstrukcji. Przykłady obliczeń. Arkady, Warszawa, 2001.</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Determine the diagrams of normal and tangential stresses in the cross-section. Determine the limit load (in the plastic range) for a simply supported beam. Sketch the normal stress distribution in the base of a column under compression by force P.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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