

## SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

## Subject card

Subject name and code	Strength of Materials, PG_00044376								
Field of study	Civil Engineering								
Date of commencement of studies	October 2022		Academic year of realisation of subject			2023/2024			
Education level	first-cycle studies		Subject group						
Mode of study	Part-time studies		Mode of delivery			at the university			
Year of study	2		Language of instruction			Polish			
Semester of study	3		ECTS credits			8.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering								
Name and surname	Subject supervisor		dr inż. Tomasz Ferenc						
of lecturer (lecturers)	Teachers		mgr inż. Błażej Meronk						
			dr inż. Tomasz Ferenc						
			dr inż. Marek	Jasina					
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	30.0	10.0	10.0	10.0		0.0	60	
	E-learning hours inclu	-learning hours included: 0.0							
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study		SUM	
	Number of study hours	60		7.0		133.0		200	
Subject objectives	Determination of stresses, strains and deflections in bar elements Identification of the problems of Strength of Materials Analysis of complex stress states Stability analysis of structural elements Assessment of imit load-carrying capacity of cross-sections of bar elements.								
Learning outcomes	Course out	come	Subject outcome Method of verification						
Subject contents	Assumptions and the scope of Strength of Materials (SM). Stress and strain - definitions. Plane stress and plane strain. Three-dimensional stress and strain state. Hookes law (constitutive relations). Boundary problem of linear elasticity theory. Classification of problems of Strength of Materials. Axial tension (compression), statically indeterminate cases, stress concentration. Results of laboratory tests of materials 1 tension/compression. Geometrical parameters of cross-sections. Uniaxial and biaxial bending. Bending with tension/compression, core of the cross-section, eccentric compression with the tension zone excluded. Free torsion of rods. Circular and rectangular cross-sections. Open thin-walled cross-sections, closed thin-walled cross-sections, shear centre (bending centre). Compound and multiple beams. Composite beams tension/ compression, bending. Deflection line of a beam. Eulers equation, integration methods. Moment-area method (Mohrs method). Redundant cases. Potential energy of elastic strain. Clapeyrons theorem. Unit energy of elastic strain (shear, compression, bending, torsion). Castiglianos theorems calculating deflections (beams, frames, trusses), graphical integration. Stability of beams. Elastic and inelastic buckling. Design of axially compressed beams. Beams on elastic foundation, Winklers hypothesis. Strength criteria, eqiuvalent stresses. Elements of plasticity theory. Material models. Limit load-carrying capacity of a cross-section (axial tension/compression, bending, tension/compression with bending). Plasticity zones of a beam. Cables. Stresses perpendicular to the beams axis under bending. Curvilinear beams, temsion/compression, bending. Tension/compression, bending. Tension/compression, bending. Tension/compression, bending. Curvilinear beams, temsion/compression, bending. Tension/compression, bending. Curvilinear beams, temsion/compression, bending. Tension/compression, bending. Curvilinear beams, temsion/compression, bending. Elements of rheology, time-dependent material models								
Prerequisites and co-requisites	Mechanics of Structures - determination of diagrams of internal forces in beam, frame and truss systems								
	Mathematics - basics of matrix calculus								
	Privatics - the basics of the theory of elasticity								

Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade		
and criteria	project	60.0%	20.0%		
	laboratory	60.0%	10.0%		
	test	60.0%	20.0%		
	exam	60.0%	50.0%		
Recommended reading	Basic literature	<ol> <li>Bielewicz E. WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Jastrzębski, Mutermilch, Orłowski WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Jakubowicz, Orłoś WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Orłowski, Słowiański WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Orłowski, Słowiański WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Zakrzewski, Zawadzki WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Rżysko J. STATYKA I WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Rżysko J. STATYKA I WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Piechnik S. WYTRZYM. MAT. DLA WYDZ.BUDOWLAN.</li> <li>Więckowski J. WYTRZYMAŁOŚĆ MATERIAŁÓW Przykłady i teoria.</li> <li>Piskorski, Trębacki ZBIÓR ZADAŃ Z WYTRZ. MATER.</li> <li>Łączkowski R. WYTRZYMAŁOŚĆ MATERIAŁÓW</li> <li>Praca zbiorowa prac. KMBiM, red. Czesław Szymczak ZBIÓR ZADAŃ Z WYTRZYMAŁOŚCI MATERIAŁÓW</li> </ol>			
	Supplementary literature no items				
	eResources addresses Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	Calculation tasks in the field of: - determination of principal stresses, Hooke's law - load capacity of bolted connections - stability of the axially compressed rod Theoretical tasks in the field of: - the concepts of stress and strain - geometrical characteristics of flat figures - linear and poplinear analyzes, orders of structure theopy				
Work placement	Not applicable				