

## SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

## Subject card

Subject name and code	Theory of elasticity and plasticity, PG_00042222								
Field of study	Civil Engineering								
Date of commencement of studies	February 2023		Academic year of realisation of subject			2022/2023			
Education level	second-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	1		Language of instruction			English			
Semester of study	1		ECTS credits			5.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Structural Mechanics Department -> Faculty of Civil and Environmental Engineering								
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Roger Sauer						
	Teachers	dr inż. Roger Sauer							
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study hours	30.0	30.0	0.0	0.0		0.0	60	
	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	60		5.0		60.0		125	
Subject objectives	Characterization of the kinematics, balance laws and material behavior of 3D continua. Determination of stresses, strains and deflections in elastic bodies, including plane strain & stress. Distinction between elastic and inelastic material behavior. Determination of safety reserves due to plasticity in 2D and 3D stress states								

Subject contents         IKT_U03] has knowledge of Continuum Mechanics, know and dynamics of complex rod, shell and volume situctures, both in linear and basic nonlinear regime         The student understands problems of solid mechanics in the student design         [SW1] Assessment of factual knowledge           IKT_U06] is able to choose proper tools (measuring, analysical or numerical) to solve engineering problems, to acquire, fittrate, proces and analyse data         The student selects the structural design         [SU1] Assessment of task fulliment           IKT_U06] is able to choose proper tools (measuring, analyse data         The student selects the structural design         [SU1] Assessment of task fulliment           IKT_U06] is able to choose proper tools (measuring, analyse data         The student understands problems of solid mechanics in the structural design         [SU1] Assessment of task fulliment           IKT_U06] as any endowed strength of materials, nowledge of fundamentals of Finite Element Method and general nonlinear analysis of angineering constructions and systems         The student formulates and solves problems of solid mechanics in the statical and dynamical analysis of engineering constructions and systems         [SU1] Assessment of task traitical and dynamical analysis problem, and identifies practical applications in the statical and dynamical analysis of engineering constructions and systems           Subject contents         Preliminaries. Assumptions and scope of theory of elasticity. Tensor calculus, Cartesian tensors, lensor aftering tensors, compatibility conditions. Stress state, Cauchy stress tensor. Balance principles in the theory of elasticity, groups of equations in the theory of elasticity. Constitutive	Learning outcomes	Course outcome	Subject outcome	Method of verification				
books (measuring, analytical or numerical) to solve engineering problems, to acquire, fittale, proces and naisyes data decording to the problem         fulliment           IV7_WO(4) has knowledge on advanced strength of materials, modeling and optimisation of the numerical to solve engineering on solution of the solution method engineering constructions and systems         The student understands problems of solid mechanics in the subject range         [SW1] Assessment of factual modeling and optimisation of the numerical solves of engineering constructions and systems         [SW1] Assessment of factual modeling of numerical solves problems of solid mechanics in the subject range, and identifies practical applectations in the theory of elasticity. Constitutive laws, linearly elastic material, generalized           Subject contents         Preliminaries and shells)         Preliminaries on weak formulation. Theory of thin elastic plates, kinematic assumptions, stresses and plane stress. Compatibility conditions. Riceas static, caunty stress tensor. Balance principles in the theory of elasticity, crower apple obundary conditions, rectangular and circular plates examples, plate strips. Elements theory of platelio.           Prerequisites         Structural Mechanics Strength of Materials         Structural Mechanics Strength of Materials. Policennis assumptions ara		[K7_W03] has knowledge of Continuum Mechanics, knows rules of static analysis, stability and dynamics of complex rod, shell and volume structures, both in linear and basic nonlinear	The student understands problems of solid mechanics in the subject range, and is able to connect solid mechanics to the practical engineering problems in	[SW1] Assessment of factual				
six-vanced strength of materials, modeling and optimisation of materials and constructions; his knowledge of fundamentials of engineering constructions and general nonlinear analysis of engineering constructions and systems         replayers of solid mechanics in the subject range         incoviedge           IVE_7_0031 can perform classic statical and dynamical analysis of rod structures stability (trusses, well as surface structures (plates, well as surface structures (plates, structural tensors, compatibility conditions. Stress state, Cauchy stress tensor. Balene principles in the theory of log of		tools (measuring, analytical or numerical) to solve engineering problems, to acquire, filtrate,	appropriate solution method					
statical and dynamical analysis of rod structures stability (trusses, frames and tes), both statically determined and undetermined as well as surface structures (plates, membranes and shells)         problems of solid mechanics in the structural engineering         initial           Subject contents         Preliminaries. Assumptions and scope of theory of elasticity. Tensor calculus, Cartesian tensors, tensor algebra, differential operators, integral theorems. Plane stress and plane strain. Ary function in plane stress, plane stress solutions in Cartesian and polar coordinates. Kinematics of continuum, deformation tensors and strain tensors, compatibility conditions. Stress state, Cauchy stress tensor. Balance principles in the theory of elasticity, groups of equations in the theory of elasticity. Constitutive laws, linearly elastic material, generalized           Preleminaries         Aume and engineering constants, hyperelastic materials. Strong from Materials           And co-requisites         Structural Mechanics           And co-requisites         Structural Mechanics           Assessment methods and criteria         Subject passing criteria         Passing threshold         Percentage of the final grade tests           Recommended reading         Basic literature         1. Holzapfel G.: Nonlinear Solid Mechanics. A continuum approach for engineers. John Wiley & Sons 2000.         2. Bielewicz E: Strength of Materials           Recommended reading         Basic literature         1. Holzapfel G.: Nonlinear Solid Mechanics. Politechnika Gdanska, Gdansk 1922.         5. Fing Y C.: Podstawy mechanik icials stalego. PWN Warszawa 1935.           Sup		advanced strength of materials, modeling and optimisation of materials and constructions; has knowledge of fundamentals of Finite Element Method and general nonlinear analysis of engineering constructions and	problems of solid mechanics in the					
algebra, differential operators, integral theorems. Plane stress and plane strain. Airy function in plane stress, plane stress solutions in Cartesian and polar coordinates. Kinematics of continuum, deformation tensors and strain tensors, compatibility conditions. Stress state, Cauchy stress tensor. Balance principles in the theory of elasticity, groups of equations in the theory of elasticity. Constitutive laws, linearly elastic material, generalized         Hookes law, Lame and engineering constants, hyperelastic materials. Strong formulation of the boundary provide intervine methods and constants, not easily provide the plane stress solutions, stresses and strains, equilibrium of a plate, boundary conditions, rectangular and circular plates examples, plate strips. Elements of theory of plasticity.         Prerequisites       Structural Mechanics         Assessment methods       Subject passing criteria         Assessment methods       Subject passing criteria         Basic literature       1. Holzapfel G: Nonlinear Solid Mechanics. A continuum approach for engineers. John Wiley & Sons 2000.         2. Bleiewicz E: Strength of Materials       3. Fung Y.C:: Podstawy mechaniki ciała stałego. PVN Warszawa, 1969.         4. Girkmann K: Dzwigary powierzchniowe. Arkady, Warszawa, 1957 (transl. R. Dagtrowski).       5. Kaęzkowski Z: Phyty boliczenia statyczne. Arkady, Warszawa, 1957.         Yuras. P. Dagtrowski).       Supplementary literature       no items         eResources addresses       Adresy na platformie eNauczanie:         Yuras. R. Dagtrowski).       5. Kaczkowski Z: Phyty boliczenia statyczne. Arkady, Warszawa, 1957. <td></td> <td>statical and dynamical analysis of rod structures stability (trusses, frames and ties), both statically determined and undetermined as well as surface structures (plates,</td> <td>problems of solid mechanics in the subject range, and identifies practical applications in the</td> <td colspan="2"></td>		statical and dynamical analysis of rod structures stability (trusses, frames and ties), both statically determined and undetermined as well as surface structures (plates,	problems of solid mechanics in the subject range, and identifies practical applications in the					
Strength of Materials         Assessment methods and co-requisites       Subject passing criteria       Passing threshold       Percentage of the final grade         Recommended reading	Subject contents	algebra, differential operators, integral theorems. Plane stress and plane strain. Airy function in plane stress, plane stress solutions in Cartesian and polar coordinates. Kinematics of continuum, deformation tensors and strain tensors, compatibility conditions. Stress state, Cauchy stress tensor. Balance principles in the theory of elasticity, groups of equations in the theory of elasticity. Constitutive laws, linearly elastic material, generalized Hookes law, Lame and engineering constants, hyperelastic materials. Strong formulation of the boundary problem, remarks on weak formulation. Theory of thin elastic plates, kinematic assumptions, stresses and strains, equilibrium of a plate, boundary conditions, rectangular and circular plates examples, plate strips. Elements of						
and criteria       tests       60.0%       100.0%         Recommended reading       Basic literature       1. Holzapfel G.: Nonlinear Solid Mechanics. A continuum approach for engineers. John Wiley & Sons 2000.       2. Bielewicz E.: Strength of Materials. Politechnika Gdańska, Gdańsk 1992.         3. Fung Y.C.: Podstawy mechaniki ciała stałego. PWN Warszawa, 1969.       4. Girkmann K.: Dźwigary powierzchniowe. Arkady, Warszawa 1957 (transl. R. Dąbrowski).         5. Kączkowski Z.: Strength of Materials.       Arkady, Warszawa 1957 (transl. R. Dąbrowski).         5. Kączkowski Z.: Odańsk 1995.       5. Kączkowski Z.: Analiza nieliniowa tarcz i płyt. Wyd. PG, Gdańsk 1995.         7. Kreja I.: Continuum Mechanics. Wydawnictwo CURE, Politechnika Gdańska, Gdańska, Gdańska, Gdańsk.       Supplementary literature         eResources addresses       Adresy na platformie eNauczanie: Theory of Elasticity and Plasticity 2023 - Moodle ID: 30283 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30283         Example issues/ example questions/ tasks being completed       Ittps://enauczanie.pg.edu.pl/moodle/course/view.php?id=30283								
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Work placement Not applicable	example questions/		-					
	Work placement	Not applicable						