GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Theory of elasticity & plasticity, PG_00072522		
Field of study	Civil Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Structural Mechanics -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jarosław Górski	
	Teachers	prof. dr hab. inż. Jarosław Górski	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	20.0	10.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=2361

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	30	3.0	42.0	75

Subject objectives

Fundamentals of 2D and 3D system analysis. Classification of governing equations of material continuum. Selected analytical methods of 2D systems. Review of yield criteria

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W01] identifies in-depth the phenomena related to the field of study and the theories describing them, indicating reliable sources of knowledge and information relevant to the issues analysed	The student can select tools (analytical or numerical) for solving engineering problems. The student has a solid understanding of methods for analyzing bar and surface systems.	[SW1] Assessment of factual knowledge
[K7_U04] prepares and presents the results of calculations, research and analysis in a coherent and logical manner, together with an in-depth interpretation	The student will have knowledge of advanced concepts in strength of materials, material modeling, and structural analysis. The student will understand the theoretical foundations of the Finite Element Method and the general principles of nonlinear calculations of engineering structures. The student will analyze limit states related to yielding. The student will solve the boundary value problem in two-dimensional (PSN) and bending plates.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Course content – lecture

Tensor algebra and analysis. Geometric and stress description of a solid body, material equations. Plate theory preliminaries. Introduction to plasticity theory. The two-dimensional problems, the Airy stress function in Cartesian and polar systems, axisymmetric cases. Plate examples - plate strip, axisymmetric cases. Safety margin in complex stress cases.

Course content – exercises

Tensor algebra and analysis. Geometric and stress description of a solid body, material equations. Plate theory preliminaries. Introduction to plasticity theory. The two-dimensional problems, the Airy stress function in Cartesian and polar systems, axisymmetric cases. Plate examples - plate strip, axisymmetric cases. Safety margin in complex stress cases.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Structural mechanics, mathematics</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>test</td><td>60.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Bielewicz E.: Wytrzymałość materiałów. Politechnika Gdańska, Gdańsk 1992 (lub inne wydania)
Fung Y.C.: Podstawy mechaniki ciała stałego. PWN Warszawa, 1969
Girkmann K.: Dźwigary powierzchniowe. Arkady, Warszawa 1957, tłumaczenie R. Dąbrowski.
Kączkowski Z.: Płyty – obliczenia statyczne. Arkady, Warszawa 1980
Kmiecik M., Wizmur M., Bielewicz E.: Analiza nieliniowa tarcz i płyt. PG, Gdańsk 1995
Kreja I.: Mechanika Ośrodków Ciągłych. Wydawnictwo CURE, Politechnika Gdańska, Gdańsk 2003.
Sawicki A.: Mechanika kontinuum, wprowadzenie. Wydawnictwo IBW PAN, Gdańsk 2004.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">no items</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">The stresses in plane stress cases and plates at bending
Equations and unknowns of elasticity problem</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
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