GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Materials strength, PG_00055053		
Field of study	Management and Production Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2022/2023
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	7.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Zakład Mechaniki Stosowanej i Biomechaniki -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Oleksii Nosko	
	Teachers	dr inż. Alicja Stanisławska dr hab. inż. Oleksii Nosko	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	15.0	0.0	0.0	75
	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	75	14.0	86.0	175

Subject objectives	The course provides students with knowledge of the basic terms, assumptions, principles and methods of Strength of Materials. Problems of tension, compression, torsion, bending and combined loading are systematically considered. The main emphasis is on the development of skills to efficiently schematise, solve and analyse typical problems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K03] is aware of the social role of a graduate of a technical university, understands the importance of non-technical aspects and effects of engineering activities including their impact on the environment and responsibility for decisions, sees the need to formulate and provide the public with information and opinions on the achievements of technology, correctly identifies and resolves dilemmas associated with thejob of an engineer	Ability to formulate the strength problem and choose the methods that should be used to solve this problem	[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
[K6_W02] has knowledge of materials, their properties and research methods, including construction materials used in the machinery industry, has ordered, theoretically founded knowledge of mechanics including modeling of mechanical systems in the field of statics, kinematics and dynamics, and has an ordered, theoretically founded knowledge in the field of strength analysis materials and products	Ability to apply the knowledge on strength of materials to perform strength analysis of mechanical systems	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_U01] can find the necessary information in professional literature, databases and other sources, knows basic scientific and technical journals in the field of production management, quality and operation management, can integrate the obtained information, formulate conclusions and justify opinions	Ability to apply the knowledge on strength of materials to solve problems of management	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents

LECTURES / PRACTICAL CLASSES

Introduction. Geometry of cross sections. Static moments and centroid. Moments of inertia. Principal moments of inertia. Tension and compression. Stresses in an axially loaded bar. Displacements in an axially loaded bar. Stresses in a pin-joint truss. Bar systems with a rigid element. Torsion. Torsion of a circular shaft. Bending stresses. Bending moments in a beam. Stresses in a beam. Bending deflections. Deflections and slopes in a beam. Single degree statically indeterminate beams. Combined loading. Combined loading of a cross section. Bending stresses in a plane frame. Strength theories. Equivalent stress. Stresses in a frame.

LABORATORY CLASSES

Static tension and compression tests. Tension test of a metal sample: determination of the elastic modulus, elastic limit and yield point. Investigation of hardness of a metal sample. Torsion test of a metal sample: determination of the shear elastic modulus. Investigation of the beam deflection. Impact strength test of a metal sample. Impact tension test of a metal sample.

Prerequisites and co-requisites

Basics of elementary and linear algebra, geometry, trigonometry, vector calculus, differential calculus, integral calculus, mechanics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exam	50.0%	40.0%
Laboratory classes	50.0%	20.0%
Practical classes	50.0%	40.0%

Recommended reading	Basic literature	J.M. Gere, B.J. Goodno, Mechanics of Materials: Brief Edition, Cengage Learning, 2012. A. Pytel, J. Kiusalaas, Mechanics of Materials, 2nd ed., Cengage Learning, 2012. A. Jakubowicz, Z. Orłoś, Wytrzymałość materiałów, 5 wyd., WTN, 1978. M. Banasiak, K. Grossman, M. Trombski, Zbiór zadań z wytrzymałości materiałów, 2 wyd., PWN, 1998.
	Supplementary literature	W.A. Nash, M.C. Potter, Schaums Outlines: Strength of Materials, 5th ed., McGraw-Hill, 2011. S. Timoshenko, Strength of Materials, 2nd ed., D. Van Nostrand Company, 1940. A.P. Boresi et al., Advanced Mechanics of Materials, 5th ed., John Wiley & Sons, 1993. V.D. da Silva, Mechanics and Strength of Materials, Springer, 2006.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	