GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Strength of Materials, PG_00055746		
Field of study	Mechanical and Medical 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	8.0
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	mgr inż. Katarzyna Pytka dr hab. inż. Oleksii Nosko	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	45.0	30.0	15.0	0.0	0.0	90

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	90	10.0	100.0	200

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. Advanced problems related to static indeterminacy, buckling instability and elastoplastic behaviour are also treated. 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_U05] he/she is able to use analytic and modelling methods to formulate and solve engineering tasks related to the mechanical-medical area	Ability to perform the strength analysis of the basic problems related to the mechanical and medical engineering.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K6_W05] he/she has skills in the field mechanics od rigid body, modelling of mechanical system, vibration and fundamental of strength of materials	Ability to perform the strength analysis of a bar subjected to tension or compression, torsion, bending; ability to analyse the stress state in a bar subjected to combined loading; ability to apply the energy methods.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>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. Energy theorems. Force method. Stability of bars. Elastoplastic behaviour.

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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basics of elementary and linear algebra, geometry, trigonometry, vector calculus, differential calculus, integral calculus, mechanics.</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>Laboratory classes</td><td>50.0%</td><td>20.0%</td></tr>
<tr><td>Exam</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>Practical classes</td><td>50.0%</td><td>40.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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.</td></tr>
<tr><td>Supplementary literature</td><td>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.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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