GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Strength of Materials I, PG_00055150		
Field of study	Mechanical Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
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	English
Semester of study	3	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Wiktoria Wojnicz	
	Teachers	dr hab. inż. Wiktoria Wojnicz mgr inż. Grzegorz Banaszek	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	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	8.0	57.0	125

Subject objectives

The aim of the subject is to present the fundamentals of strength of materials and methods used to conduct strength of materials calculations

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W05	The student can design the simple mechanical systems and conduct mechanical analysis of these systems	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
K6_U06	The student can analysis a behaviour of mechanical systems	[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
K6_U01	A student can use methods strength of materials methods to solve engineering problems	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information

Subject contents	**Lectures** 1. Fundamentals of Strength of Materials. Area moments of inertia. 2. Axial load: statically determinate problems of bars and systems of bars. 3. Axial load: statically indeterminate problems of bars and systems of bars. Thermal stress and mounting stress. 4. Torsion load: statically determinate problems of shafts, driving shafts, statically indeterminate problems shafts. 5. Bending of beams: determination of shear forces and bending moments. 6. Deflection of beam (method of initial parameters (Clebsch's method)). Statically determinate problems and statically indeterminate problems. 7. Determination of internal forces in planar frames. 8. Determination of geometrical parameters of axial loaded bars (systems of bars), torsion loaded shafts driving shafts and bending beams (normal and shear stresses). 9. Planar state of stress. Mohr's circle of planar state of stress. 10. Energy theorems for statically determinate problems (beams, frames, system of bars). Castigliano's theorem. 11. Energy theorems for statically determinate problems (beams, frames, system of bars). Maxwella-Mohr's method. 12. Energy theorems for statically indeterminate problems (beams, frames). Menabrea-Castigliano's method. 13. Complex loading problems. **Tutorials** 1. Area moments of inertia. 2. Axial load: statically determinate problems of bars and systems of bars. Axial load: statically indeterminate problems of bars and systems of bars. 3. Torsion load: statically determinate problems of shafts and statically indeterminate problems of shafts. 4. Bending of beams: determination of shear forces and bending moments. 5. Deflection of beam (method of initial parameters (Clebsch's method). Statically determinate problems and statically indeterminate problems. 6. Determination of geometrical parameters of axial loaded bars (systems of bars), torsion loaded shafts and driving shafts, beams (normal and shear stresses).

	7. Planar state of stress. Mohr’s circle of planar state of stress. 8. Energy theorems for statically determinate problems (beams, frames, system of bars). Castigliano’s theorem. 9. Energy theorems for statically determinate problems (beams, frames, system of bars). Maxwella-Mohr’s method. 10. Energy theorems for statically indeterminate problems (beams, frames, system of bars). Menabrea-Castigliano’s method. 12. Test 1 13. Test 2 13. Repeat test
Prerequisites and co-requisites	Knowledge form the Mechanics (Theoretical Mechanics) field
Assessment methods and criteria	Subject passing criteria: tutorials' tests passing — Passing threshold: 56.0% — Percentage of the final grade: 50.0% Subject passing criteria: lectures' test passing — Passing threshold: 56.0% — Percentage of the final grade: 50.0%
Recommended reading	Basic literature: 1. Muvdi B.B., McNabb J.W.: Engineering Mechanics of Materials. Third edition. Springer-Verlag 1991. 2. Da Silva, Vitor Dias: Mechanics and Strength of Materials. Springer 2006. 3. Timoshenko S.: Strength of Materials. Part I. Elementary Theory and Problems. USA 1940. 4. Timoshenko S.: Strength of Materials. Part II. Advanced Theory and Problems. USA 1940. Supplementary literature: Literature from the "Strength of Materials" field eResources addresses:
Example issues/ example questions/ tasks being completed	1.Analysis a behaviour of the given mechanical system 2. Determine internal forces in the beam constrained and subjected to the application of one concentrated force and load with linear intensity distribution
Work placement	Not applicable