GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mechanics and Strength of Materials , PG_00047788		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
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	4	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Structural Mechanics Department -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Karol Winkelmann	
	Teachers	dr inż. Karol Winkelmann	

Lesson types and methods of instruction

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

Students should be able to: construct static schemes; write equilibrium equations and calculate reactions; determinate internal forces; draw diagrams of stress for beams under compression and bending conditions.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] Knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	Knowledge of basic issues and rules of clasical mechanics;	[SW1] Assessment of factual knowledge
[K6_U52] can determine properties of materials and biomaterials used in biomedical engineering	At the conclusion of the course, students should be able to: construct static schemes ; write equilibrium equations and calculate reactions; determinate internal forces for statically determinate beam structures.	[SK2] Assessment of progress of work

Subject contents

Vector calculus. Fundamental concepts of vector statics. Reduction and equilibrium of the general system of forces. Concurrent force system. Parallel force System. Centers of gravity. Planar force system. Degrees of freedom and internal forces. Determination of reactions and internal forces in beams. Differential equations of equilibrium. Statically determinate planar structures: frames, trusses.
Assumptions and the scope of Strength of Materials. Stress and strain - definitions. Plane stress and plane strain. Hookes law (constitutive relations). Classification of problems of Strength of Materials. Axial tension (compression), Laboratory tests of materials. Geometrical parameters of cross-sections. Uniaxial bending. Free torsion of rods. Stability of beams. Elastic and inelastic buckling.

Prerequisites and co-requisites

Rudiments of vector algebra and analysis, differential and integral calculus

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>laboratory</td><td>16.0%</td><td>30.0%</td></tr>
<tr><td>written test</td><td>0.0%</td><td>30.0%</td></tr>
<tr><td>written test</td><td>0.0%</td><td>40.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Hibbeler R.C. Structural analysis. Printice Hall 1995.
2. Carpinteri A. Structural mechanics. A unified approach. E & FN Spon 1997</td></tr>
<tr><td>Supplementary literature</td><td>Meriam J.L., Kraige, L.G., Engineering Mechanics. Statics. John Wiley & Sons 1998</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Draw the axial force, shear and moment diagrams for the given statically determinate structure.

Draw the stress diagrams for beam under bending conditions.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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