



Subject card

Subject name and code	Mechanics and Strength of Materials , PG_00047788						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
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_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		
	[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 classical mechanics;		[SW1] Assessment of factual knowledge		
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						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written test	0.0%	40.0%
	written test	0.0%	30.0%
	laboratory	16.0%	30.0%
Recommended reading	Basic literature	1. Hibbeler R.C. Structural analysis. Printice Hall 1995. 2. Carpinteri A. Structural mechanics. A unified approach. E & FN Spon 1997	
	Supplementary literature	Meriam J.L., Kraige, L.G., Engineering Mechanics. Statics. John Wiley & Sons 1998	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<p>Draw the axial force, shear and moment diagrams for the given statically determinate structure.</p> <p>Draw the stress diagrams for beam under bending conditions.</p>		
Work placement	Not applicable		