



Subject card

Subject name and code	Mechanics of Materials, PG_00072595						
Field of study	Civil Engineering						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	second-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	1		Language of instruction		English		
Semester of study	1		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Mechanics of Materials and Structures -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Erwin Wojtczak				
	Teachers		dr inż. Erwin Wojtczak dr inż. Tomasz Ferenc				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=8242 Moodle ID: 8242 Mechanics of Materials (2026/2027) https://enauczanie.pg.edu.pl/2025/course/view.php?id=8242						
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	45		4.0		51.0	100
Subject objectives	The aim of the course is to introduce the fundamental concepts of statics and mechanics of materials. The course covers, among other topics, support reactions and internal forces in beams, stress states caused by tension/compression and bending, beam deflections, structural stability of columns, and the fundamentals of structural dynamics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W01] identifies in-depth the phenomena related to the field of study and the theories describing them, indicating reliable sources of knowledge and information relevant to the issues analysed	The student is familiar with the fundamental concepts of statics and mechanics of materials, as well as the basic assumptions of theory of structures. They are able to interpret the behaviour of framed structures under external loading. They understand the concept of structural stability within the elastic range and are able to interpret the behaviour of structures subjected to dynamic loading.	[SW1] Assessment of factual knowledge
	[K7_U04] prepares and presents the results of calculations, research and analysis in a coherent and logical manner, together with an in-depth interpretation	The student performs theoretical calculations in the field of structural mechanics. They determine support reactions and internal forces in beams. They develop normal-stress distributions in the cross-sections of members subjected to tension/compression and bending. They calculate the critical load of an ideal column and determine the natural frequencies of framed structures. They are able to plan and carry out experimental measurements on physical structural models, process the results, and interpret them critically.	[SU1] Assessment of task fulfilment

Subject contents	Course content – lecture 1. Fundamental principles and definitions of structural mechanics. Supports and reaction forces. Internal forces in beam elements. 2. Cross-sectional characteristics. Stress and strain. Uniaxial stress state. Elastic constants. Hooke's law. 3. Bending in beams elements. Flexural stress state. Deflections in beams. 4. Structural stability of columns. Critical force. 5. Basic concepts of dynamics of structures.		
	Course content – exercises 1. Calculation of reaction forces and internal forces in beam elements. Internal forces diagrams. 2. Calculation of cross-sectional characteristics, stresses and strains in tension/compression. Application of Hooke's law. 3. Calculation of stresses in beams under bending. Calculation of deflections in beams. 4. Calculation of critical force in axially compressed columns. 5. Calculation of natural frequencies in beams and frames.		
	Course content – laboratory 1. Experimental determination of support reactions in simple framed structures. 2. Experimental determination of elastic constants of typical materials. 3. Measurement of strains and deflections in beams under bending. 4. Experimental investigations of critical force in axially loaded columns. 5. Measurements of natural frequencies of simple structural elements.		
	Prerequisites and co-requisites Knowledge of differential and integral calculus, including derivatives, definite integrals, and indefinite integrals. Knowledge of the fundamentals of vector calculus, including the definition of a vector, the dot product, cross product, and scalar triple product. Knowledge of the fundamentals of physics in the field of particle mechanics, including kinematics and dynamics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	50.0%	70.0%
	Laboratory tasks	50.0%	30.0%
Recommended reading	Basic literature	1. Beer F. P., Johnston E. R. Jr., DeWolf J. T., Mazurek D. F.: Mechanics of Materials, McGraw-Hill 2026 (8th ed.).	
		2. Chopra A. K.: Dynamics of Structures: Theory and Applications to Earthquake Engineering, Pearson 2024 (6th ed.).	
		3. Hibbeler, R. C.: Mechanics of Materials, Pearson 2023 (11th ed.).	
		4. Hibbeler R. C.: Structural Analysis, Pearson 2024 (11th ed.).	

	Supplementary literature	1. Clough R. W. Penzien, J.: Dynamics of Structures, Computers & Structures, Inc 2003 (3rd ed.). 2. Gere J. M., Goodno B. J.: Mechanics of Materials, Cengage Learning 2018 (9th ed.). 3. Hibbeler R. C.: Statics and Mechanics of Materials, Pearson 2024 (6th ed.). 4. Kassimali A.: Structural Analysis, Cengage Learning 2020 (6th ed.).
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Determine the support reactions and draw the internal force diagrams for the beam/frame under the specified loading. 2. Characterize Hooke's law in uniaxial stress state. 3. State the formula for normal stress in simple bending and define its terms. 4. Define the critical force. Calculate the critical force of a member with the specified geometry and support conditions. 5. Define the natural frequency of a structure.	
Practical activities within the subject	Not applicable	

Document generated electronically. Does not require a seal or signature.