GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mechanics of materials, PG_00064920		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2027	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	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Szymon Grymek	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	9.0	9.0	0.0	0.0	0.0	18

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	18	4.0	28.0	50

Subject objectives

The aim of the course is to familiarize students with the basic issues related to the strength of materials and strength of structures: 1.Fundamentals of applied mechanics - models of loads, models of materials and structures, methods of strength of materials and structures; loads, structure, stress and strain. 2.Types of structures, design and operation. 3.Environment, models and changes of loads. 4.Strength of materials and structures. Loads on structures, methods of predicting the stress in structure. 5.Specific issues related to strength of materials and structures.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W01] explains and describes, on the basis of general knowledge of the scientific disciplines forming the theoretical basis of Mechanics and Mechanical Engineering, the structure and principles of operation of mechanical systems and processes	The student has the ability to analyze basic issues related to the strength of materials in the field of theory and solving simple tasks and practical problems.	[SW1] Assessment of factual knowledge
[K7_U01] utilizes information obtained from the literature and other sources in the field of Mechanics and Mechanical Engineering and presents and analyses the results of solutions to technical problems in this field	The student has the ability to solve basic problems related to the strength of materials, including the performance of simple engineering tasks.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[K7_U15] evaluates the feasibility of advanced methods and tools for solving complex engineering tasks of a practical nature, characteristic of the field of study, and selects and applies appropriate methods and tools for this purpose	A student is able to assess the complex state of loads and stress. A student is able to assess the complex states of loads, stress and deformation using the strength hypotheses and energy-based methods.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Lectures concern the presentation of selected issues, including: the basics of strength of materials, strength of a straight bar, strength analysis for statically indeterminate bar systems, torsional strength of bars, bending strength of beams, deformations of bent beams, shearing of bars, states of stresses and strains, methods of stress determination and deformations for statically indeterminate bar systems, evaluation of the strength of bars and bar systems using energy methods, bar buckling, complex strength problems, and others.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>The student should have basic information in the field of applied physics and mathematics, mathematical analysis and solid state mechanics, including kinetics and dynamics.</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>Final test</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>1. Bąk R., Burczyński T.: Wytrzymałość materiałów z elementami ujęcia komputerowego. WNT, Warszawa 2001.2. Dyląg Z., Jakubowicz A., Orłoś Z.: Wytrzymałość materiałów. WNT, Warszawa, t. I 1996, t. II 1997.3. Misiak J.: Mechanika techniczna. Statyka i wytrzymałość materiałów. WNT, Warszawa 1996.4. Kaliński K. J.: Nadzorowanie procesów dynamicznych w układach mechanicznych. Gdańsk: Wydaw. PG 2012.5. Gallagher R. H.: Finite element analysis fundamentals. New Jersey: Prentice Hall 1975.6. Niezgodziński M.E., Niezgodziński T.: Wzory, wykresy i tablice wytrzymałościowe. Warszawa: WNT 1996.7. Walczyk Z.: Wytrzymałość materiałów. Wyd. PG, Gdańsk t. I 2000, t. II 2001.8. Żmuda J.: Projektowanie konstrukcji stalowych. Wydawnictwo Naukowe PWN, 2016.9. Kaliński K.: Materiały do wykładów z przedmiotu "Wytrzymałość materiałów" sem IV.10. Banasiak M.: Ćwiczenia laboratoryjne z wytrzymało ci materiałów. PWN, Warszawa 2000.</td></tr><tr><td>Supplementary literature</td><td>1. Ship Construction by D. J. Eyres, Butterworth-Heinemann, 2001.2. Elements of Modern Ship Construction by David J. House, 2010.3. Ship Construction 7th Edition, by George J Bruce, Butterworth-Heinemann, May 2012.4. Ship Construction and Welding by Mandal, Nisith Ranjan, Springer Series on Naval Architecture, Marine Engineering, Shipbuilding and Shipping.</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Assembly stresses - arise as a result of correcting dimensional differences of the connected elements of the structure. Example. To install a bar of length l between two vertical walls, increase its length by D. A tensile force N appears in the cross-section of the bar, which causes assembly stresses.2. Example. A beam with a length of 2l and stiffness EI, pinned at its ends, is loaded with a uniformly distributed load q acting on length l. Formulate the equation of deflection angles and deflection axis and determine the deflection angle and deflection at point B.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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