GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Strength of materials towards applications , PG_00053661						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2026/2027			
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery	at the university			
Year of study	3		Language of instruction	Polish			
Semester of study	6		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. Wiktoria Wojnicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	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	30		0.0		0.0	30
Subject objectives	The aim of the subject is to acquire knowledge referring to the advanced problems of Mechanics of Materials (Strength of Materials)						

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U07	The students uses acquired engineering knowledge to solve complex problems related to design and to check function of mechanical systems used in machine industry	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
K6_U01	To design a mechanical system and to present a functionality of this system the student uses specific databases and specific engineering literature	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K6_W12] possesses basic knowledge necessary to understand the ex-technical conditions of engineering activity, possesses basic knowledge on management, including quality management and running commercial enterprise, within the range of protection of intellectual property and patent law; knows general principles of creating and developing forms of individual entrepreneurship and basic HSE rules applicable to machine industry	The students uses acquired engineering knowledge to solve complex problems related to design and to check functionality of mechanical systems used in machine industry along with assessment of external influence of proposed solution	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
K6_W06	The students uses knowledge referring to automatics and robotics to design mechanical systems used in machine industry	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents	Course content – lecture **Lectures (15h) + Tutorials (15h)** Fundamentals of Strength of Materials: summarizing. State of stress (3D and 2D). Strain stress - Strain rosettes. Stress and Strain relations: Generalized Hooke's law. Finite Element Method: application to solve chosen problems (bars, beams, planar elements). Review of Failure criteria. Fatigue and Fracture mechanics. Prandtl Stress Function. Herz contact stress. Rayleigh-Ritz Method. Course content – exercises **Lectures (15h) + Tutorials (15h)** Fundamentals of Strength of Materials: summarizing. State of stress (3D and 2D). Strain stress - Strain rosettes. Stress and Strain relations: Generalized Hooke's law. Finite Element Method: application to solve chosen problems (bars, beams, planar elements). Review of Failure criteria. Fatigue and Fracture mechanics. Prandtl Stress Function. Herz contact stress. Rayleigh-Ritz Method.
Prerequisites and co-requisites	The student should have fundamentals related to the applied physics, applied mathematics and mechanics of materials.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Examination	56.0%	100.0%

Recommended reading	Basic literature	• Hibbeler R.C. Mechanics of materials,10th edition, Pearson Prentice Hall, USA, 2014. • S. Seangatith, Advanced mechanics of materials, School of Civil Engineering Institute of Engineering, Suranaree Nniversity of Technology, 2001. • Ansel C. Ugural, Saul K. Fenster, Advanced Mechanics of Materials and Applied Elasticity, Sixth Edition, Pearson,2020. • Muvdi B.B., McNabb J.W.: Engineering Mechanics of Materials. Third edition. Springer-Verlag 1991. • Da Silva, Vitor Dias: Mechanics and Strength of Materials. Springer 2006.
	Supplementary literature	• Timoshenko S.: Strength of Materials. Part I. Elementary Theory and Problems. USA 1940. • Timoshenko S.: Strength of Materials. Part II. Elementary Theory and Problems. USA 1940
	eResources addresses	
Example issues/ example questions/ tasks being completed	Spatial state of stress and planar state of stress: explain the way to assess a general state of stress in 2D space and 3D space. State of strain: explain application of strain gauge system.	
Practical activites within the subject	Not applicable	

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