GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Experimental Methods in Strength of Materials, PG_00044005		
Field of study	Civil Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Mechanics of Materials and Structures -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Erwin Wojtczak	
	Teachers	dr inż. Erwin Wojtczak dr inż. Marcin Nowak dr inż. Błażej Meronk dr inż. Łukasz Pachocki	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	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	15	2.0	8.0	25

Subject objectives	The purpose of the laboratory is experimental verification of formulas of strength of materials using model tests.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] Demonstrate knowledge and understanding of the processes and established methods of analysis / solution of engineering issues & problems in the field of civil engineering and of their limitations.	Student has knowledge of the statics of buildings and the strength of materials, describes the behavior of structures under external factors and examines the scope of validity of analytical models.	[SW3] Assessment of knowledge contained in written work and projects
[K6_K03] Can effectively, clearly and unambiguously convey information, describe activities and communicate their results/ outcomes to engineers or a wider audience using appropriate communication methods and tools.	Student presents the results of research conducted in groups in an understandable way and provides clear and adequate answers to questions related to them.	[SK1] Assessment of group work skills [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
[K6_U05] Conducts research (obtaining information, simulations, experimental methods) in the field of construction in order to solve specific tasks and report research results.	Student examines the response of simple engineering structures to external factors, including planning and conducting experimental measurements such as selecting and using appropriate analytical models. Student prepares a report on the conducted research with a critical assessment of the differences between experimental and theoretical results and determining the reasons for these differences.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K6_U01] Apply knowledge and understanding of mathematics as well as sciences and engineering disciplines underlying civil engineering to solve engineering problems and issues.	Student uses knowledge of mathematics, physics, statics of buildings and strength of materials to solve problems of structural mechanics, including obtaining experimental and theoretical data and their critical analysis.	[SU1] Assessment of task fulfilment [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
[K6_W05] Demonstrate knowledge and understanding of research methods (obtaining information, simulations, experimental methods) in the field of civil engineering.	Student knows the methodology of conducting research, including planning and obtaining measurement data on experimental models such as obtaining theoretical results using appropriately selected analytical models.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

The following experiments are individually carried out and analysed:
1. Static tensile tests of carbon and hardened steel specimens.
2. Static compression tests of metal and metal alloy specimens.
3. Determination of Young's modulus and Poissons ratio of polycarbonate specimen (using strain gauges).
4. Determination of strains in selected sections of bending polycarbonate beams (T and Z sections).
5. Measurement of torsion angle of thin-walled tubes with closed and open cross sections.
6. Determination of the centre of twist of thin-walled beams.
7. Measurement of displacements in bending beam.
8. Determination of the shape of a cable.
9. Determination of critical loads for various supported columns.
10. Bending test of aluminium beam with C section.

Prerequisites and co-requisites

Course Engineering Mechanics should be completed. Course Strength of Materials should be taken. Precondition to the executing of experiments is acquaintance.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Reports	60.0%	60.0%
Test	60.0%	40.0%

Recommended reading

Basic literature

1. Chróścielewski J., Rucka M., Witkowski W.: *Metody doświadczalne w wytrzymałości materiałów*. Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2018.
2. Banasiak M.: *Ćwiczenia laboratoryjne z wytrzymałości materiałów.* PWN, Warszawa, 2000.
3. Bielewicz E.: *Wytrzymałość materiałów*, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2006.
4. Boruszak A., Sygulski R., Wrześniowski K.: *Wytrzymałość materiałów: doświadczalne metody badań.* PWN Warszawa-Poznań, 1984.
5. Burczyński T., Beluch W., John A.: *Laboratorium z wytrzymałości materiałów*. Wydawnictwo Politechniki Śląskiej, Gliwice, 2002.
6. Górski J., Iwicki P., Mikulski T.: *Metody doświadczalne w analizie konstrukcji*. Skrypt Politechniki Gdańskiej, Gdańsk, 2008.

	Supplementary literature	1. Dyląg Z., Jakubowicz A., Orłoś Z.: *Wytrzymałość materiałów, tom I*. Wydawnictwa Naukowo-Techniczne, 2003. 2. Dyląg Z., Jakubowicz A., Orłoś Z.: *Wytrzymałość materiałów, tom II*. Wydawnictwa Naukowo-Techniczne, 2003. 3. Szymczak Cz., Skowronek M., Witkowski W., Kujawa M.: *Wytrzymałość materiałów*. *Zadania*. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2017.
	eResources addresses	Podstawowe https://pbc.gda.pl/dlibra/publication/108003/edition/96871/content?ref=L2NvbGxlY3Rpb25kZXNjcmlwdGlvbi8xOA - Chróścielewski J., Rucka M., Witkowski W.: Metody doświadczalne w wytrzymałości materiałów. Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2018. Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	- Analyse and interpret the obtained experimental results. Compare the results of experiments with theoretical calculations. - Perform experimental tests according to the instructions in groups of three. - Draw stress diagrams for torsion of an open and closed annular bar. - Draw a graph of axial tensile test for mild and hard steel.	
Work placement	Not applicable	

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