

GDAŃSK UNIVERSITY

Subject card

Subject name and code	Computer Analysis of Construction, PG_00043969							
Field of study	Civil Engineering							
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024			
Education level	ducation level first-cycle studies		Subject group		Obliga field c	atory subject of study	group in the	
					research in the field of study			
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		1.0			
Learning profile	general academic profile		Assessme	nt form		assessment		
Conducting unit	Structural Mechanics Department -> Faculty of Civil and Environmental Engineering							
Name and surname	Subject supervisor		dr inż. Łukasz Smakosz					
of lecturer (lecturers)	Teachers		prof. dr hab. inż. Paweł Kłosowski					
			dr inż. Krzysztof Żerdzicki					
			mgr inż. Łukasz Żmuda-Trzebiatowski					
			dr inż. Marcin Krajewski					
			dr inż. Mateusz Sondej					
			drinż Łukasz Smakosz					
			ur inz. Iviarcin zmuda i rzediatowski					
			dr hab. inż. Andrzej Ambroziak					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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	30		0.0			30
Subject objectives	Getting to know the theoretical and practical basics of computer methods of structural analysis. Working in a Finite Element Method computing environment on the example of Autodesk Robot SAP.							

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U05] is able to use selected software supporting design decisions in civil engineering; can critically evaluate numerical calculations of constructions	uses the Robot SAP program to build numerical models of building structures subjected to characteristic loads; performs calculations in terms of static and dynamic analysis; interprets whether the permissible values of stresses and displacements have not been exceeded in the designed structure based on the obtained results; recognizes whether the obtained results are reliable	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K6_U02] is able to define basic calculation models used in computer calculations	selects the types of finite elements that correctly reflect the behavior of the designed structures; applies degree of freedom constraints corresponding to the structure support conditions; uses load types consistent with the project description	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K6_W11] Knows selected software supporting the calculation and design of construction as well as construction management	can name the advantages and disadvantages of using Robot SAP in the design of typical building structures; explains which options of the Robot SAP program allow to reproduce the characteristic behavior of the designed structures; describes how Robot SAP takes into account selected building codes in its calculations	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[K6_U04] can correctly choose tools (analytical or numerical) to solve engineering problems in design of structures or construction process	uses the appropriate modules of Robot SAP to perform numerical calculations in the field of: static analysis, dynamic analysis, and moving loads; uses the appropriate modules for the interpretation of results in the form of graphs, maps and tables	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment

Subject contents	General information about the commercial analysis systems. Getting familiar with a sample program basing on the finite element method: Robot Structural Analysis Professional. Selecting the right type of finite element. Building 3D rod models: a) linear static analysis (static load, temperature, force, moving load) b) dynamic analysis (solution of eigenproblem, integrating the equations of motion), c) linear stability analysis (solution of eigenproblem, method of initial stability), d) a proper interpretation of results. Building a simple 2D surface models (plane stress, plane strain, axisymmetric): a) linear static analysis (static load, temperature), b) principles of finite element mesh automatic generation, c) a proper interpretation of results.					
	Cooperation of the structural analysis and CAD programs.					
Prerequisites and co-requisites	BSP012 General mechanics					
	BSP015 Strength of materials					
	BSP009 Structural mechanics					
	BSP021 Computational methods					
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
	passing the laboratory	60.0%	100.0%			
Recommended reading	Basic literature	 Instrukcja obsługi programu Robot Millenium (Robobat- AutoDESK) (dostępna w postaci pliku PDF). Ambroziak A., Kłosowski P.: Autodesk Robot Structural Analysis podstawy obliczeń. Wydawnictwo PG, 2010. Zienkiewicz O.C.: Metoda elementów skończonych. Arkady, Warszawa 1972. Rakowski G., Kacprzyk Z.: Metoda elementów skończonych w analizie konstrukcji. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1993. Dacko M., Borkowski W., Dobrociński S., Niezgoda T., Wieczorek M.: Metoda elementów skończonych w mechanice konstrukcji. Arkady, Warszawa 1994. 				
	Supplementary literature Brak					
	eResources addresses Adresy na platformie eNauczanie: Komputerowa Analiza Konstrukcji 2023/2024 - Moodle ID: 35950 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35950					
Example issues/ example questions/ tasks being completed	Analyse an engineering structure, given geometry, supporting conditions, external actions and material parameters, using different discretization variants in the FEM procedure, complemented by the result verification.					
Work placement	Not applicable					