



Subject card

Subject name and code	Computer Analysis of Construction, PG_00069418						
Field of study	Civil Engineering						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2026/2027		
Education level	first-cycle studies		Subject group				
Mode of study	Part-time studies		Mode of delivery		at the university		
Year of study	4		Language of instruction		Polish		
Semester of study	7		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Structural Mechanics -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marcin Kujawa				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	20.0	0.0	0.0	20
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30850						
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	20		5.0		50.0	75
Subject objectives	The aim of the course is to present and familiarize students with the structure and numerical analysis of bar and surface systems in the computational environment of the finite element method, using the example of Autodesk Robot Structural Analysis Professional.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W01] Demonstrate knowledge and understanding of mathematics as well as sciences and engineering disciplines underlying civil engineering at a level necessary to achieve the other programme outcomes.		The student knows the theoretical basis of computer methods of structural analysis.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K6_U02] Analyse & solve engineering issues & problems in the field of civil engineering by applying appropriate and relevant established analytical, numerical and experimental methods.		The student knows and can use the tools of computer methods for structural analysis.		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K6_W05] Demonstrate knowledge and understanding of research methods (obtaining information, simulations, experimental methods) in the field of civil engineering.		The student can perform static and dynamic analyses of structures.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K6_U05] Conducts research (obtaining information, simulations, experimental methods) in the field of construction in order to solve specific tasks and report research results.		The student can perform static and dynamic analyses of structures.		[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		

Subject contents	Course content – laboratory Introduction to the calculation program, structure types, degrees of freedom, 2D bar model analysis, structure axes, database cross-sections, materials, releases, local systems, supports, self-weight, nodal and linear loads, manual ULS/SLS combinations, internal force diagrams, deformation, detailed analysis, tabulated results, displaying results with active selection, stresses in the cross-section. Building a 3D bar model, generating nodes at bar intersections, bar groups, gamma angle, offsets, advanced characteristics. Surface loads in the local and global coordinate system, projected, distribution using facings, uniform heating/cooling, temperature gradient, kinematic excitations. Moving loads, influence lines, envelope diagrams. Modal analysis, vibration frequencies and mode shapes, integration of the equations of motion, time-dependent diagrams. Construction of a surface model, degrees of freedom, panel geometry, arc segments, openings, materials, panel thicknesses, point and linear supports, distributed and concentrated loads. Meshing methods for regular and irregular areas, local refinement of the finite element mesh, mesh quality control. Analysis of results in the form of maps and cross-sections through the panel, local coordinate system settings, principal directions. Convergence analysis, determining a fixed location for reading results, the effect of stress concentration, tabular comparison of results, drawing the convergence curve.		
Prerequisites and co-requisites	Mastering issues in the field of general mechanics, structural mechanics and strength of materials.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project Task No. 1	60.0%	50.0%
	Project Task No. 2	60.0%	50.0%
Recommended reading	Basic literature 1. Ambroziak A., Kłosowski P.: Autodesk Robot Structural Analysis podstawy obliczeń. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2010. 2. Ambroziak A., Kłosowski P.: Autodesk Robot Structural Analysis. Wymiarowanie konstrukcji stalowych i żelbetowych - przykłady obliczeń. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2014. 3. Zienkiewicz O.C.: Metoda elementów skończonych. Arkady, Warszawa 1972. 4. Rakowski G., Kacprzyk Z.: Metoda elementów skończonych w analizie konstrukcji. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1993. 5. Dacko M., Borkowski W., Dobrociński S., Niezgoda T., Wieczorek M.: Metoda elementów skończonych w mechanice konstrukcji. Arkady, Warszawa 1994.		
	Supplementary literature		
	eResources addresses		
Example issues/example questions/tasks being completed			
Practical activities within the subject	Not applicable		

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