



## Subject card

Subject name and code	Advanced computer analysis of structures, PG_00040231						
Field of study	Civil Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2022/2023		
Education level	second-cycle studies	Subject group					
Mode of study	Full-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	Structural Mechanics Department -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Paweł Kłosowski					
	Teachers	dr hab. inż. Izabela Lubowiecka					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	0.0	0.0	45
	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	45	2.0	8.0	55		
Subject objectives	The main aim of the subject is to acquaint the student with possibilities of advanced analysis of structures by the finite element method using selected commercial system of the finite element analysis.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U06] is able to choose proper tools (measuring, analytical or numerical) to solve engineering problems, to acquire, filtrate, proces and analyse data	The student is able to select a proper program for the certain type of problem and to perform the static or dynamic analysis as well as make automatic dimensioning of structures.			[SU1] Assessment of task fulfilment		
	[K7_W01] has knowledge of higher mathematics, physics and chemistry, which is a base of subjects, such as construction theory and advanced material technology	The student has knowledge on available commercial FEM analysis programs.			[SW1] Assessment of factual knowledge		
Subject contents	<ol style="list-style-type: none"><li>1. Calculations of plates and shells in FEM programs</li><li>2. MSC. Marc/Mentat – program description and data input for beams</li><li>3. MSC. Marc/Mentat –results for beams and different types of finite elements and mesh techniques. Internal hinges in beams.</li><li>4. Msc.Marc/Mentat – Surface elements. Ways of mesh composition. Mesh import from AutoCAD (hypar membrane)</li><li>5. Msc.Marc/Mentat – linking of beam and surface elements</li><li>6. Msc.Marc/Mentat – problem of initial stress balance</li><li>7. Cable elements in Msc.Marc/Mentat and Robot</li><li>8. Panels in program Robot – local coordinate systems (silo)</li><li>9. Dimensioning of steel posts in program Robot</li><li>10. Dimensioning of steel beams in program Robot</li><li>11. Dimensioning of concrete posts in program Robot</li><li>12. Dimensioning of concrete beams in program Robot</li><li>13. Dimensioning of plates in program Robot</li><li>14. Solid finite elements in program Robot</li><li>15. Solid finite elements in Msc.Marc/Mentat</li><li>16. (Problems selected by students or dynamic calculations in program Robot)</li></ol>						
Prerequisites and co-requisites	Knowledge of FEM techniques and ability of modeling of basic constructions in FEM						
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade		
	defence of two designing problems	60.0%			100.0%		

Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. O. C. Zienkiewicz „Metoda elementów skończonych”, Arkady, Warszawa 1972</li> <li>2. G. Rakowski, Z. Kacprzyk „Metoda elementów skończonych w mechanice konstrukcji” Oficyna Wydawnicza Politechniki Warszawskiej, Wyd. 2, Warszawa 2005</li> <li>3. A. Ambroziak, P. Kłosowski „Robot Structural Analysis podstawy obliczeń” Wydawnictwo Politechniki Gdańskiej 2015</li> <li>4. A. Ambroziak, P. Kłosowski "Robot Structural Analysis wymiarowanie konstrukcji stalowych i żelbetowych Przykłady obliczeń" Wydawnictwo Politechniki Gdańskiej 2016</li> <li>5. A. Ambroziak, P. Kłosowski "Podstawy obliczeń układów powierzchniowych w systemie MSC.Marc/Mentat" Wydawnictwo Politechniki Gdańskiej 2015</li> <li>6. A. Ambroziak, P. Kłosowski "MSC.Marc/Mentat przykłady obliczeń" Wydawnictwo Politechniki Gdańskiej 2017</li> </ol>
	Supplementary literature	-
	eResources addresses	Adresy na platformie eNauzanie:
Example issues/ example questions/ tasks being completed	1. Finite element analysis of cylindrical shell supported by six posts in MSC. Marc/Mentat and in Robot	
Work placement	Not applicable	