GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Advanced computer analysis of structures, PG_00040231		
Field of study	Civil Engineering		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
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		

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 acquamt 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

1. Calculations of plates and shells in FEM programs
2. MSC. Marc/Mentat – program description and data input for beams
3. MSC. Marc/Mentat –results for beams and different types of finite elements and mesh techniques. Internal hinges in beams.
4. Msc.Marc/Mentat – Surface elements. Ways of mesh composition. Mesh import from AutoCAD (hypar membrane)
5. Msc.Marc/Mentat – linking of beam and surface elements
6. Msc.Marc/Mentat – problem of initial stress balance
7. Cable elements in Msc.Marc/Mentat and Robot
8. Panels in program Robot – local coordinate systems (silo)
9. Dimensioning of steel posts in program Robot
10. Dimensioning of steel beams in program Robot
11. Dimensioning of concrete posts in program Robot
12. Dimensioning of concrete beams in program Robot
13. Dimensioning of plates in program Robot
14. Solid finite elements in program Robot
15. Solid finite elements in Msc.Marc/Mentat
16. (Problems selected by students or dynamic calculations in program Robot)

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	1. O. C. Zienkiewicz „Metoda elementów skończonych”, Arkady, Warszawa 1972 2. G. Rakowski, Z. Kacprzyk „Metoda elementów skończonych w mechanice konstrukcji” Oficyna Wydawnicza Politechniki Warszawskiej, Wyd. 2, Warszawa 2005 3. A. Ambroziak, P. Kłosowski „Robot Structural Analysis podstawy obliczeń” Wydawnictwo Politechniki Gdańskiej 2015 4. A. Ambroziak, P. Kłosowski "Robot Structural Analysis wymiarowanie konstrukcji stalowych i żelbetowych Przykłądy obliczeń" Wydawnictwo Politechniki Gdańskiej 2016 5. A. Ambroziak, P. Kłosowski "Podstawy obliczeń układów powierzchniowych w systemie MSC.Marc/Mentat"" Wydawnictwo Politechniki Gdańskiej 2015 6. A. Ambroziak, P. Kłosowski "MSC.Marc/Mentat przykłady obliczeń" Wydawnictwo Politechniki Gdańskiej 2017
	Supplementary literature	-
	eResources addresses	Adresy na platformie eNauczanie:
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	

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