GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basics of Numerical Methods, PG_00048220		
Field of study	Civil Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	4.0
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	dr hab. inż. Andrzej Ambroziak	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	0.0	30

E-learning hours included: 0.0

Adresy na platformie eNauczanie:

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	5.0	65.0	100

Subject objectives

The aim of the subject is to present theoretical and practical knowledge on the computer methods used for structural analysis of civil engineering objects. The practical part is realized using the finite element method analysis performed in the commercial software Autodesk Robot Structural Analysis Professional and Abaqus.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U04] is able (using Finite Element Method), to define a calculation model and to perform advanced numerical analysis of complex constructions in: linear range and elementary nonlinear range, can criticaly evaluate the results of calculations.	Student knows how to perform static and dynamic analysis of civil engineering structures.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K7_W01] has knowledge of higher mathematics, physics and chemistry, which is a base of subjects, such as construction theory and advanced material technology	Students knows the theoretical basics of computer methods used for structural analysis.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K7_W04] has knowledge on advanced strength of materials, modeling and optimisation of materials and constructions; has knowledge of fundamentals of Finite Element Method and general nonlinear analysis of engineering constructions and systems	Student knows how to perform static and dynamic analysis of civil engineering structures.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K7_U06] is able to choose proper tools (measuring, analytical or numerical) to solve engineering problems, to acquire, filtrate, proces and analyse data	Students knows the tools of computer methods used for structural analysis.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools

Subject contents

Examples of finite element method application. Creating numerical models and discretization. Basics of FEM for bar and shell structures. Element types and kinds of analysis. Local and global formulation of FEM. Advantages and disadvantages of computer methods. Risk and error sources in FEM.

Prerequisites and co-requisites

Structural Mechanics, Strength of Metarials, Continuum Mechanics

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		60.0%	80.0%
		60.0%	20.0%
Recommended reading	Basic literature	Szmelter J.: Metody komputerowe w mechanice. BNI, Warszawa, 1980. Cichoń C., Cecot W., Krok J., Pluciński P.: Metody komputerowe w liniowej mechanice konstrukcji, Politechnika Krakowska, 2009. Zienkiewicz O.C.: Metoda elementów skończonych. Arkady 1972. Łodygowski T., Kąkol W.: Metoda elementów skończonych w wybranych zagadnieniach mechaniki konstrukcji inżynierskich. Politechnika Poznańska 2003. Ambroziak A., Kłosowski P.: Autodesk Robot Structural Analysis podstawy obliczeń. Politechnika Gdańska, 2010. Ambroziak A., Kłosowski P.: *Autodesk Robot Structural Analysis Wymiarowanie konstrukcji stalowych i żelbetowych*. Wydawnictwo PG, 2015.	
	Supplementary literature	Rakowski G. (red.): Mechanika Budowli z elementami ujęcia komputerowego. Arkady, Warszawa, 1991. Branicki C., Wizmur M.: Metody macierzowe w mechanice budowli i dynamika budowli. Politechnika Gdańska, 1984.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		