



Subject card

Subject name and code	, PG_00070573						
Field of study	Civil Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2025/2026		
Education level	first-cycle studies	Subject group			Optional subject group		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	4	Language of instruction			Polish		
Semester of study	8	ECTS credits			2.0		
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 inż. Marcin Krajewski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=47817						
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		0.0		0.0	30
Subject objectives	The aim of the course is to familiarize students with the principles of modeling and analysis of engineering structures and to prepare them to independently develop computational models of real structural systems. During the course, students become acquainted with the fundamental assumptions of computer-based methods for structural analysis , including the direct stiffness method . An important objective is also to develop students competencies in the interpretation of calculation results and in the proper representation of the real conditions of frame and beam structures in computational models.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U05] Conducts research (obtaining information, simulations, experimental methods) in the field of construction in order to solve specific tasks and report research results.	Using computer software, the student is able to model engineering structures built of beam and frame elements.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
	[K6_W03] Demonstrate knowledge and understanding of the processes, established standards and design methods in the civil engineering subject area and of their limitations.	The student is also able to perform static analyses and stability analyses of the beam structures	[SW1] Assessment of factual knowledge
	[K6_K04] Engages in independent lifelong learning and individually follows the development of science and technology in the field of civil engineering.	Student learns about structures built in reality.	[SK5] Assessment of ability to solve problems that arise in practice
	[K6_K03] Can effectively, clearly and unambiguously convey information, describe activities and communicate their results/ outcomes to engineers or a wider audience using appropriate communication methods and tools.	Student can present research results	[SK5] Assessment of ability to solve problems that arise in practice
[K6_K01] Is aware of the key aspects of professional, ethical and social responsibility related to management, business operation, decision making and opinion formulation in civil engineering.	The student is able to determine the state of stresses and deformations in the beam structures using computer methods.	[SK5] Assessment of ability to solve problems that arise in practice	
Subject contents	<p>Course content – laboratory</p> <p>Modeling of structures structure and definition of a model, mathematical and physical models, basic assumptions of structural mechanics.</p> <p>Elements of matrix analysis of frame and beam structures; the direct stiffness method. Application of elastic supports.</p> <p>Modeling of structures with elements oriented at arbitrary angles. Transformation of coordinate systems. Block assembly of the global stiffness matrix of the system.</p> <p>Models of structures on elastic foundations.</p> <p>Linear stability analysis of structures. Issues of ultimate load capacity problems related to nonlinear analysis. Geometric stiffness matrix and its application to beam and frame systems (second-order theory). <u>Modeling problems illustrated with examples of real structures. Elements with semi-rigid connections.</u></p>		
Prerequisites and co-requisites	The student should have knowledge in the fields of General Mechanics , Structural Mechanics , and possess basic skills in computer-based structural analysis .		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	design projects	60.0%	40.0%
	midterm test	60.0%	60.0%
Recommended reading	Basic literature	<p>Z. Kacprzyk, P. Czumaj, S. Dudziak: Modeling of Building Structures, Publishing House of the Warsaw University of Technology, Warsaw, 2021</p> <p>M. Guminiak, J. Rakowski: Matrix Analysis of Frame Structures, Publishing House of Poznań University of Technology, Poznań, 2012.</p> <p>C. Branicki: Computer Analysis of Frame Structures Using the Direct Stiffness Method, Gdańsk University of Technology, 1999.</p> <p>G. Rakowski (ed.): Structural Mechanics with Elements of Computer-Based Approach, Arkady, Warsaw, 1991.</p>	
	Supplementary literature	P. Kłosowski: Robot Structural Analysis Professional in Engineering Practice , PWN, Warsaw, 2018.	
	eResources addresses		

Example issues/ example questions/ tasks being completed	static analysis and stability analysis of truss structures static analysis of bending beam systems with elastic supports stability analysis and nonlinear static analysis of compressed members with elastic supports static analysis of elements situated on a continuously distributed elastic foundation
Practical activities within the subject	Not applicable

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