

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modelling of engineering structures, PG_00044257							
Field of study	Civil Engineering							
Date of commencement of studies	October 2021		Academic year of realisation of subject			2024/2025		
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	7		ECTS credits			5.0		
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. Izabela Lubowiecka							
	Teachers		dr inż. Marcin Krajewski dr hab. inż. Izabela Lubowiecka					
Lesson types and methods	Lesson type	Lecture	Tutorial Laboratory		Projec	ct Seminar SUM		SUM
of instruction	Number of study hours	30.0	15.0	15.0	0.0		0.0	60
	E-learning hours inclu	uded: 0.0				-		
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic led in study	Participation in consultation hours		Self-study		SUM
	Number of study hours	60			5.0			125
	I he aim of the course is to familiarize the student with the issues of building a numerical model of a structure using commercial software, the definition of a model based on structure mechanics in a matrix approach, and the basics of matrix analysis of structures, with particular emphasis on stability issues. Computer programs for the numerical analysis of structures in the field of first- and second-order statics and stability will be presented. The student is to independently perform calculations of the bar model of a civil engineering structure.							
Learning outcomes	Course outcome		Subject outcome			Method of verification		
	[K6_U02] is able to define basic calculation models used in computer calculations		Student defines the models of engineering structures with various types of bar elements using commercial software or defines the models using matrix approach in structural mechanics with implementation in MATLAB environment. The student models bar structures taking into account second-order effects, elastic soil and stability.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K6_W11] Knows selected software supporting the calculation and design of construction as well as construction management		Student fluently uses engineering software in the scope of structural analysis, demonstrating knowledge in the field of organisation of construction works.			[SW1] Assessment of factual knowledge		
	[K6_U17] has specialized skills in civil engineering within offered specialization		Student knows how to use a wide range of engineering knowledge covered by the scope of separate subjects, combining them freely in the solution of a given task.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K6_W16] Has deeper and adequate knowlege of civil engineering, within offered specialization		Student is able to use an extensive knowledge in the field of civil engineering, when solving complex tasks requiring information covered by the scope of various courses.			[SW1] Assessment of factual knowledge		

Subject contents	Matrix analysis of structures. Modification and condensation of stiffness matrix. Geometric matrix and its application to stability problems and static analysis with the second order effects. The influence of elastic supports. Stiffness matrix of a beam on a Winkler-type elastic foundation. Elements with semi-rigid connections. Basics of nonlinear static analysis. Application of structural analysis software to static problems. Selected examples of modeling of engineering structures.						
Prerequisites and co-requisites	Knowledge within the scope of the following subjects is needed:						
	Structural mechanics Strength of Materials Computational Mechanics						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	two tests	60.0%	70.0%				
	five laboratory projects	60.0%	30.0%				
Recommended reading	Basic literature	 Guminiak M., Rakowski J.: Mechanika konstrukcji prętowych w ujęciu macierzowym, Wydawnictwo Politechniki Poznańskiej, Poznań, 2012. Weiss G., Giżejowski M., Stateczność konstrukcji metalowych układy prętowe. Warszawa Arkady 1991. G. Rakowski (red.): Mechanika Budowli z elementami ujęcia komputerowego, Arkady, Warszawa, 1991. Z. Kacprzyk, P. Czumaj, S. Dudziak.: Modelowanie konstrukcji budowlanych. 					
	Supplementary literature	 Timoshenko S. P., Gere J. M.: Teoria stateczności sprężystej. Arkady, 1963 Waszczyszyn Z., Cichoń C., Radwańska M.: Stability of structures by finite element methods. Elsevier, Amsterdam, 1994 					
	eResources addresses	Adresy na platformie eNauczanie: Modelowanie Konstrukcji Inżynierskich - 2024/25 - Moodle ID: 42281 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42281					
Example issues/ example questions/ tasks being completed	Calculation of forces and displacements or buckling load of beams and frames using matrix mechanics approach.						
Work placement	Not applicable						

Document generated electronically. Does not require a seal or signature.