



Subject card

Subject name and code	Modeling of reinforced concrete structures, PG_00044250						
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			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Concrete Structures -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Ireneusz Marzec				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	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	30		5.0		15.0	50
Subject objectives	The aim of the course is to acquire knowledge of the correct modeling and calculation of reinforced concrete structures with aid of engineering software within Finite Element Method (FEM).						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U05] is able to use selected software supporting design decisions in civil engineering; can critically evaluate numerical calculations of constructions	The student is able to use the ARSAP software, supporting design decisions and is able to critically evaluate the results of numerical calculations of the analyzed engineering structures.					
	[K6_U04] can correctly choose tools (analytical or numerical) to solve engineering problems in design of structures or construction process	The student is able to correctly select and use the tools for numerical analysis of engineering reinforced concrete structures.					
	[K6_W06] knows the rules of constructing and dimensioning of building elements of: steel, reinforced concrete, wood, masonry.	The student knows the rules of design and dimensioning of selected reinforced concrete structures.					
	[K6_W16] Has deeper and adequate knowledge of civil engineering, within offered specialization	The student has a systematized and in-depth knowledge of the calculation of selected members of reinforced concrete structures.					
	[K6_W11] Knows selected software supporting the calculation and design of construction as well as construction management	The student knows the use of the ARSAP software, supporting the calculation and design of structures in the field of static analysis and dimensioning of selected elements of reinforced concrete structures.					

Subject contents	<p>Analysis of selected problems of modeling reinforced concrete structures using the Finite Element Method (FEM). Principles of numerical calculation of slab-beam systems: assuming the FE mesh, different modeling of the connection between the slab and the supporting beams, the influence of the way of the support and supports compiliance on the internal forces and deformations. Modeling and calculation of flat slabs: shaping of the support zone, modeling of the columns, the influence of support compiliance, approximate calculation methods (Equivalent Frame Method). Calculation of deflections of RC slabs using FEM, with taking into account the reduction of the stiffness of the reinforced concrete section after cracking.</p> <p>Advanced modeling of reinforced concrete structures: 2D and 3D modeling with the use of sophisticated material definitions and contact laws. Simulating shrinkage in reinforced concrete elements. Modeling of direct and indirect foundation.</p>		
Prerequisites and co-requisites	Basic knowledge about reinforced concrete structures. Familiar with the Finite Element Method (FEM).		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tutorial	50.0%	50.0%
	Project	50.0%	50.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. W. Starosolski: "Wybrane zagadnienia komputerowego modelowania konstrukcji inżynierskich", Gliwice 2003. 2. W. Starosolski: "Konstrukcje żelbetowe według eurokodu 2 i norm związanych", Warszawa 2019. 3. Z. Kacprzyk, P. Czumaj, S. Dudziak: "Modelowanie konstrukcji budowlanych", Warszawa 2021. 	
	Supplementary literature	-	
	eResources addresses	Adresy na platformie eNauczanie: Modelowanie konstrukcji żelbetowych VII sem. 2024/2025 - Moodle ID: 40663 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=40663	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Application of FEM for modeling reinforced concrete structures 2. Application of FEM for the calculation of deflections of reinforced concrete slabs 		
Work placement	Not applicable		

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