



Subject card

Subject name and code	Modelling in Civil Engineering, PG_00042232						
Field of study	Civil Engineering						
Date of commencement of studies	February 2025		Academic year of realisation of subject		2025/2026		
Education level	second-cycle studies		Subject group		Optional 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	2		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Building Structures and Material Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Andrzej Tejchman-Konarzewski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	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		5.0		25.0	75
Subject objectives	Make acquaintance of students with different modelling methods of engineering structures.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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				[SW1] Assessment of factual knowledge		
	[K7_W02] knows principles of analysis, design and dimensioning of complex constructions and its elements				[SW1] Assessment of factual knowledge		
	[K7_U10] can analyse complicated environmental loads acting on a construction; can apply proper processes to design marine and hydroengineering constructions taking into consideration hydrological and hydraulic impact				[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K7_U12] can calculate and analyse the energy balance of a building				[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[K7_U02] can design and dimension complex steel, concrete (including reinforced), wood and masonry constructions and its details				[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		

Subject contents	Behaviour of concrete and reinforced concrete under static and dynamic loads. Flat floors. Foundation on elastic subsoil.Truss models. Beam walls. Tanks. Discrete models for granular materials and concrete. Elastic-plastic theory. Failure criteria. Elasto-plastic constitutive models. Damage constitutive models. Regularization methods in FE calculations. Finite element calculation examples.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	55.0%	10.0%
	Exam	55.0%	90.0%
Recommended reading	Basic literature	Lectures.	
	Supplementary literature	1. Chen, W.-F., Saleeb, A. F. <i>Constitutive Equations for Engineering Materials</i> , Elsevier, 1994. 2. W. Ramm, W., Wörner, R. Anwendung von Stabwerkmodellen bei der Bemessung und Konstruktion von Stahlbeton- und Spannbetonbauteilen. <i>Skript</i> , Kaiserslautern, 2002. 3. Majewski, T., Bobinski, J., Tejchman, J. FE-analysis of failure behaviour of reinforced concrete columns under eccentric compression. <i>Engineering Structures</i> , 2007. 4. Malecki, T., Marzec, I., Bobiński, J., Tejchman, J. Effect of a characteristic length on crack spacing in a reinforced concrete bar under tension. <i>Mechanics Research Communications</i> , 2007. 5. Kozicki, J., Tejchman, J. Effect of aggregate structure on fracture process in concrete using 2D lattice model. <i>Archives of Mechanics</i> , 2007. 6. Marzec, I., Bobinski, J., Tejchman, J. Simulations of crack sparing in reinforced concrete beams using elastic-plasticity and damage with non-local softening. <i>Computers and Concrete</i> , 2007. 7. Tejchman, J. and Bobinski, J. <i>Simulations of strain localization in plain and reinforced concrete with enhanced continuum models</i> . Wydawnictwo PG. 2010.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	The most salient properties of reinforced concrete.		
Work placement	Not applicable		

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