

## Subject card

Subject name and code	Complex concrete structures, PG_00041056								
Field of study	Civil Engineering								
Date of commencement of studies	October 2023		Academic year of realisation of subject			2023/2024			
Education level	second-cycle studies		Subject group			Obligatory subject group in the field of study			
						Subject group related to scientific research in the field of study			
Mode of study	Full-time studies		Mode of delivery			at the university			
Year of study	1		Language of instruction			English			
Semester of study	1		ECTS credits			4.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department of Concre	ete Structures -	-> Faculty of C	ivil and Enviror	nmental	Engine	ering		
Name and surname	Subject supervisor		dr inż. Patryk Ziółkowski						
of lecturer (lecturers)	Teachers			1			·	-	
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	30.0	15.0	0.0	15.0		0.0	60	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes include plan		Participation in consultation hours		Self-study		SUM	
	Number of study hours	60		5.0		35.0		100	
Subject objectives	The student knows the mechanical properties of concrete and steel. On the model adopted in the European standard, the student can determine the load-bearing capacity of the beams and cross-reinforced slabs. Student can dimension reinforcement for bending and shear and construct it. The student understands the necessity to calculate the serviceability limit state in reinforced concrete structures. The student also knows the dimensioning rules of reinforced concrete stairs, reinforced concrete deep-beams, reinforced concrete retaining walls, and reinforced concrete foundation slabs.								
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		The student knows the principles of designing selected elements of reinforced concrete structures.			[SW3] Assessment of knowledge contained in written work and projects			
	[K7_W09] knows advanced methods of building physics with applications in heat and moisture migration in buildings, energy demand for buildings and its acoustics		The student knows the principles of designing selected elements of reinforced concrete structures.			[SW3] Assessment of knowledge contained in written work and projects			
	[K7_U02] can design and dimension complex steel, concrete (including reinforced), wood and masonry construtions and its details		The student knows the principles of designing selected elements of reinforced concrete structures.			[SU2] Assessment of ability to analyse information			
	[K7_W02] knows principles of analysis, design and dimensioning of complex constructions and its elements		The student knows the principles of designing selected elements of reinforced concrete structures.			[SW3] Assessment of knowledge contained in written work and projects			
	[K7_K01] is aware of necessity of professional competences improvement; obeys the professional ethics code		The student knows the principles of designing selected elements of reinforced concrete structures.			[SK2] Assessment of progress of work [SK1] Assessment of group work skills			

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Subject contents	As part of this course, the following issues in the field of concrete structures will be discussed:  Mechanical properties of concrete and reinforcing steel; Calculation of reinforced concrete cross-sections - bending; Calculation of reinforced concrete cross-sections - shear; Serviceability limit state in reinforced concrete structures; Reinforced concrete slabs, one-way and cross-reinforced; Reinforced concrete stairs; Reinforced concrete deep beams; Reinforced concrete retaining walls; Reinforced concrete foundation slabs; Concrete structures of the future - current and future trends.					
Prerequisites and co-requisites	No prerequisites.					
Assessment methods and criteria	Subject passing criteria Semester project with oral defense Test	Passing threshold 60.0% 60.0%	Percentage of the final grade 40.0% 60.0%			
Recommended reading	Supplementary literature					
Evample issues/	eResources addresses	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	<ul> <li>Explain the term: double-reinforced cross-section.</li> <li>Explain the consequences of concrete shrinkage in reinforced and prestressed concrete structures.</li> <li>Describe the general characteristics of reinforced concrete slabs one-way and cross-reinforced - explain essential differences.</li> <li>For cross-reinforced slabs, sketch the static diagrams for the design of the support beams. What condition must the spans mentioned above meet to treat the concrete slab as working in two directions?</li> <li>Influence of the ratio of height to the cross-sectional dimension of a concrete sample on its compressive strength.</li> <li>What is the guaranteed strength of concrete? At what confidence level it is determined?</li> <li>Describe the concept of mean, characteristic and computational strength of concrete in compression and tensile strength.</li> </ul>					
Work placement	Not applicable					

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