



Subject card

Subject name and code	Theory of Bridge Structures, PG_00045942						
Field of study	Civil Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional subject group 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			Polish		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Railway Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Krzysztof Żółtowski					
	Teachers	mgr inż. Mikołaj Binczyk dr inż. Przemysław Kalitowski dr hab. inż. Krzysztof Żółtowski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	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	60		5.0		35.0	100
Subject objectives	Expanding the knowledge of shaping concrete, metal, composite bridge structures. Simplified mechanical models and reality. Basic construction and design issues. Practical application of theoretical methods of structure analysis. FEM in bridges.						
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	Consolidation of theoretical knowledge			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U02] can design and dimension complex steel, concrete (including reinforced), wood and masonry constructions and its details	Ability to apply theory in design practice and analysis			[SU4] Assessment of ability to use methods and tools		
	[K7_W15] has deep and adequate knowledge of civil engineering, within offered specialization and profile	Consolidation of theoretical knowledge in practical applications on bridge modeling			[SW1] Assessment of factual knowledge		
	[K7_W02] knows principles of analysis, design and dimensioning of complex constructions and its elements	Ability to apply theory in design practice and analysis			[SW1] Assessment of factual knowledge		

Subject contents	<p>Static systems in bridges. Beam bridges. Plate bridges. Lattice bridges. Frame bridges. Arche bridges. Suspension bridges. Bridge modeling methods. Analytical methods. Numerical methods. Finite element method. 2D and 3D bar models. 2D and 3D Shell models. Static diagram, discretization, model accuracy. Bridge loads. Static and dynamic loads. Imperfections. Non linear static. Secondary loads. Bridge modeling. Comparison of bridge structure analysis at different discretization levels. Sample models, construction of bridges and details (discussion of the consequences of the used design solutions).</p>		
Prerequisites and co-requisites	<p>Strength of materials, building mechanics. FEM. Bridge structures</p>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	60.0%	40.0%
	completion of exercises and lab	60.0%	60.0%
Recommended reading	Basic literature	<p>1. Czudek H., Radomski W. : Basics of bridge engineering. PWN, Warsaw 1983. 2. Ryżyński A., Wołowicki W., Skarżewski J., Karlikowski J. : Steel Bridges . PWN, Warsaw-Poznań 1984. 3. Szelągowski F. : Metal bridges. WKiŁ, Warsaw 1966. 4. Szczygieł J. : Bridges made of reinforced and prestressed concrete. WKiŁ, Warsaw 1974 (1972). 5. Leonhardt F. : Fundamentals of concrete bridge construction. WKiŁ, Warsaw 1982. 6. Branicki Cz. : Matrix methods in structure mechanics and building dynamics. Gdańsk University of Technology script 1980. 7. Szymczak Cz. : Elements of the theory of design. PWN, Warsaw 1998. 8. Bielewicz E. : Strength of materials. University of Technology script Gdańska 1992. 9. Chudzikiewicz A. : Statics of a building. PWN, Warsaw 1976. 10. SOFiSTiK. Program description. 11. ROBOT. Program description. m. description.</p>	
	Supplementary literature	Timosenko S.P. ; Gere J.M. The theory of elastic stability	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<p>Static systems in bridges. Static and strength analysis</p>		
Work placement	<p>Not applicable</p>		