

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Steel and composite bridge structures, PG_00045875								
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 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			5.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Department of Railwa	Department of Railway Engineering -> Faculty of Civil and Environmental Engineering							
Name and surname	Subject supervisor		dr hab. inż. Krzysztof Żółtowski						
of lecturer (lecturers)	Teachers								
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study hours	30.0	15.0	0.0	15.0		0.0	60	
	E-learning hours inclu	E-learning hours included: 0.0							
Learning activity and number of study hours	Learning activity	ctivity Participation in didacti classes included in str plan		Participation in consultation hours		Self-study SUM		SUM	
	Number of study 60 hours		10.0		55.0		125		
Subject objectives	To get a basic knowledge of design of metal and composite bridge structures. A simplified mechanical models and reality. Basic issues of construction and design.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K7_W15] has deep and adequate knowlege of civil engineering, within offered specialization and profile		Has knowledge of steel and composite bridges, in particular: a) types and properties of structural materials; b) types of structural systems (statics, design, construction); c) analysis and design of structural elements due to standards design and FEM calculations.			[SW1] Assessment of factual knowledge			
	[K7_W02] knows principles of analysis, design and dimensioning of complex constructions and its elements		Can: a) identify static and constructional problems related to the designed structural system; b) select methods and tools for static analysis and design of a given structural system.			[SW1] Assessment of factual 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 construtions and its details		Can: a) identify computational problems related to the designed structural system; b) select methods and tools for static analysis and design of a given structural system; c) adopt design solutions in accordance with the constructional principles of steel and composite spans.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject			

Subject contents	LECTURES							
	 LECTURES Theory and real construction. The actual work of steel bridge elements (nodes, connections, bracing). Complex bridges (steel - concrete). Shear connectors flex, rigid - with applications. Technologies perform concrete slabs. Prestressed Composite. Steel lattice structures with concrete deck. Rheology technical approach. Steel girders - large spans with constant and variable height, sections open, closed one and hollow. Lattice bridges - large spans. Principles of constructing of main girders: lattice with parallel flanges and with variable height. Recent types of trusses - calculation. Bridges without bracings in upper flange stability issues of concentrations. Bridge bearings. Arched bridges. Types of arch bridges: Langer type bridges, arches combined with the stiffness of the roadway. Location of roadway: top, bottom, middle position and stability issue associated with it. Large and small span in arches - differences. Bracing of arches: portal frames inclined, horizontal, type Vierendeel solution. Bracing and the related problems of the theory of second order. Arched truss bridges. Suspended and cable stayed bridges. Types of bridge systems, geometry of cables, stays, pylons and roadway. Specificity of the construction of the road way. The construction of cables and hangers. Spans - cross sections open and hollow – wind action. Bearing for large suspension bridges. The specificity of assembly. Hanging footbridge. Dynamics and aerodynamics - selected issues. Overview of cable stayed bridges. Static schemes of the girders. Geometry of truss railway bridge (welded, single-span, single-track) Construction of the span - structural and non-structural elements (equipment). Static schemes of the girders. Geometry of truss bridges - lattice types, girder's shape, decks. Cross-section of structural elements - girder elements, deck							
Prerequisites and co-requisites	Structural Mechanics, Strength of Materials. The theory of design of steel and reinforced concrete							
Assessment methods and criteria	Subject passing criteria design work	Passing threshold 70.0%	Percentage of the final grade 50.0%					
	written exam	60.0%	50.0%					
Recommended reading	Basic literature	 Czudek H., Radomski W.: <i>Podstawy mostownictwa</i>. PWN, Warszawa 1983. Leonhardt F.: <i>Budowa mostów</i>. WKiŁ, Warszawa 1982. Madaj A., Wołowicki W.: <i>Budowa i utrzymanie mostów</i>. WKiŁ, Warszawa 1995. Furtak K., Mosty zespolone, PWN, Warszawa, Kraków, 1999 Hydzik J.: <i>"Mosty kolejowe"</i>, WKŁ, Warszawa, 1986. Ryżyński A., Wołowicki W., Skarżewski J., Karlikowski J.: <i>"Mosty stalowe"</i>, PWN, Warszawa – Poznań, 1984. Danielski L.: <i>"Mosty metalowe"</i>, Politechnika Wrocławska, Wrocław, 1983. Biliszczuk J. Mosty podwieszone ARKADY Warszawa 2005 						
	Supplementary literature	 Cholewo J., Sznurowski M.: "Mosty kolejowe i fundamentowanie" ,WKŁ, Warszawa, 1965. Korelewski J.: "Mosty stalowe", Politechnika Krakowska, Kraków, 1980. Szelągowski F.: "Mosty metalowe", WKŁ, Warszawa, 1966. Pszenicki A.: "Mosty stalowe nitowane", Wydawnictwa Komunikacyjne, Warszawa, 1954. Furtak K., Mosty zespolone, PWN, Warszawa, Kraków, 1999 Jarominiak A.; <i>Mosty podwieszone</i>. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 1997. Karlikowski J., Sturzbecher K.: "Mosty stalowe. Mosty belkowe i zespolone. Przewodnik do ćwiczeń projektowych" Politechnika Poznańska, Poznań, 2003. Malinowski M., Miśkiewicz M., Szafrański M.: "Materiały pomocnicze do projektowania mostów metalowych – wersja elektroniczna na stronie internetowej http://www.okno.pg.gda.pl. 						
Example issues/	Static analysis and dimonsioning of l	hridge structures						
example questions/ tasks being completed								
Work placement	Not applicable							