



## Subject card

Subject name and code	DIAGNOSTIC AND RELIABILITY OF RAILWAYS, PG_00042244						
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			3.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Railway Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Zbigniew Kędra					
	Teachers	dr inż. Zbigniew Kędra dr inż. Kamila Szwaczekiewicz					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	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		10.0	75	
Subject objectives	Planning and execution of diagnostic tests railways. Methods of assessment and conclusions from the research. Assessment durability and reliability of rails, sleepers and ballast.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U09] is able to design railway tracks of complex geometry on sections and stations, both newly designed and renovated; can make a plan and perform diagnostic of railway track and to interpret its results, propose conclusions; can evaluate durability and reliability of railroad elements	is able to plan and perform diagnostic tests in the field of railways, interpret the results of tests and draw conclusions; can assess the durability and reliability of railway pavement elements	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
	[K7_W08] has deep knowledge of railway track construction, including high speed railroads; design and renovation of railroads of complex geometry; has detailed knowledge about diagnostics of railroads, knows basics of railway traffic organisation and control	has detailed knowledge in the field of railways diagnostics	[SW1] Assessment of factual knowledge
	[K7_K02] Recognizes the significance of knowledge in solving cognitive and practical problems; reliably evaluates results of his own and team research	reliably assesses his and his team's research results	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills [SK2] Assessment of progress of work
	[K7_W16] knows methods of diagnostics of engineering objects, has knowledge about different kinds of defects in constructions and its reasons; knows means of fixing and reinforcing of constructions.	knows methods of railways diagnostics, has knowledge about types and causes of defects and damages; knows the ways and methods of repair	[SW1] Assessment of factual knowledge
	[K7_U16] is able to estimate the technical condition of engineering object; can interpret the results of constructions and materials examination;	is able to assess the technical condition of a railway road and interpret results of tests	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
Subject contents	Assessment of the geometry of the railway track. Methods and criteria for track geometry assessment. Levels of aggregation, classification and characteristics of track quality index. Diagnostics of rails, sleepers and ballast. Diagnostics of continuous welded rail. Diagnostics of railway turnouts. Modelling of track failures. Durability and reliability of rails, sleepers and ballast.		
Prerequisites and co-requisites	Railways		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	100.0%	50.0%
	Written exam	50.0%	50.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>Bałuch H.: Trwałość i niezawodność eksploatacyjna nawierzchni kolejowej. WKiŁ, Warszawa 1980.</li> <li>Bałuch H.: Diagnostyka nawierzchni kolejowej. WKiŁ, Warszawa 1978.</li> <li>Bałuch M., "Interpretacja pomiarów i obserwacji nawierzchni kolejowej", Politechnika Radomska 2005</li> <li>Bałuch H., Bałuch M.: Determinanty prędkości pociągów - układ geometryczny i wady toru. Instytut Kolejnictwa, Warszawa 2010.</li> </ol>	
	Supplementary literature	<ol style="list-style-type: none"> <li>Id-1 (D-1), "Warunki techniczne utrzymania nawierzchni na liniach kolejowych", Warszawa 2005</li> <li>Id-3 (D-4), "Warunki techniczne utrzymania podtorza kolejowego", Warszawa 2009</li> <li>Id-4 (D-6), "Instrukcja o oględzinach, badaniach technicznych i utrzymaniu rozjazdów", Warszawa 2005</li> <li>Id-7 (D-10), "Instrukcja o dozowaniu linii kolejowych", Warszawa 2005</li> <li>Id-8, "Instrukcja diagnostyki nawierzchni kolejowej", Warszawa 2005</li> <li>Id-10 (D-16), "Instrukcja badań defektoskopowych szyn, spoin i zgrzein w torach kolejowych", Warszawa 2005</li> <li>Id-14 (D-75), "Instrukcja o dokonywaniu pomiarów, badań i oceny stanu torów", Warszawa 2005</li> <li>"Katalog wad w szynach", Warszawa 2005</li> </ol>	

	eResources addresses	Adresy na platformie eNauczenie:
Example issues/ example questions/ tasks being completed	Measurement and assessment of track geometry. Assessment of rails, sleepers and ballast. Measurement systems railway track geometry. Measurement of junction.	
Work placement	Not applicable	