



Subject card

Subject name and code	Mechanics of Railway Track, PG_00041391						
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			2.0		
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. Piotr Chrostowski					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	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		0.0	50
Subject objectives	The aim of the lectures is to present the problems of the mechanical work of the railway superstructure and its subgrade. The first part (4-5 meetings) is devoted to superstructure construction issues by presenting typical structural elements. The subject of track surface and subgrade dimensioning is further developed, taking into account the technical and operational parameters of the track. The issues of the impact of service life (durability and reliability) on the track structure's mechanical work are also discussed.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U15] has advanced skills in civil engineering within offered specialization/profile	Student is able to determine the basic mechanical characteristics of pavement elements and railway track subgrade. Student can calculate both stress in main elements and deflection of track structure, under static and dynamic load.	[SU1] Assessment of task fulfilment
	[K7_K02] Recognizes the significance of knowledge in solving cognitive and practical problems; reliably evaluates results of his own and team research	Student is able to correctly interpret and present the results of his analyzes related to the sensitivity of the track structure to the assumed both technical and operational parameters.	[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
	[K7_W15] has deep and adequate knowlege of civil engineering, within offered specialization and profile	Student has a knowledge about the mechanical work of railway track structure. Has knowledge of the operating conditions of the continues welded track and issues related to the durability of infrastructure elements.	[SW1] Assessment of factual knowledge
	[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	Student is able to identify the basic types of both superstructure and subgrade construction components. Student is able to calculate the stress and deflection of the railway track using a beam model on elastic foundation. Student is able to correctly assess the impact of the track construction used on the mechanical work of the track superstructure and subgrade.	[SW1] Assessment of factual knowledge
Subject contents	<ul style="list-style-type: none"> <li>- elements of superstructure and railway subgrade</li> <li>- continues welded track and its construction</li> <li>- load of track structure</li> <li>- calculation of stresses in the railway track structure, methodology and theoretical models used in railway engineering</li> <li>- methods for determining mechanical characteristics in a CWR track, review of measurement and analytical methods</li> <li>- application of durability and reliability analysis in determining the operational suitability of a railway pavement</li> </ul> <p>As part of the classes, design and analytical tasks are performed. Students perform construction calculations using the theoretical models of the railway superstructure and subgrade mechanics. The calculation methodology used in the classes allows for the adoption of a certain spectrum of mechanical /construction parameters and loads. Therefore, a broader analysis of the railway track under given conditions is performed. Classes are finalized with submitting a comprehensive report.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	report	50.0%	50.0%
	test	50.0%	50.0%

Recommended reading	Basic literature	W. Czyczuła, Tor bezстыkowy, Politechnika Krakowska 2002  Sancewicz S.: Nawierzchnia kolejowa, KOW/ZPK/WAT/PKP PLK Warszawa 2010  Skrzyński E.: Podtorze kolejowe, KOW/ZPK/WAT/PKP PLK Warszawa 2010  H. Bałuch, Wspomaganie decyzji w drogach kolejowych KOW 1994
	Supplementary literature	C. Esveld, MODERN RAILWAY TRACK Second Edition, 2001 MRT-Productions
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Railway superstructure, elements and their characteristics Railway subgrade, layers and their functions, designing of protective covering Continuous Welded Rail track, axial forces, track stability Dimensioning of superstructure, calculation of stress in rails and superstructure deflections using the Winkler model Sensitivity analysis of pavement structure taking into account operational parameters, issues of durability of railway superstructure	
Work placement	Not applicable	

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