



Subject card

Subject name and code	MODERNISATION OF RAILROAD, PG_00042245						
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		
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			exam		
Conducting unit	Department of Railway Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Kamila Szwaczekiewicz				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	15.0	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		50.0	100
Subject objectives	The aim of the course is to provide students with issues of planning and implementing projects for the upgrading and revitalization of railway lines.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U15] has advanced skills in civil engineering within offered specialization/profile	The student has advanced skills in the field of construction			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[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	The student is able to design complex geometric layouts on railway lines and stations, newly build and upgraded			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K7_K04] understands the necessity of dissemination civil engineering knowledge in the society and to support the professional ethos of a civil engineer	The student understands the need to provide the public with knowledge about construction and maintain the ethos of the profession of civil engineer			[SK4] Assessment of communication skills, including language correctness		
	[K7_W15] has deep and adequate knowledge of civil engineering, within offered specialization and profile	The student has systematized and thorough knowledge in the field of construction, within the offered specialties and diploma profiles			[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	The student has systematized and theoretically founded knowledge of railway structures, including high-speed railways and the design of complex track geometric layouts			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		

Subject contents	<p>Historical conditions related to the need of upgrading railway lines in Poland.          Upgrading process as an engineering problem.          Criteria of railway line upgrading.          Factors determining the upgrading process of lines and stations.          Speed profile of complex geometric layouts on railway lines.          Computer support in the process of upgrading railway lines.          Implementation of upgrading works on routes and stations.          Optimization of cant and transition curves.          Calculation of earthworks in the process of railway lines upgrading.</p>		
Prerequisites and co-requisites	Railways		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	100.0%	45.0%
	Written exam	50.0%	55.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Bałuch H.: <i>Układy geometryczne połączeń torów</i>. WKŁ. Warszawa 1989.</li> <li>2. Grulkowski S., Kędra Z., Koc W., Nowakowski M.: <i>Drogi szynowe</i>. Wyd. Pol. Gdańskiej, Gdańsk 2013</li> <li>3. Koc W.: <i>Elementy teorii projektowania układów torowych</i>. Politechnika Gdańska 2004.</li> <li>4. Sysak J.: <i>Drogi kolejowe</i>. PWN, Warszawa 1986.</li> <li>5. Rozporządzenie ministra transportu i gospodarki morskiej z dnia 10 września 1998 r. w sprawie warunków technicznych, jakim powinny odpowiadać budowle kolejowe i ich usytuowanie. Dz. U. z dnia 15 grudnia 1998.</li> <li>6. Id -1 Warunki techniczne utrzymania nawierzchni na liniach kolejowych Warszawa, 2005.</li> <li>7. Szczegółowe warunki techniczne dla modernizacji lub budowy linii kolejowych do prędkości <math>V_{max} \leq 200</math> km/h (dla taboru konwencjonalnego) / 250 km/h (dla taboru z wychylnym pudłem) – TOM I - DROGA SZYNOWA (Załącznik do uchwały Nr 442/2019 Zarządu PKP Polskie Linie Kolejowe S.A. z dnia 9 lipca 2019 r.)</li> <li>8. Szczegółowe warunki techniczne dla modernizacji lub budowy linii kolejowych do prędkości <math>V_{max} \leq 200</math> km/h (dla taboru konwencjonalnego) / 250 km/h (dla taboru z wychylnym pudłem) – ZAŁĄCZNIK ST1-T1-A6 (Załącznik Nr 1 do uchwały Nr 1086/2017 Zarządu PKP Polskie Linie Kolejowe S.A. z dnia 13 listopada 2017 r.).</li> </ol>	
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Bogdaniuk B.: <i>Modernizacja dróg kolejowych przy ich elektryfikacji</i>. WKŁ, Warszawa 1988.</li> <li>2. Bogdaniuk B., Towpik K.: <i>Budowa, modernizacja i naprawy dróg kolejowych</i>. KOW, Warszawa 2010.</li> <li>3. Massel A.: <i>Projektowanie linii i stacji kolejowych</i>. PKP Polskie Linie Kolejowe, Warszawa 2010.</li> <li>4. Massel A., Wołek M.: <i>Podręcznik rewitalizacji linii kolejowych</i>. Samorząd Województwa Pomorskiego, Gdańsk 2007.</li> </ol>	
	eResources addresses	Adresy na platformie eNauczanie:	

Example issues/ example questions/ tasks being completed	1. Calculate the kinematic and geometrical parameters of the complex geometrical layout on a line or a railway station; 2. Calculate the permissible speed on the railway line (for different thresholds - in accordance with Annex ST1-T1-A6); 3. Redesign the geometric layout of the railway line in the plan and profile due to given criteria; 4. Assess the possibility of the geometric layout upgrading on a selected part of the railway line.
Work placement	Not applicable

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