

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Railway safety and operation</b>		Code <b>1010102121010121993</b>
Field of study <b>Civil Engineering Second-cycle Studies</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>Railways</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>15</b> Laboratory: <b>15</b> Project/seminars: <b>15</b>		No. of credits <b>5</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>5 100%</b> <b>5 100%</b>
<b>Responsible for subject / lecturer:</b> DSc Eng. Jeremi Rychlewski email: jeremi.rychlewski@put.poznan.pl tel. 61 647 5816 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		<b>Responsible for subject / lecturer:</b> MSc Eng. Bogdan Bresch email: brak@brak tel. 61 665 2407 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	K_W01. Has an advanced knowledge of sectors of mathematical and physical knowledge important for railway construction. K_W02, K_W14. Knows rules governing design and dimensioning of rail roads. K_W17. Knows and uses building code rules.
2	<b>Skills</b>	K_U02. Has an ability to classify rail network elements. K_U03, K_U09. Has an ability to design railway superstructure and layout of turnouts. K_U05. Knows methods for building process optimisation.
3	<b>Social competencies</b>	K_K02. Is responsible for solidity of results acquired from own or subordinate team's work. K_K03. Individually supplements and enlarges knowledge about modern processes in rail transport. K_K11. Behaves with regard to rules of ethics.
<b>Assumptions and objectives of the course:</b> A basic goal of this subject is to teach 1) rules of train traffic control and management 2) rail traffic engineering, including competition problems in transport, and 3) about yard service for rail vehicles.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Has knowledge about sustainable transport, - [K_W13] 2. Knows rules of rail traffic management and control, - [K_W16] 3. Knows basics of rail traffic engineering and rules governing competition in transport. - [K_W09, K_W11, K_W16]		
<b>Skills:</b>		
1. Can describe rules for safe train control and design location and signals of rail lights and signs, - [K_U09, K_U12] 2. Can draw a railway timetable graph for trains operating at a given cadence, - [-] 3. Can research a technical problem connected to train traffic management and yard service for rail vehicles. - [K_U17]		
<b>Social competencies:</b>		
1. Is conscious about a need for sustainable transport, - [K_K04] 2. Can formulate opinions concerning traffic management, - [K_K08] 3. Takes care about own health and physical fitness by using modes of transport alternative to the car. - [K_K13]		

<b>Assessment methods of study outcomes</b>		
<p>Lectures ? written colloquium at semester?s end, activity during lectures, participation in technical trips;            Classes ? participation in discussions, activity during classes, for students with lesser activity ? oral colloquium;            Laboratory ? accomplishment of traffic engineering projects;            Project ? achievement of projects with the projects? defence.</p>		
<b>Course description</b>		
<p>Lectures: Rail (including tram) traffic management: rail signalling, European Train Control System, turnout setting, confirmation of trains path through a station?s head. Control of rail traffic. Rail vehicle?s check-ups. Elements of rail traffic engineering. Competition in transport.            Classes: Rail (including tram) traffic management and control. Regulation of rail traffic. Rail vehicle management. Reaction in emergency cases. Competition in transport            Laboratory: Capacity and freedom of flow. Tram traffic management. Traffic simulations.            Project: Rail signals and signs on a medium station. Turnout setting, confirmation of trains path through a station?s head, train detection. Railroad crossings. Construction of a cadential timetable and calculation of operational parameters.</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Chwieduk A., Dyr. T.: Projektowanie ruchu pociągów. WPR, Radom 1997.</li> <li>2. Cieślakowski S.: Stacje kolejowe. WKiŁ, Warszawa 1992.</li> <li>3. Massel A.: Projektowanie linii i stacji kolejowych. KOW, Warszawa 2010.</li> <li>4. Podoski J.: Transport w miastach. WKiŁ, Warszawa 1977.</li> <li>5. Węgiński J.: Układy torowe stacji ? funkcja I teoria. WKiŁ, Warszawa 1974.</li> <li>6. Woch J.: Narzędzia analizy efektywności i optymalizacji sieci kolejowej. WPŚI., Gliwice 2001.</li> <li>7. Woch J.: Podstawy inżynierii ruchu kolejowego. WKiŁ, Warszawa 1983.</li> <li>8. Żurkowski A., Pawlik M.: Ruch i przewozy kolejowe, sterowanie ruchem. KOW, Warszawa 2010.</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Datka S., Suchorzewski W.: Tracz M. Inżyniera Ruchu. WKiŁ, Warszawa 1999.</li> <li>2. Dąbrowa-Bajon M.: Podstawy sterowania ruchem kolejowym. OWPW, Warszawa, 2002.</li> <li>3. Ostaszewicz J., Rataj M.: Szybka komunikacja miejska. WKiŁ, Warszawa 1979.</li> <li>4. Rojek A.: Tabor i trakcja kolejowa. KOW, Warszawa 2010.</li> <li>5. Rozkwitalska C.: Koszty i korzyści transportu zbiorowego i indywidualnego w miastach. IGPIK, Warszawa 1997.</li> <li>6. Sysak J.: Podstawy dróg kolejowych. WKiŁ, Warszawa, 1982.</li> <li>7. Przegląd Komunikacyjny, Stowarzyszenie Inżynierów i Techników Komunikacji Rzeczpospolitej Polskiej, Warszawa.</li> <li>8. Technika Transportu Szynowego, EMI-PRESS, Łódź.</li> <li>9. Transport Miejski i Regionalny, Stowarzyszenie Inżynierów i Techników Komunikacji Rzeczpospolitej Polskiej, Warszawa.</li> <li>10. Materiały cyklicznej konferencji: Problemy komunikacyjne miast w warunkach zatłoczenia motoryzacyjnego.</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Student?s attendance to lectures, classes, projects and laboratories, excluding technical trips.	75	
2. Technical trips.	10	
3. Consulting.	10	
4. Preparation to colloquium.	10	
5. Preparation to laboratory.	10	
6. Designing project outside classrooms	10	
7. Writing descriptions.	10	
8. Preparation for projects? defence.	10	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	125	5
Contact hours	85	3
Practical activities	70	2