

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Maintenance and operation of railways</b>		Code <b>1010125131010126035</b>
Field of study <b>Structural Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>2 / 3</b>
Elective path/specialty <b>Road-Train Engineering</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>part-time</b>	
No. of hours Lecture: <b>10</b> Classes: <b>8</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>1</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>1 100%</b> <b>1 100%</b>
<b>Responsible for subject / lecturer:</b> Michał Pawłowski, DSc Eng email: MICHAL.PAWLOWSKI@PUT.POZNAN.PL tel. +48 61 665 2407 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		<b>Responsible for subject / lecturer:</b> dr hab. inż. Włodzimierz Bednarek email: wlodzimierz.bednarek@PUT.POZNAN.PL tel. +48 61 665 2638 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>	Knowledge from mathematics and physics required to solve tasks dealing with railroad construction. Knowledge and skills for reading construction drawings. Knowledge of properties, scope of utilisation and investigations of construction materials. Principles of design and analysis of railway construction.
2	<b>Skills</b>	Ability to design railway lines. Ability to read construction drawings. Ability to conduct experiments leading to assessment construction materials quality.
3	<b>Social competencies</b>	Competency of individual and group work under a given task. Being responsible for reliability of the executed work and the work's interpretation. Responsibility for personal and group safety. Cognition of a need to increase one's professional and personal competencies.
<b>Assumptions and objectives of the course:</b> Acquiring by the students basic knowledge and skills in the field of maintenance and operation of railways.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. has knowledge about rules of planning maintenance of railway lines - [K_W14] 2. knows the technologies of construction and maintenance of railways - [K_W14] 3. knows way of organizing the construction process and carrying out works safely - [K_W15]		
<b>Skills:</b>		
1. is able to plan maintenance works - [K_U16] 2. is able to apply the appropriate technology according to the needs of the railway line maintenance, - [K_U21] 3. is able to assess the risks during maintenance works - [K_U16] 4. is able to organize railway maintenance works of railway lines according to the principles of technology and organization - [K_U21]		
<b>Social competencies:</b>		
1. is competent to work individually and in a group under a given task - [K_K01] 2. is responsible for reliability of work done and of the work's results interpretation - [K_K02] 3. states conclusions and describes results of own work - [K_K09]		

<b>Assessment methods of study outcomes</b>		
Outcome of the lectures ? a written colloquium - checking master the knowledge presented in the lectures. Graduation from 51%.		
Outcome of the classes ? a written colloquium - checking master the knowledge presented in the classes. Graduation from 51%.		
<b>Course description</b>		
Lectures: learning method - lecture / problem lecture / lecture with multimedia presentation Maintenance, current and main repairs of railway superstructure and subgrade; Machinery and equipment for track works; Basic technological processes of repairs of railway superstructure and subgrade; Technology of construction of railway lines; Safety rules during works on open railway lines. Classes: learning method - exercise method Securing of trackwork. Repairing broken rails.		
<b>Basic bibliography:</b>		
1. Bałuch H.: Diagnostyka nawierzchni kolejowej. WKiŁ, Warszawa 1978. 2. Batko M.: Budowa i utrzymanie dróg kolejowych. WKiŁ, Warszawa 1985. 3. Bernaś M., Koktysz B.: Maszyny i urządzenia do robót torowych. WKiŁ, Warszawa 1990. 4. Bogdaniuk B., Towpik K.: Budowa, modernizacja i naprawy dróg kolejowych. KOW, Warszawa 2010. 5. Id-1. Warunki techniczne utrzymania nawierzchni na liniach kolejowych. PKP Polskie Linie Kolejowe S.A., Warszawa 2005. 6. Id-3. Warunki techniczne utrzymania podtorza kolejowego. PKP Polskie Linie Kolejowe S.A., Warszawa 2009. 7. Kędra Z.: Technologia robót torowych. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2015. 8. Klonowski P., Kulczycki B., Lenkiewicz W., Wasilewski Z., Wyszyński K.: Technologia zmechanizowanych robót kolejowych. Wydawnictwa Politechniki Warszawskiej, Warszawa 1983. 9. Koktysz, M. Bernaś: Maszyny i urządzenia do robót torowych, tom I, WKiŁ, Warszawa 1990. 10. Matylla S.: Technologia zmechanizowanych robót kolejowych. Wydawnictwo Politechniki Poznańskiej, Poznań 1981. 11. Mazur J.: Roboty torowe. Państwowa Inspekcja Pracy . Warszawa 2014. 12. PKP PLK S.A.: Informacje o zagrożeniach dla bezpieczeństwa i zdrowia w zakresie wykonywania prac na terenie kolejowym PKP Polskie Linie Kolejowe S.A. Warszawa 2014. 13. PKP PLK S.A.: Poradnik dla wykonawców w zakresie bezpiecznego wykonywania prac na terenie kolejowym PKP Polskie Linie Kolejowe S.A. Warszawa 2013. 14. Semrau A., Zamięcki H.: Budowa i utrzymanie dróg kolejowych, tom II,, WKiŁ, Warszawa 1975. 15. Skrzyński E., Sikora R.: Kolejowe budowle ziemne. Tom II. WKiŁ, Warszawa 1987. 16. Sysak J. (red.): Drogi kolejowe. PWN, Warszawa 1986. 17. Towpik K.: Utrzymanie nawierzchni kolejowej. WKiŁ, Warszawa 1990.		
<b>Additional bibliography:</b>		
1. Dyżewski A.: Technologia i organizacja budowy. Arkady, Warszawa 1965. 2. Lewinowski C., Zimnoch S.: Ogólne zasady projektowania robót ziemnych dróg samochodowych i kolejowych. PWN, Warszawa 1987. 3. Infrastruktura Transportu, ELAMED, Katowice 4. Przegląd Komunikacyjny, Stowarzyszenie Inżynierów i Techników Komunikacji Rzeczpospolitej Polskiej, Warszawa 5. Technika Transportu Szynowego, EMI-PRESS, Łódź		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. participation in lectures	10	
2. participation in classes	8	
3. own study using the indicated literature and online resources	6	
4. preparation to lectures colloquium	3	
5. preparation to classes colloquium	2	
6. consultations	1	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	30	1
Contact hours	10	1

Practical activities	8	1
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