

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Maintenance and operation of railways		Code 1010102121010126035
Field of study Civil Engineering Second-cycle Studies	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 2
Elective path/specialty Railways	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 45 Classes: 15 Laboratory: - Project/seminars: 30		No. of credits 7
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 7 100% 7 100%
Responsible for subject / lecturer: dDSc. Michał Pawłowski email: MICHAL.PAWLOWSKI@PUT.POZNAN.PL tel. +48 61 665 2407 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Has knowledge of managing business in the construction sector, knows the standards and guidelines for the design of linear structures; knows and applies acts of law, standards and guidelines
2	Skills	Uses specialized tools in order to find useful information, software supporting the work of the designer and organizer of the construction process; knows how to prepare a schedule of construction works, manage the construction process; is able to analyze the risks during the performance of projects and operation of building
3	Social competencies	Can work individually and in a group on a given task or eventually manage a team; Takes responsibility for solidity of own and team work's results; complements and enhances knowledge about railway construction; Takes responsibility for own and team's safety; Consciousness about a need to improve professional skills and personal competence
Assumptions and objectives of the course: Getting to know the technologies in the earthworks, repairs of the broken rails and improve the efficiency of railway superstructure's maintenance		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Student knows the planning of the work, work schedules, organization of construction process, acceptance and settlement of the works - [K_W11]		
2. Student knows the technologies used for the construction, maintenance and modernization of the railway line - [K_W14]		
3. Student knows the technologies used for the improvement the efficiency of railway superstructure's maintenance - [K_W17]		
Skills:		
1. Student is able to choose an appropriate technology for railway works - [K_U05]		
2. Student is able to draw the graph of construction progress for each technology - [K_U10]		
3. Student is able to choose an appropriate machineries used in the construction and maintenance works of the railway lines - [-]		
Social competencies:		
1. Student is responsible for solidity of own work's results - [K_K02]		
2. Student alone complements and enhances knowledge about railway lines - [-]		
3. Student in conscious about a need to improve professional skills and personal competence - [-]		

Assessment methods of study outcomes		
<p>Verification of knowledge: class participation and exam at the end of semester. Getting points for: active participation in the classes, knowledge presented at the exam. Verification of skills: active participation in the projects; completing 2 projects, oral defense of the projects and studies; discussion of the solutions used in projects. Getting points for: activity in the classroom, knowledge of the issues presented in the projects, substantive quality of the projects</p>		
Course description		
<p>1. Technology of railway works. 2. Drawing the graph of construction progress for a given technology. 3. Repairing of the broken continuous welded rails. 4. Technologies used for the improvement the efficiency of railway superstructure?s maintenance. 5. The geometric and kinematic assessment of rail track. 6. Degradation of railway superstructure. 7. The process of maintenance railway superstructure</p>		
Basic bibliography:		
<p>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., Towpiak K.: Budowa, modernizacja i naprawy dróg kolejowych. KOW, Warszawa 2010. 5. Kędra Z.: Technologia robót torowych. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2015. 6. Klonowski P., Kulczycki B., Lenkiewicz W., Wasilewski Z., Wyszynski K.: Technologia zmechanizowanych robót kolejowych. Wydawnictwa Politechniki Warszawskiej, Warszawa 1983. 7. Koktysz, M. Bernaś: Maszyny i urządzenia do robót torowych, tom I, WKiŁ, Warszawa 1990. 8. Matylla S.: Technologia zmechanizowanych robót kolejowych. Wydawnictwo Politechniki Poznańskiej, Poznań 1981. 9. Mazur J.: Roboty torowe. Państwowa Inspekcja Pracy . Warszawa 2014. 10. PKP PLK S.A.: Id-1. Warunki techniczne utrzymania nawierzchni na liniach kolejowych. PKP Polskie Linie Kolejowe S.A., Warszawa 2005. 11. PKP PLK S.A.: Id-3. Warunki techniczne utrzymania podtorza kolejowego. PKP Polskie Linie Kolejowe S.A., Warszawa 2009. 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. Towpiak K.: Utrzymanie nawierzchni kolejowej. WKiŁ, Warszawa 1990.</p>		
Additional bibliography:		
<p>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. Przegląd Komunikacyjny, Stowarzyszenie Inżynierów i Techników Komunikacji Rzeczpospolitej Polskiej, Warszawa 4. Infrastruktura Transportu, ELAMED, Katowice 5. Technika Transportu Szynowego, EMI-PRESS, Łódź</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. Student?s attendance to lectures	30	
2. Current preparation to lectures	30	
3. Preparation to final exam and student?s attendance to exam	40	
Student's workload		
Source of workload	hours	ECTS
Total workload	175	7

Contact hours	100	4
Practical activities	75	3