

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Railroads		Code 1010104181010120153
Field of study Civil Engineering First-cycle Studies	Profile of study (general academic, practical) (brak)	Year /Semester 4 / 8
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 22 Classes: 8 Laboratory: - Project/seminars: 10		No. of credits 5
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 %) 5 100% 5 100%
Responsible for subject / lecturer: Jeremi Rychlewski, DSc Eng email: jeremi.rychlewski@put.poznan.pl tel. +48 61 647 58 16 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		Responsible for subject / lecturer: dr inż. 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	Basic knowledge from mathematics and physics required to solve tasks dealing with railroad construction. Knowledge and skills for drawing and reading geodesic maps, including drawing using CAD software. Knowledge of fundamentals of mechanics and strength of materials. Knowledge of fundamentals of soil mechanics. Knowledge of properties, scope of utilisation and investigations of construction materials.
2	Skills	Ability to choose tools for a design of a railway line. Ability to read technical drawing and geodesic maps. Ability to make a graphical documentation.
3	Social competencies	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.
Assumptions and objectives of the course: Acquiring by the students basic knowledge and skills in the field of railroads necessary to design section of a railway line.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. has basic knowledge about railway network and it's hierarchy - [K_W09]		
2. knows rules governing a design of a railway line in plane and profile - [K_W10]		
3. has basic knowledge about railroad superstructure and subgrade - [K_W14]		
Skills:		
1. can design a railway line and a railway station in plane and profile given uncomplicated terrain - [K_U08]		
2. can propose a method for railroad drainage - [K_U20]		
Social competencies:		
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]		

Assessment methods of study outcomes		
Outcome of the lectures ? a written colloquium in the 15. week of the semester. Graduation from 51%.		
Outcome of the classes ? a written colloquium in the 15. week of the semester. Graduation from 51%.		
Outcome of the project ? a content related evaluation of the presented design, orderliness of work (according to a consultancy card and participation in projects), defence of the project (written or oral).		
Course description		
Lectures: learning method - lecture / problem lecture / lecture with multimedia presentation		
Railway network and railway lines classification. Rules governing design of railroads in plane and profile. Basic elements of railroad?s superstructure and subgrade. Rules governing design of standard cross-sections. Rules governing construction of embankments and excavations and subgrade?s drainage. Description of drag during train?s movement and traction calculations.		
Classes: learning method - exercise method		
Calculations for design of a railroad in plane, traction calculations, calculations for design of a railroad in profile.		
Projects: learning method - project method (practical project)		
Preliminary design of a railroad.		
Basic bibliography:		
1. Bałuch. H., Bałuch M.: Układy geometryczne toru i ich deformacje. KOW, Warszawa 2010.		
2. Batko M.: Budowa i utrzymanie dróg kolejowych, WKiŁ, Warszawa 1985.		
3. Bogdaniuk B., Towpik K.: Budowa, modernizacja i naprawy dróg kolejowych. KOW, Warszawa 2010.		
4. Cieślakowski S.: Stacje kolejowe, WKiŁ, Warszawa 1992.		
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. Kiewlicz S., Łączyński J., Pelc S.: Nawierzchnia kolejowa typu S60, S49, S42. WKiŁ, Warszawa 1974.		
8. Sancewicz S.: Nawierzchnia kolejowa. KOW, Warszawa 2010.		
9. Semrau A., Zamięcki H.: Budowa i utrzymanie dróg kolejowych, tom II, WKiŁ, Warszawa 1975.		
10. Sysak J. (red.): Drogi kolejowe. PWN, Warszawa 1986.		
11. Towpik K.: Utrzymanie nawierzchni kolejowej. WKiŁ, Warszawa 1990.		
Additional bibliography:		
1. Wiłun Z.: Zarys geotechniki, WKiŁ, Warszawa 2005.		
2. Transport Miejski i Regionalny, Stowarzyszenie Inżynierów i Techników Komunikacji Rzeczpospolitej Polskiej, Warszawa		
3. Infrastruktura Transportu, ELAMED, Katowice		
4. Przegląd Komunikacyjny, Stowarzyszenie Inżynierów i Techników Komunikacji Rzeczpospolitej Polskiej, Warszawa.		
5. Technika Transportu Szynowego, EMI-PRESS, Łódź		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in lectures	22	
2. preparation to lectures colloquium	15	
3. participation in classes	8	
4. preparation to classes colloquium	15	
5. participation in projects	10	
6. project realisation outside project lessons	45	
7. participation in consultations	8	
Student's workload		
Source of workload	hours	ECTS
Total workload	125	5
Contact hours	47	2
Practical activities	61	2