STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Railway Roads**		Code **1010102121010121019**
Field of study **Civil Engineering Second-cycle Studies**	Profile of study (general academic, practical) **general academic**	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: **30** Classes: **15** Laboratory: **-** Project/seminars: **-**		No. of credits **3**
Status of the course in the study program (Basic, major, other) **major**	(university-wide, from another field) **from field**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **3 100%** **3 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	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. Basic knowledge of design, construction and maintenance.
2	**Skills**	Ability to evaluate and make a statement of loads acting on railway track; Ability to choose and use appropriate tools for the design of the railway line; Ability to read construction drawings and geodesic maps; Ability to prepare graphical documentation.
3	**Social competencies**	Can work individually and in a group on a given task; Takes responsibility for solidity of own work?s results and interpretation, 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:

To extend knowledge of design, construction and reconstruction of railways. To get acquainted with methods of optimization of railroad track geometry.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has extended knowledge of design and reconstruction of railway lines in plane - [K_W09]
2. Has extended knowledge of design and reconstruction of railway lines in profile - [K_W09]
3. Knows rules and methods of optimization of railway track geometry - [K_W09]

Skills:

1. Can design a reconstruction of railway track geometry in plane in complex terrain conditions - [K_U06]
2. Can design a reconstruction of railway track geometry in profile in complex terrain conditions - [K_U06]
3. Is able to prepare technical documentation of reconstruction of railway track geometry in plane and in profile - [K_U16]

Social competencies:

1. Can work individually and in a group on a given task - [K_K01]
2. Is responsible for solidity of own work?s results and interpretation - [K_K02]
3. Formulate conclusions and describes the results of own work?s - [K_K09]

Assessment methods of study outcomes

Outcome of the lectures - written exam - checking master the knowledge presented in the lectures.

Outcome of the classes - written colloquium in the 15. week of the semester.

Course description

Lectures: relationship between radius, velocity and acceleration. Cant and ramp. Transition curves with straight and curvilinear ramp. Joining curves having different radius. Benefits of using tilting trains. Optimization of the track geometry in plan. Trains at switches. Meaningful, harmful, harmless, lost and replacement track gradient on a high-speed lines. Optimization of the track geometry in plan.

Classes: Optimization of a track geometry layout in plan and profile.

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. Szajer R.: Drogi żelazne, WKiŁ, Warszawa 1970
12. 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. Student?s attendance to lectures	30
2. Student?s attendance to classes	15
3. Current preparation to classes	15
4. Preparation to exam	20
5. Preparation to colloquium	10
6. Consulting	3

Student’s workload

Source of workload	hours	ECTS
Total workload	75	3
Contact hours	50	2
Practical activities	25	1