



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Railway construction II

### Course

Field of study

Civil Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

4 / 7

Profile of study

general academic

Course offered in

polish

Requirements

elective

### Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

30

### Number of credit points

6

### Lecturers

Responsible for the course/lecturer:

DSc hab. Eng. Włodzimierz Bednarek

email: wlodzimierz.bednarek @put.poznan.pl

phone: 61-665 2407

Faculty of Civil and Environmental Engineering

ul. Piotrowo 5 60-965 Poznań

Responsible for the course/lecturer:

DSc Eng. Jeremi Rychlewski

email: jeremi.rychlewski@put.poznan.pl

phone. 61 647 5816

Faculty of Civil and Environmental Engineering

ul. Piotrowo 5 60-965 Poznań

### Prerequisites

KNOWLEDGE: student knows rules governing construction and analysis of railway construction objects.

SKILLS: student is able to obtain information from literature, databases and other properly selected sources;

student is able to integrate obtained information and evaluate it, make conclusions and discuss these conclusions.

SOCIAL COMPETENCIES: student is prepared to individually supplement and expand own knowledge of modern solutions and technologies in railway construction.



### Course objective

Acquainting students with construction and operation of a railway track, basic terms and processes taking place in an operated railway track. Identification of the main sources of risks in railway track related to its operation and discussion of possible actions and possible preventive measures.

Acquainting students with systems of urban rail transport.

Propagation of an attitude for life-long learning.

### Course-related learning outcomes

#### Knowledge

1. Has a basic general knowledge of railroad design and maintenance;
2. Knows basic processes taking place in the life cycle of a railroad and methods for evaluation and maintenance of its technical condition;
3. Knows similarities and differences between classical railways and urban rail transport systems.

#### Skills

1. Is able to dimension basic structural elements of linear railway construction;
2. Can work individually or in a team.

#### Social competences

1. Is conscious about a need to increase professional and personal competences, understands the need and knows the possibilities of the life-long learning (second and third degree studies, postgraduate studies, courses).

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

- for discussion, current preparation and activity in class;
- written colloquium - students should acquire at least 50% of points;
- obligatory execution of design exercises;
- final colloquium for design class.

### Programme content

#### LECTURE:

1. Introduction (including basic definitions); classification of railways (classic two-rail railways; unconventional railways);
2. Types of railway track structure and discussion about importance and role of its elements; a problem of choosing proper railroad superstructure;



3. Influence of temperature in a jointless railway track and work of such railway track elements (force and thermal stress); railway track displacements;
4. Transfer of loads from a rail vehicle's wheel to the subgrade; soil compaction and subgrade strengthening;
5. Necessary innovations in railways;
6. Urban rail transport systems;
7. Rail traffic management.

Project: Computational projects covering strength and maintenance of railroad's superstructure and subgrade

### Teaching methods

An informative lecture utilising a multimedia presentation with an occasional use of a blackboard. A choice of films available on the Internet.

Project – design method.

### Bibliography

#### Basic

1. Bałuch M.: Podstawy dróg kolejowych. Politechnika Radomska, Radom 2001.
2. Czyczuła Wł.: Tor bezстыkowy. Wydawnictwo Politechniki Krakowskiej, Kraków 2002.
3. Grulkowski S., Kędra Z., Koc Wł., Nowakowski M. J.: Drogi szynowe. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2013.
4. Praca zbiorowa pod red. J. Sysak: Drogi Kolejowe. PWN, Warszawa 1986.
5. Podoski J.: Transport w miastach. WKiŁ, Warszawa 1977.
6. Sancewicz S.: Nawierzchnia kolejowa. Wojskowa Akademia Techniczna, Warszawa 2010.
7. Żurkowski A., Pawlik M.: Ruch i przewozy kolejowe, sterowanie ruchem. KOW, Warszawa 2010.

#### Additional

1. Bogdaniuk B., Towpik K.: Budowa, modernizacja i naprawy dróg kolejowych. PKP Polskie Linie Kolejowe S.A., Warszawa 2010.
2. Czyczuła W., Towpik K.: Problemy modelowania oraz identyfikacji modeli toru bezстыkowego. Problemy Kolejnictwa, z. 128, 1998, s. 67–97.
3. Esveld C.: Modern Railway track. Second Edition. Delft, 2001.
4. Łoś M.: Wpływ temperatury na pracę bezстыkowego toru kolejowego. WKiŁ, Warszawa 1987.



5. Ostaszewicz J., Rataj M.: Szybka komunikacja miejska. WKiŁ, Warszawa 1979.
6. Puzavac L., Popović Z., Lazarević L.: Influence of track stiffness on track behaviour under vertical load. Traffic&Transportation, Vol. 24, 2012, No. 5.
7. Szcześniak W.: Statyka, dynamika i stateczność nawierzchni i podtorza kolejowego. Przegląd podstawowych pozycji literatury. Prace Naukowe Politechniki Warszawskiej, seria Budownictwo, z. 129, 1995.
8. Szczuraszek T.: Bezpieczeństwo ruchu miejskiego. WKiŁ, Warszawa 2005.
9. Towpik K.: Infrastruktura drogi kolejowej. Obciążenia i trwałość nawierzchni. Biblioteka Problemów Eksploatacji, Warszawa-Radom 2006
10. Tracz M., Allsop R. E.: Skrzyżowania z sygnalizacją świetlną. WKiŁ, Warszawa 1990.

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for colloquium, project preparation) <sup>1</sup>	75	3,0

<sup>1</sup> delete or add other activities as appropriate