



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of railroads [S1BZ1E>PBK]

### Course

Field of study

Sustainable Building Engineering

Year/Semester

3/6

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

English

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

15

### Number of credit points

2,00

### Coordinators

dr inż. Jeremi Rychlewski

jeremi.rychlewski@put.poznan.pl

### Lecturers

### Prerequisites

**KNOWLEDGE:** Student beginning this course should: - have knowledge of mathematics and physics useful in solving tasks connected with railway construction; - know rules governing drawing and reading geodesic maps; - have knowledge on theoretical mechanics, strength of materials and soil mechanics; - have knowledge on appropriate use, properties and investigations of construction materials; - have basic information about history of railways in the world and in Poland. **SKILLS:** Student should be able to: - analyse, synthesize and interpret acquired information; - independently learn and acquire knowledge; - adjust tools appropriate for given design tasks. **SOCIAL COMPETENCIES:** Student should: - be conscious about a need to work for a common good, to reach goals, both individual and social; - be able to work individually and in a group on a given task. - realise a necessity to improve professional and personal competence; - apply rules of culture and social cohabitation, notice other people's needs; - cooperate with other students and with the lecturer, knowing it is necessary to avoid actions disrupting other student's learning; - apply rules of culture and social cohabitation, notices other people's needs.

### Course objective

To present basic knowledge and teach basic skills on railway design. To present preliminary knowledge on construction, maintenance, diagnostics and exploitation of railroads.

## Course-related learning outcomes

### Knowledge:

Student acquires basic knowledge on design, construction, maintenance, diagnostics and exploitation of railroads;

Student acquires basic knowledge on geometrical layout of railway tracks;

Student learns about classification of railway lines and railroad pavements.

### Skills:

Student learns how to calculate basic railroad curves;

Student acquires an ability to categorise railways and classify railroad track;

Student learns to read topographic maps.

### Social competences:

Student learns to choose criteria and priorities for a certain task, taking into account common values and sustainable development;

Student takes responsibility for the accuracy and reliability of working results and their interpretation, gets an ability to critically evaluate the results of own work.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

LECTURE: Learning outcomes presented above are verified as follows:

The acquired knowledge is verified by a written colloquium done on the last lecture. The colloquium will be in a form of a multiple choice test with penalty for wrong answers, and questions of "list with a short description" type. With small number of students it is possible to change the form into an oral colloquium, requiring acceptance from the lecturer and majority of students. To pass the colloquium, students should acquire at least 50% of points. Activity during the lectures may be taken into account during the colloquium's score evaluation.

PROJECT: Skills and competencies will be checked by an evaluation of the presented project, social competencies presented during project's consulting, systematic work and a possible defence of the presented project.

Grade scale: 50-60% 3,0; 60-70% 3,5; 70-80% 4,0; 80-90% 4,5; 90-100% 5,0.

## Programme content

The module's programme covers:

- lectures on design of railways;
- lectures presenting preliminary information on construction, exploitation and diagnostics of railroads;
- designing elements of a preliminary railway line project in plane and profile.

## Course topics

### LECTURE:

1. Presentation of railway network and categorisation of railway lines;
2. Presentation of rules governing railroad design in plane and profile; discussion on equation describing train's motion;
3. Acquainting with basic elements of railroad superstructure, classical and non-classical, and subgrade;
4. Preliminary presentation of railroad's cross-sections;
5. Preliminary presentation of basic railroad work's technology, of railroad maintenance, exploitations and diagnosis;

PROJECT: A preliminary design of a railroad's fragment in plane and profile.

## Teaching methods

Informative lecture using multimodal presentation, with an occasional use of a blackboard. A selection of films to be seen on Internet.

Project - project method.

## Bibliography

Basic

1. Chandra S., Agarwal M.: Railway engineering. Oxford University Press, New Delhi 2014.
2. Hessami A.: Modern railway engineering. InTechOpen, 2018.
3. Kędra Z.: Technologia robót kolejowych. Politechnika Gdańska, Gdańsk 2017.
4. Profillidis V.: Railway management and engineering. Ashgate, Burlington 2014.
5. Rozporządzenie w sprawie warunków technicznych jakim powinny odpowiadać budowle kolejowe i ich usytuowanie.
6. Shift to rail joint undertaking: Shift to rail moving European railway forward. Luxembourg Publications Office, Luxembourg 2019.
7. Standardy techniczne - szczegółowe warunki techniczne dla modernizacji lub budowy linii kolejowych...
8. Yi S.: Principles of railway location and design. Elsevier, Amsterdam 2018.

#### Additional

1. Bałuch. H., Bałuch M.: Układy geometryczne toru i ich deformacje. KOW, Warszawa 2010.
2. Basiewicz T., Gołaszewski A., Rudziński L.: Infrastruktura transportu. Politechnika Warszawska, Warszawa 2002.
3. Bogdaniuk B., Towpik K.: Budowa, modernizacja i naprawy dróg kolejowych. KOW, Warszawa 2010.
4. Cieślakowski S.: Stacje kolejowe. WKiŁ, Warszawa 1992.
5. Sancewicz S.: Nawierzchnia kolejowa. KOW, Warszawa 2010.
6. Id-1. Warunki techniczne utrzymania nawierzchni na liniach kolejowych. PKP Polskie Linie Kolejowe S.A., Warszawa 2005.
7. Id-3. Warunki techniczne utrzymania podtorza kolejowego. PKP Polskie Linie Kolejowe S.A., Warszawa 2009.
8. Tolley R., Tolley R. S.: Sustainable transport. Cambridge 2003.
9. Sysak J. (red.): Drogi kolejowe. PWN, Warszawa 1986.
10. Towpik K.: Utrzymanie nawierzchni kolejowej. WKiŁ, Warszawa 1990.
11. Victoria Transport Policy Institute - web page: [www.vtpi.org](http://www.vtpi.org).

#### Breakdown of average student's workload

|                                                                                                                                         | Hours | ECTS |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Total workload                                                                                                                          | 60    | 2,00 |
| Classes requiring direct contact with the teacher                                                                                       | 30    | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 30    | 1,00 |