



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Construction and operation of railway lines

		Course
Field of study		Year/Semester
Civil Engineering		2/3
Area of study (specialization)		Profile of study
Road, Bridge and Railway Engineering		general academic
Level of study		Course offered in
Second-cycle studies		Polish
Form of study		Requirements
part-time		compulsory

		Number of hours
Lecture	Laboratory classes	Other (e.g. online)
20	0	0
Tutorials	Projects/seminars	
0	18	
<b>Number of credit points</b>		
3		

		Lecturers
Responsible for the course/lecturer:		Responsible for the course/lecturer:
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**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

Extending students' knowledge on construction and operation of a railway track and on processes taking place in an operated railway track. Analysis of main sources of risks in exploited railroad superstructure with presentation of possible preventive actions and measures. Presentation of rules and methods of railroad subgrade and superstructure diagnostics.

### Course-related learning outcomes

#### Knowledge

1. Has extended knowledge on railroad design and modernisation in plane and profile;
2. Knows rules and methods for optimisation of track geometric layout;
3. Knows rules, codes and standards for designing track layout of stations.

#### Skills

1. Can evaluate the risks in a railroad's superstructure during its operation;
2. Is able to select basic methods and preventive measures used to ensure operational suitability of a railway track;
3. Can obtain information from literature, databases and other properly selected sources, and creatively evaluate and interpret them.

#### Social competences

1. Is ready to autonomously complete and broaden knowledge in the field of modern processes and technologies of building engineering;
2. Is conscious about a need to increase professional and personal competences.

### 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. Rail track construction;
2. Process of railway track maintenance. Sustainance of railway track. Destressing of jointless track rails;



3. Influence of operation on a rail track – estimation of track irregularities and changes in geometric parameters. Rail wear (corrugation, vertical, side);
4. Track regulation in horizontal and vertical planes. Reprofilation of rail in an operated track;
5. Diagnostics of a railway track. Machines for the track's maintenance;
6. Cracking of rails. Hazards in the railway track;
7. Maintenance of railway's subgrade. The subgrade's strengthening and drainage.

Project: Calculative projects on rail track diagnosis and maintenance.

### Teaching methods

An informative lecture utilising a multimedia presentation with an occasional use of a blackboard.

Project – design method.

### Bibliography

Basic

1. Bałuch M.: Diagnostyka nawierzchni kolejowej. WKiŁ, Warszawa 1978.
2. Bogdaniuk B., Towpik K.: Budowa, modernizacja i naprawy dróg kolejowych. PKP Polskie Linie Kolejowe S.A., Warszawa 2010.
3. Czyczyła Wł.: Tor bezстыkowy. Wydawnictwo Politechniki Krakowskiej, Kraków 2002.
4. Towpik K.: Utrzymanie nawierzchni kolejowej. WKiŁ, Warszawa 1990.

Additional

1. Bednarek W.: Zużycie faliste szyn toru kolejowego (przyczyny i środki zaradcze). Archiwum Instytutu Inżynierii Lądowej Politechniki Poznańskiej, nr 20/2015.
2. Bogdaniuk B., Towpik K.: Budowa, modernizacja i naprawy dróg kolejowych. PKP Polskie Linie Kolejowe S.A., Warszawa 2010.
3. Czyczyła W., Towpik K.: Problemy modelowania oraz identyfikacji modeli toru bezстыkowego. Problemy Kolejnictwa, z. 128, 1998, s. 67–97.
4. Esveld C.: Modern Railway track. Second Edition. Delft, 2001.
5. Łoś M.: Wpływ temperatury na pracę bezстыkowego toru kolejowego. WKiŁ, Warszawa 1987.
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. Towpik K.: Infrastruktura drogi kolejowej. Obciążenia i trwałość nawierzchni. Biblioteka Problemów Eksploatacji, Warszawa-Radom 2006

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	38	1,5
Student's own work (literature studies, preparation for exam, project preparation) <sup>1</sup>	37	1,5

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