COURSE DESCRIPTION CARD - SYLLABUS

Course name
Construction and operation of railway lines [S2Bud1-BDMiK>BiELK]

Course

Field of study
Civil Engineering

Year/Semester
1/2

Area of study (specialization)
Road, Bridge and Railway Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
30

Number of credit points

3,00

Coordinators

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Lecturers

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. Propagation of an attitude for life-long learning.

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 COMPETENCIES:
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.
3. Is conscious about a need to critically evaluate personal and acquired knowledge.

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

The module's programme covers:
- diagnosis of railroads' state,
- system of railroads' maintenance,
- calculations connected to diagnostics and maintenance.

Course topics

LECTURE:
1. Rail track construction;
2. Process of railway track maintenance. Sustenance 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). Railroad's superstructure wear and degradation;
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. Vertical and horizontal stability of a jointlesst railway track. Cracking of rails. Durability of rail superstructure. 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. Czyczuła Wł: Tor bezstykowy. 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. Czyczuła W., Towpik K.: Problemy modelowania oraz identyfikacji modeli toru bezstykowego. 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 bezstykowego 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.
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Breakdown of average student's workload

	Hours	ECTS
Total workload	85	3,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00