COURSE DESCRIPTION CARD - SYLLABUS

Course name
Construction and operation of roads, motorways [S2Bud1-BDMiK>BiEDA]

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
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
15

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge: basic knowledge of design, construction, maintenance and operation of road. Skills: The ability to acquire information from literature, databases and other sources and to integrate obtained data. The ability to interpret and draw conclusions; The ability to critically analyse and to evaluate of existing road construction technologies; Social competencies: The ability to work independently and in a team; Understanding a need to transfer to the society the knowledge about building engineering; Understanding a necessity to improve professional and personal competence during the entire life;

Course objective

The aim of the course is to introduce students to the detailed issues of maintenance and operation of road as a very important area of road engineering, concerning issues related to the use of roads, road management, and diagnostics of road pavement. The objective of the course is to introduce the students with identification and resolving problems connected with diagnostics of road pavement. The aim of the course is gain skills of analysing new problems and solving them in the research work.

Course-related learning outcomes

Knowledge:

Student knows in detail currently utilised construction materials and products, their properties and testing methods as well as production and assembly technologies.
Student knows in detail the rules of design, construction and operation of road construction object
Student has structured and theoretically based knowledge of the processes in the full life cycle of building structures and their management rules. He/she also knows and understands the need formsystematic evaluation and maintenance of roads technical condition.
Student has detailed knowledge of the impact of building investments on the environment and understands the need to implement the rules of sustainable development.

Skills:
Student is able to identify the road pavement faults and determine the probable cause of them.
Student is able to determine repair needs of road pavement and suggest the proper maintenance works for roads.
Student is able to predict the change in time of the parameters describing the pavement condition.
Student is able to obtain information from literature, databases and other properly selected information sources; can integrate the obtained information, interpret and evaluate it as well as draw conclusions, formulate, justify, discuss and present opinions.

Social competences:
Student takes responsibility for the reliability of working results and their interpretation.
Student is ready to autonomously complete and broaden (extend) knowledge in the field of modern processes and technologies of building engineering.
Student is aware how important is sustainable development in building engineering.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: students knowledge is assessed on the basis of a written exam which takes place during the exam session;
Projects and laboratories: students" skills are assessed on the basis of a projects which must be handed on last classes; The projects must be done according to the topic assigned during the first classes; The projects are assessed in terms of content and aesthetics;

Programme content

LECTURE:
Issues related to the use, management and maintenance of roads, including motorways;
PROJECTS:
Design exercises in the field of diagnostics of road pavements, shoulders and drainage elements;
LABORATORIES:
Laboratory exercises in the field of road pavement diagnostics using diagnostic devices.

Course topics

LECTURE:
Issues related to the use of roads, including the characteristics of road users, traffic, traffic management systems, ITS traffic management, road safety.
Road management, tasks of road administration, rules for keeping records of roads, reference systems, road management system elements including: road data banks, systems of assessment of road elements, models and analysis, criteria and optimization, analysis of the consequences.
Pavement management system (PMS), kinds and aims of the road pavement diagnostics, factors influencing the road pavement condition, genesis of the road pavement faults, diagnosis of the road pavement technical condition, prediction of the road pavement condition, diagnostics of roads pavement in the existing legislation, assessment system of pavement condition DNS system and HDM-4 system.
Technical Equipment of motorways and expressways.
Safety in motorways and expressways operation.
Evaluation of technical state of motorways and expressways pavements.
Capacity and stability of earth objects and pavement construction of motorways and expressways.
Act on Toll Motorways and the National Road Fund.

The tender procedure for construction and operation of toll motorways.
The contract for the construction and operation of toll motorways.
PROJECTS:
Part I - inventory of damage to drainage elements and marginal strips for a selected road section;
Part II - assessment of the technical condition of the asphalt road pavement for specific data on pavement damage (diagnosis);
Part III - determining the model of the trend of changes in the state of a given parameter and determining the date of immediate renovation (prediction);
LABORATORIES:
Part I - introduction to the subject of assessing the technical condition of pavement (DSN system), presentation of diagnostic devices commonly used in Poland;
Part II - presentation of the prototype ZiSPON device (acronym translated into English: Precise Pavement Assessment Integrated System) with demonstration measurements in in-situ conditions;
Part III - determination of the deflection state class and the SCI300 index for the results obtained from the ZiSPON device measurement database;

Teaching methods

Lecture: informational lecture/problematic lecture/multimedia presentation lecture;
Project: case study;
Laboratory: presentation and experience method;

Bibliography

Basic
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2. Gaca S., Suchorzewski W., Tracz M.: Inżynieria ruchu drogowego, Wydawnictwa Komunikacji i Łączności, Warszawa 2008
3. Diagnostyka stanu nawierzchni i wybranych elementów korpusu drogi. Wytyczne stosowania, Generalna Dyrekcja Dróg Krajowych i Autostrad, Warszawa 2019
4. Katalog Przebudów i Remontów Nawierzchni Podatnych i Półsztywnych KPRNPP-2014, Generalna Dyrekcja Dróg Krajowych i Autostrad, Instytut Badawczy Dróg i Mostów, Warszawa 2014
5. Podemska M., Utrzymanie dróg - Technologia robót i sprzęt, Wydawnictwo KaBe, Krosno 2015
Additional
1. Pożarycki A., Górnaś P., Bilski M., Turkot A., Parametryzacja krzywej ugięć nawierzchni podatnych, Drogownictwo, 3, s. 67-73, 2019
2. Raszewski J., Pożarycki A., Górnaś P., Ocena wskaźnikowa stanu technicznego konstrukcji nawierzchni jezdni–studium przypadku na poziomie projektu, Drogownictwo, 11-12, s. 309 – 320, 2021
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6. Płatkiewicz A., Sztukiewicz R., Zastosowanie metody prognozowania szeregów czasowych do przewidywania zmian równości poprzecznej nawierzchni asfaltowej, Pięćdziesiąta Konferencja Naukowa KILiW PAN - KN PZITB, Krynica 2004, t. V, s. 217 - 224.
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8. Rydzewski P., Sztukiewicz R., Diagnoza nawierzchni jako podstawa wyboru zabiegów utrzymaniowych, Autostrady, Nr 5/2007, s. 110-113

Breakdown of average student's workload

	Hours	ECTS
Total workload	115	4,00
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)	55	2,00