

I. Tantárgyleírás

1. Alapadatok

1.1 Tantárgy neve

Highway and Railway Laboratory Practice

1.2 Azonosító (tantárgykód)

BMEEOUVAI44

1.3 Tantárgy jellege

Kontaktórási tanegység

1.4 Óraszámok

| Típus | Óraszám / (nap) |
|-------------------------|-----------------|
| Laboratóriumi gyakorlat | 2 |

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Félévközi érdemjegy

1.6 Kreditszám

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1.7 Tárgyfelelős

| | |
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1.8 Tantárgyat gondozó oktatási szervezeti egység

Út és Vasútépítési Tanszék

1.9 A tantárgy weblapja

<https://epito.bme.hu/BMEEOUVAI44>

<https://edu.epito.bme.hu/course/view.php?id=3595>

1.10 Az oktatás nyelve

magyar és angol

1.11 Tantárgy típusa

Kötelező az építőmérnöki (BSc) szak Infrastruktúra-építőmérnöki ágazatán

1.12 Előkövetelmények

Soft preliminary requirement:

- Highway and Railway Structures (BMEEOUVAI41)

1.13 Tantárgyleírás érvényessége

2023. február 27.

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

The aim of the course is for the student to master:

the structural elements of the railway superstructure, the investigation of the longitudinal restraint of rail fastenings, the testing of static stiffness of the rail fastenings, the testing of the dynamic stiffness of rail fastening, the testing of the clamping force of rail fastening, cracking and fracture testing of reinforced concrete railway sleepers,

the main raw materials of asphalt mixtures, their expected characteristics and test methods, the compositional conditions of asphalt mixtures, the specifications for the design of asphalt mixtures, the design principles and methods of asphalt mixtures, the performance-related and performance-based characteristics, their meaning and standard European test methods, the basic principles of qualification, the quality category determined during production and installation the structure and meaning of standards, the main content elements of type tests of asphalt mixtures, the requirements for the built-in layers, the reasons for the requirements, and their test methods.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése utána a hallgató

A. Tudás

1. knows the structural elements of the railway superstructure,
2. knows the testing of longitudinal restraint of the rail fastenings,
3. knows the testing of the static stiffness of the rail fastenings,
4. knows the testing of the dynamic stiffness of rail fastening,
5. knows the testing of the clamping force of rail fastening,
6. knows the cracking and fracture testing of reinforced concrete railway sleepers,
7. knows the main raw materials of asphalt mixtures, their expected characteristics and test methods,
8. knows the asphalt mixtures its composition conditions,
9. knows the specifications for the design of asphalt mixtures,
10. knows the design principles and methods of asphalt mixtures,
11. knows the performance-related and performance-based characteristics, their meaning, and standard European test methods,
12. knows the basic principles of qualification, the structure of quality categories determined during production

and installation,

13. knows the main content elements of type tests of asphalt mixtures,

14. knows the expectations for built-in layers, the reasons for the expectations, and their test methods.

B. Képesség

1. able to recognize and identify the structural elements of the railway superstructure,

2. able to analyze the longitudinal restraint of the rail fastenings,

3. able to carry out to test the static stiffness of the rail fastenings,

4. able to test the dynamic stiffness of rail fastening,

5. able to test the clamping force of rail fastening,

6. able to determine the suitability of given raw materials for the production of asphalt mixture,

7. able to actively contribute to the design of an asphalt mixture,

8. able to use a given asphalt mixture determine its design parameters,

9. able to adapt to the relevant system of regulations and standards,

10. able to compile the type test of the asphalt mixture,

11. able to distinguish between type test, mid-production and qualification tests and procedures,

12. able to establish tests the suitability of the asphalt mixture to be built into each track structure layer based on results,

13. able to establish the adequacy of individual track structure layers based on test results.

C. Attitűd

1. continuously cooperates with the instructor and fellow students during practical measurements and tests,

2. continuously cooperates with the instructor and fellow students during the analysis of the received data and performing calculations.

D. Önállóság és felelősség

1. performs the delegated laboratory tasks.

2.3 Oktatási módszertan

Railway part:

The reasons, needs, circumstances, methods and standards of the various tests are explained in a classroom. The tests are presented and performed as laboratory exercises.

Road part:

The role of the main parameters of asphalt mixtures and their raw materials and the test principles of each characteristic, as well as European standard test methods will be explained in a classroom. The individual tests are presented in the laboratory and specific tests are performed under the supervision of the students.

2.4 Részletes tárgypogram

| Week | Topics of lectures and/or exercise classes |
|------|--|
| 1. | Railway lab: Presentation of the structural elements of the railway superstructure in the laboratory. |
| 2. | Road lab: Description of the materials and properties of asphalt mixtures and the requirements imposed on them. Tests of aggregates. |
| 3. | Railway lab: Measurement of the longitudinal rail restraint of rail fastenings. |
| 4. | Road lab: Getting to know the types and characteristics of binders used in asphalt mixing, and the requirements placed on them. Testing of binders. Design principles of asphalt mixtures. |
| 5. | Railway lab: Measuring the static stiffness of rail fastenings. |
| 6. | Road lab: Preparation of asphalt mixtures in the laboratory. Preparation of laboratory specimens. Mass and volume ratios of asphalt mixtures. |
| 7. | Railway lab: Measuring the dynamic stiffness of rail fastenings. Measuring the clamping force of rail fastenings. |
| 8. | Road lab: Conventional asphalt tests. |
| 9. | Railway lab: Cracking and fracture testing of reinforced concrete railway sleepers. |
| 10. | Road lab: Performance-based tests of asphalt mixtures. |
| 11. | Railway lab: Track measurement demonstration at a site |
| 12. | Road lab: On-site and laboratory tests of built-in layers. Classification of built-in layers. |

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|-----|--------------|
| 13. | Spare class. |
| 14. | Spare class. |

A félév közbeni munkaszüneti napok miatt a program csak tájékoztató jellegű, a pontos időpontokat a tárgy honlapján elérhető "Részletes féléves ütemterv" tartalmazza.

2.5 Tanulástámogató anyagok

Textbooks:

- A. T. Papagionnakis, E. A. Masad: Pavement Design and Materials
- Asphalt Institute: Superpave Mix Design
- Asphalt Institute: Mix Design Methods

Online materials:

- Presentations
- Electronic lecture [notes](#)

2.6 Egyéb tudnivalók

Participation in laboratory exercises is 100% compulsory. A student who is absent from one or more exercises cannot obtain credit for the course. In case of an absence, the department provides one opportunity to complement for the absence during the week of repeats.

2.7 Konzultációs lehetőségek

Due to the nature of the tasks, there is no need for a consultation outside of the timetable.

Jelen TAD az alábbi félévre érvényes:

2024/2025 semester II

II. Tárgykövetelmények

3. A tanulmányi teljesítmény ellenőrzése és értékelése

3.1 Általános szabályok

The assessment of the learning outcomes specified in clause 2.2. above and the evaluation of student performance occurs via 2 tests (1 test of railway part and 1 test of road part) and active participation.

3.2 Teljesítményértékelési módszerek

| Evaluation form | Abbreviation | Assessed learning outcomes |
|-------------------------|--------------|----------------------------------|
| 1. test (railway part) | ZH1 | A.1-A.6; B.1-B.5 |
| 2. test (road part) | ZH2 | A.7-A.14; B.6-B.13 |
| Attendance and activity | A | A.1-A.14; B.1-B.13; C.1-C.2; D.1 |

A szorgalmi időszakban tartott értékelések pontos idejét, a házi feladatok ki- és beadási határidejét a "Részletes féléves ütemterv" tartalmazza, mely elérhető a tárgy honlapján.

3.3 Teljesítményértékelések részaránya a minősítésben

| Abbreviation | Score |
|--------------|-------------|
| ZH1 | 50% |
| ZH2 | 50% |
| A* | 0% |
| Sum | 100% |

* Criteria requirement.

ZH1: It is scoreless (failed) if it does not reach minimum 50% of the available score.

ZH2: It is scoreless (failed) if it does not reach minimum 50% of the available score.

A: Attendance at 100% of the lectures is compulsory.

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

The requirements for fulfilling the subject are follows: achieve the ZH1 successfully (reach minimum 50% of the available score), achieve the ZH2 successfully (reach minimum 50% of the available score), in addition

attendance at 100% of the lectures is compulsory.

3.5 Érdemjegy megállapítása

If the student satisfies the attendance criteria, his/her mark will be determined as follows. The final mark will be calculated as the average of the points received for the tests (based on 3.3).

| Grade | Points (P) |
|------------------|------------------------|
| excellent (5) | $P \geq 87,5\%$ |
| good (4) | $87,5\% > P \geq 75\%$ |
| satisfactory (3) | $75\% > P \geq 62,5\%$ |
| passed (2) | $62,5\% > P \geq 50\%$ |
| failed (1) | $P < 50\%$ |

3.6 Javítás és pótlás

- ZH1 and ZH2 can be repeated during the week of repeats (both of them for 2 times).

- In case of an absence, the department provides one opportunity to complement for the absence during the week of repeats.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

| Activity | Hours/semester |
|---------------------------|--------------------|
| contact hours | $12 \times 2 = 24$ |
| preparation for the tests | $2 \times 3 = 6$ |
| Sum | 30 |

3.8 A tárgykövetelmények érvényessége

2023. február 27.

Jelen TAD az alábbi félévre érvényes:

2024/2025 semester II