Highway and Railway Design - BMEEOUVAI43 - 2024/25/2

I. Tantárgyleírás

1. Alapadatok

1.1 Tantárgy neve

HIGHWAY AND RAILWAY DESIGN

1.2 Azonosító (tantárgykód)

BMEEOUVAI43

1.3 Tantárgy jellege

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	3
Gyakorlat	2

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Vizsga

1.6 Kreditszám

5

1.7 Tárgyfelelős

név	Dr. Ákos VINKÓ
beosztás	Adjunktus
email	vinko.akos@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Út és Vasútépítési Tanszék

1.9 A tantárgy weblapja

$@COURSEVIEWBYID*3584@$
https://edu.epito.bme.hu/course/view.php?id=3584

1.10 Az oktatás nyelve

angol

1.11 Tantárgy típusa

Kötelező az építőmérnöki (BSc) szak Infrastruktúra-építőmérnöki ágazatán

1.12 Előkövetelmények

- Roads (BMEEOUVAT42)

1.13 Tantárgyleírás érvényessége

2022. szeptember 1.

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

To get to know the role of rail and road transport, the planning and decision-making process for infrastructure investment, basic principles of alignment design, operation, and control. In addition, students can deepen their understanding in practice from the concrete cases.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése utána a hallgató

A. Tudás

1. will learn the alignment design principles of horizontal and vertical alignment on tramways
2. will learn the layout design of tramway track connections, the application areas of turnouts,
3. will learn the operation modes of tramway turnouts,
4. will learn the widely applied tramway track superstructures and their construction methods

B. Képesség

1. will be able to identify the different types of track structures
2. will be able to design the horizontal and vertical alignment of the tramway route.
3. will be able to calculate and design track connections as well as select the proper turnout type
4. will be able to use the loading gauge and kinematic envelope concepts in the design of tramway lines integrated into an urban landscape
5. will be able to perform complex modeling tasks using CAD software,
6. will be able to represent his digital model with a graphic representation that complies with the standard,

C. Attitűd

1. cooperates with the tutor/lecturer and with fellow students, develops his/her co-working skills during the teamwork [HF1 – Homework 1.]
2. continuously extends his/her knowledge.
3. develops precise problem-solving skills.

D. Önállóság és felelősség

1. will be able to work autonomously and/or with individual research to complete his/her tasks.
2. is open to the comments and critics of teachers and fellow students.
3. co-operates with his/her fellow students.
4. is able to think in a total system.

2.3 Oktatási módszertan

Lectures with slides, seminars, case studies, self-made small projects,

2.4 Részletes tárgyprogram

Week	Topics of lectures
1.	The design process, phases: Feasibility study, Study Plan, Construction Plan. Content and formal requirements of plans
2.	Elements and design of horizontal and vertical alignment (straight sections, transition curve, circular curve). Spatial coordination of horizontal and vertical alignment. Self-explaining roads.
3.	Elements of the cross-section: rural and urban roads. Function and design. Facilities for pedestrians and cyclists.
4.	Traffic planning. At-grade intersections, elements of intersections.
5.	Traffic regulation on rural roads: road signs and

	pavement markings, traffic lights.
6.	Details of horizontal alignment elements: pavement edge rounding, compound curves, parking lots, stops of public transport services.
7.	Traffic regulation on urban roads: traffic calming, traffic calming on through-passing sections, settlement gate.
8.	**Introduction**: Rail transport systems and their classification. Basic Aspects of railway route (*center line of track, center of alignment, structural and loading gauge, distance between track axes*). Track layout guidelines, elements of the railway horizontal and vertical alignment;
9.	**Tramway route and line design I.:** Railway Alignment Optimization in Tramway, analytical descriptions of· track geometry variations (*flexible tramway track alignment design, distance variation between the axes of two tracks, comparison of multiple alignments*)
10.	**Tramway route and line design II.:** Tramstop and terminus Platforms layout design, track connections, tram depot (operational principles, Organisation of Space & Tasks)
11.	**Tramway Turnouts and crossings:** standard turnout forms, design parameters, geometry, structural components
12.	**Modern Tramway Track Structures and its elements**: conventional ballasted tracks, slab tracks, embedded rail system (*Concepts and functionalities with mechanical-, / fastening based indirect-, / without Track gauge control*), green track solutions, construction and maintenance technologies
13.	**Special railway systems in an urban area I**: Cog railways, Cableways, Funiculars,
14.	**Special railway systems in an urban area II**: monorail systems, and rubber-tired trams

Content and formal requirements of plans. I.

Week	Topics of exercise classes
1.	Study plan. Orientation on the map, forming neutral lines.
2.	Study plan. Elements and design of the horizontal alignment.
3.	Study plan. Elements and design of the vertical alignment.
4.	Study plan. Elements and design of the cross-section.
5.	Cross sections. Superelevation. Drainage. Horizontal curve with symmetrical and asymmetrical transition curves. Superelevation. Superelevation runoff.
6.	Consultation - workshop
7.	Designing the horizontal alignment of tramway tracks I.
8.	Designing the horizontal

	alignment of tramway tracks II.
9.	Turnouts, track connection, and tramstop platform design
10.	Consultation - workshop
11.	Cross-section design: Integrating Tramway System into the Urban Landscape
12.	Content and formal requirements of plans. I.
13.	Content and formal requirements of plans. II.
14.	Consultation - workshop

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

Lectures and slides.

2.6 Egyéb tudnivalók

Attendance of lectures is compulsory. The credits from the subject will be refused to students missing more than four times.

2.7 Konzultációs lehetőségek

Teachers are available for consultation during their office hours, as advertised on the department website.

Jelen TAD az alábbi félévre érvényes:

II. Tárgykövetelmények

3. A tanulmányi teljesítmény ellenőrzése és értékelése

3.1 Általános szabályok

The assessment of the learning outcomes is specified in clause 2.2. above and the evaluation of student performance occurs via two midterm tests, two homework, and a written exam in the exam period.

3.2 Teljesítményértékelési módszerek

Evaluation form	Abbreviation	Assessed learning outcomes
1. Midterm test	ZH1	
2. Midterm test	ZH2	A.1-A.2; B.1-B.4; C.2
1. Projectwork	HF1	C.1
2. Projectwork	HF2	A.1-A.4; B.1-B.6
Written exam	V	A.1-A.4; B.1-B.6; C.1-C.3; D.1-D.4

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
HF1	15%
HF2	15%
ZH1	10%
ZH2	10%
V	50%
Sum	**100%**

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

To be present at least 70% of the classes and seminars. The student must achieve a result of at least 50% (=performance threshold) separately for all performance evaluations carried out during the semester. submit the homework and receive a grade of at least pass of it.

3.5 Érdemjegy megállapítása

Grade	Points (P)
excellent (5)	P>87,5%
good (4)	75%<=P<87,5%
satisfactory (3)	62,5%<=P<75%
passed (2)	50%<=P<62,5%
failed (1)	P<50%

3.6 Javítás és pótlás

1. The homework can be given with delay till a pre-defined date – usually one week later – by paying a fee.
2. The homework given in and accepted can be amended till the pre-defined deadline without paying a fee.
3. The two midterm tests can be repeated –without fee – at a previously determined date given in the course schedule. One midterm test can be repeated twice by paying a previously defined fee.
4. The new result of the repeated test always overwrites the former results.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	Hours/semester
contact hours	14×5=70
preparation for the projects	24
preparation for the tests	2×14=28
preparation for the exam	28
Sum	**5x30=150**

3.8 A tárgykövetelmények érvényessége

2022. szeptember 1.

Jelen TAD az alábbi félévre érvényes: