Design of Railway Stations - BMEEOUVMU-2

I. Subject Specification

1. Basic Data

1.1 Title

DESIGN OF RAILWAY STATIONS

1.2 Code

BMEEOUVMU-2

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2
Seminar	1

1.5 Evaluation

Exam

1.6 Credits

4

1.7 Coordinator

name	Dr. Szabolcs FISCHER, Ph.D.
academic rank	Associate professor
email	fischersz@sze.hu

1.8 Department

Department of Highway and Railway Engineering

1.9 Website

https://epito.bme.hu/BMEEOUVMU-2
https://edu.epito.bme.hu/course/view.php?id=4568

1.10 Language of instruction

english

1.11 Curriculum requirements

Optional in the Infrastructure Engineering (MSc) programme

1.12 Prerequisites

1.13 Effective date

1 September 2022

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2. Objectives and learning outcomes

2.1 Objectives

The aim of the course is to acquire design knowledge related to railway stations. Students have an existing railway station (with geometry), they have to upgraded it. This task can be executed through steps of the upgrade planning up to the parts of the work to be completed (site plan, longitudinal section, cross section, drainage), with continuous instructors' guidance (consultation). They also receive tangential information about the tasks in the 'field of specialities'.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. is familiar with the various railway service points (stations, stops, turn-out tracks, junctions) for conventional and high-speed lines,
2. knows the parts of the turnouts, their main dimensions, the rules and restrictions of their use,
3. is familiar with all types of standard and custom track connections known in the literature,
4. is familiar with the methods of station platforms, the related Hungarian and EU regulations,
5. knows the elements of cross-sections of railway stations,
6. knows the ways of curving methods of turnouts,
7. is familiar with the most important parts of overhead cable equipment,
8. is familiar with the types of cable construction facilities in the substructure.

B. Skills

1. is able to draw various railway service locations at the level of a 'distorted topographical sketch',
2. is able to interpret a computer drawing from a geodetic survey,
3. is able to edit a stationary track geometry (geometries) in the form of a 'distorted topographic sketch' in scale, according to the Hungarian and EU regulations,
4. is able to determine/design the longitudinal section, drainage and cross-sections of a railway station based on its site plan,
5. is able to prepare the work parts belonging to the construction plan (sleeper and rail allocation plan, layout plan),
6. is able to accommodate cable-laying facilities (in the substructure) on an existing railway station layout,
7. is able to draw and edit using a computer, including the appropriate layout,
8. is able to express his / her thoughts orally and in writing in an orderly form.

C. Attitudes

1. cooperates with the instructor in the preparation of partial evaluations,
2. is open to the use of information technology tools,
3. strives for an accurate and error-free solution,
4. strives for precise, professional wording in its oral and written statements,
5. in its written performance appraisals, he/she strive for orderly quality at the engineering level and for the preparation of visual documentation,
6. in the preparation of plans and drawings, he/she strives for orderly, line thicknesses, appropriate shapes and for transparent work with lettering.

D. Autonomy and Responsibility

1. he/she successfully prepares by processing the knowledge material listened to in class, to be able to successfully fulfil the summary evaluations,
2. he/she prepares – independently and to the best of his/her ability – the issued tasks during the independent partial assessments,
3. openly accepts well-founded critical remarks, incorporates them into the solution of his/her tasks.

2.3 Methods

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Lectures with presentations, independently prepared home works, communication in writing and orally: performance appraisal, exam, and active participation in contact classes.

2.4 Course outline

Week	Topics of lectures
1.	Schedule-based infrastructure development is practical through examples.
2.	Turnouts and track connections I.
3.	Processing of basic railway design data. Geodetic interpretation of the survey for stations. Editing (drawing) the existing status.
4.	Turnouts and track connections II.
5.	Horizonatal (layout) design of railway stations, appropriate track layouts depending on traffic.
6.	Platforms, underpasses, passenger connections. P + R and B + R systems. PRM interoperability specifications.
7.	Longitudinal sections, design in vertical plane.
8.	Drainage of railway stations.
9.	Track connections with curved turnouts I.
10.	Track connections with curved turnouts II.
11.	Track connections with curved turnouts III.
12.	Content of the construction plan: Rail allocation and sleeper-allocation plan. Layout (geodetic) plan.
13.	Basic concepts related to other disciplines/facilities.
14.	Consultation, submitting of the homework.

Week	Topics of lectures and/or exercise classes
1.	General studies 1. Introduction into railway permanent ways I. (Set-up of railway vehicles; Railway track and vehicle; Loading gauge and structural gauge; Cross-sectional dimensions of railway permanent ways; Railway traction force and resistances; Geometrical design of railway tracks in general)
2.	General studies 2. Introduction into railway permanent ways II. (Railway track structures: ballasted and ballastless tracks; Elements of railway tracks I.)
3.	General studies 3. Introduction into railway permanent ways III. (Elements of railway tracks II.)
4.	General studies 4. Introduction into railway permanent ways IV. (Tracks with normal 'gapped' (fishplated) rail joints as well as CWR tracks; Set-up of substructure and supplementary layers)
5.	General studies 5. Reserve week to supplement the missing information and lessons
6.	Construction of ballasted railway tracks (construction technologies)
7.	Calculation of mechanical stresses and deformations in railway permanent ways' elements and layers
8.	Interaction between railway track and railway bridge. Set-up of transition zones.
9.	Laboratory tests with granular materials as well as field tests with geogrids

10.	Modern tramway superstructures
11.	Modern subway superstructures
12.	Crumbling examination of railway crushed stones by individual laboratory method
13.	Investigation of glued insulated rail joints
14.	Extra energy consumption due to speed restrictions

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

a) Textbooks:

1. Lichtberger, B.: Track compendium, Eurailpress Tetzlaff-Hestra, Hamburg, 2005
2. Esveld, C.: Modern railway tracks, MRT Production, Zaltbommel, 2014
3. Mundrey, JS: Railway Track Engineering, 5th Edition, Mc Graw Hill India, 2017

b) Online materials:

1. Presentations: Fischer, S.: Design of railway stations, BUTE, 2023
2. Electronic lecture notes: Fischer, S., Eller, B., Kada, Z., Németh, A.: Railway engineering, Universitas-Győr Nonprofit Kft., Győr, 2015

2.6 Other information

Attendance to lectures and practices is compulsory. The signature and credits from the subject will be refused to students missing more than 30% of the lectures and practises.

2.7 Consultation

According to the information on the Dept.'s website.

This Subject Datasheet is valid for:

2025/2026 semester I

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes specified in clause 2.2. above and the evaluation of student performance occurs via tests, homework assignments and class work.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
1. control test	ED1	A.2-A.3; B.3
2. control test	ED2	A.4-A.5; B.3
1. homework	HF1	A.2-A.5; B.1-B.7; C.1-C.3, C.5-C.6; D.2-D.3
written and oral examination	V	A.1-A.8; B.8; C.4-C.6; D.1

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Abbreviation	Score
ED1	15%
ED2	15%
HF1	30%
Total achievable during the semester	**60%**
V	40%
Sum	**100%**

3.4 Requirements and validity of signature

The condition for obtaining the signature is that the score (based on 3.3) that can be obtained during the semester period (excluding exam period) according to achieve at least 50% of the points: both for each individual performance appraisal and for the cumulative in terms of score. In addition, attendance at 70% of the lectures is compulsory.

3.5 Grading system

Grade	Points (P)
excellent (5)	90%<=P
good (4)	77.5%<=P<90%
satisfactory (3)	65%<=P<77.5%
passed (2)	50%<=P<65%
failed (1)	P<50%

3.6 Retake and repeat

1. Homework – in addition to paying the fee specified in the regulations – is delayed in the "Detailed semester schedule".
2. Due to its nature, active participation cannot be replaced or improved.
3. The control tests (ED1 and ED2) can be replaced or improved for the first time (the date is according to the "Detailed semester schedule") free of charge. In case of correction (improvement), the new result overwrites the previous result in all cases.
4. If the student is not able to obtain a grade other than insufficient (scoreless) even with the replacement according to point 3), so – in addition to paying the fee specified in the regulations - a second, repeated attempt can do to improve the first replacement of one of the failed control test in the 'replacement week'.

3.7 Estimated workload

Activity	**Hours/semester**
contact hours	42
preparation for the tests	48
preparation of homeworks	2×5=10
preparation for the examination	20
Sum	**120**

3.8 Effective date

1 September 2022

This Subject Datasheet is valid for:

2025/2026 semester I